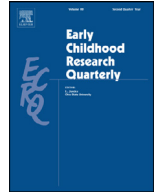




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Room to grow: examining participation and stability in child care subsidies using state administrative data

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ABSTRACT

Child care subsidies help low-income families purchase child care, but the field lacks recent and longitudinal studies of patterns of participation. This study uses longitudinal administrative data from the Commonwealth of Virginia to: 1) examine subsidy program participation and duration in 2019 ($N = 29,122$); and 2) examine participation in public assistance programs including subsidies among a cohort of children born in 2015 ($N = 6,267$). Findings indicate that, in general, few eligible children in Virginia benefit from child care subsidies before they enter kindergarten, and spells of participation in the subsidy program are brief. Results suggest that participation and stability vary by children's sex, race, ethnicity, and geography, with males, non-Hispanic white children, and those in rural areas experiencing higher levels of stability than their counterparts. Findings highlight the importance of additional investment in child care subsidies to reach eligible families and to support stable child care arrangements, key to children's development and parental employment.

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1. Introduction

Low-income working families often qualify for public early care and education programs like child care subsidies to help pay for their high costs. Research suggests that child care subsidies increase parents' labor market activity (Ha, 2009; Morrissey, 2017), reduce families' child care problems (Gennetian, Crosby, Huston, & Lowe, 2004), and help families access regulated and generally higher-quality care arrangements, particularly in child care centers (Forry, Daneri, & Howarth, 2013; Gennetian et al., 2004; Johnson, Martin, & Ryan, 2014; Krafft, Davis, & Tout, 2017; Ryan, Johnson, Rigby, & Brooks-Gunn, 2011). However, only a small fraction of those eligible receive subsidies (Chien, 2021), and previous research using administrative data suggests that subsidy participation is brief (Ha, Magnuson, & Ybarra, 2012; Pilarz, Claessens, & Gelatt, 2016), with implications for the stability of children's child care, parents' employment, and family well-being (Adams & Rohacek, 2010; Carrillo, Harknett, Logan, Luhr, & Schneider, 2017). Yet, most prior research is focused on a single point in time that makes generalizing results difficult, or that prevents the exploration of the subsidy's reach over time. This study uses longitudinal administrative data from a large, diverse state to examine child care subsidy participation and stability in participation both longi-

tudinally for a cohort of children and across a single year, and how participation and stability varies with child sex, race, ethnicity, age, and geography.

1.1. Child care expenses, supply, and stability

Child care, particularly high-quality care or care for infants and toddlers, is expensive and hard to find (Chaudry, Morrissey, Weiland, & Yoshikawa, 2021). In 2011, families spent an average of 7% of household income on child care expenses—but families below the poverty line spent more than 30% of income on child care (Laughlin, 2013). Child Care Aware, an advocacy organization, reported that in 2018 the average cost of child care for 2 children exceeded mortgage costs for homeowners in 35 states and the District of Columbia, and exceeded the annual median rent in all states (Child Care Aware of America, 2018). Further, child care expenses come at a time when parents are typically at the lowest earning years of their careers (Traub, Hiltonsmith, & Draut, 2016), and families lack time to save or the capacity to secure the financing mechanisms, such as subsidized loans, that are available for college.

Even among families who can afford it, research suggests that there are too few slots at licensed or regulated centers or family child care homes to meet the demand. This is particularly true in rural areas and for infant and toddler care, but "child care deserts" exist in cities and for older children's services as well (Anderson

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& Mikesell, 2019; Davis, Lee, & Sojourner, 2019; Reinvestment Fund, 2018; Jessen-Howard, Malik, Workman, & Hamm, 2018; Kim & Wang, 2019; Malik et al., 2018). Further, evidence suggests that much of the early care and education in the United States, particularly in those settings attended by low-income children, is of low or mediocre quality (Chaudry et al., 2021; NICHD Early Child Care Research Network, 2000). Inequalities in access to high-quality early care and educational experiences contribute to downstream achievement gaps in kindergarten and beyond (Chaudry et al., 2021).

Moreover, many children experience frequent changes in or unstable early care and education arrangements; however, counts of these changes in arrangements underestimate care instability resulting from high caregiver or teacher turnover in the sector (Adams & Rohacek, 2010; Ansari & Winsler, 2013; Morrissey, 2010). The quality of early care and education relies on the consistency and warmth of child-caregiver interactions (Zaslow et al., 2016); when these relationships are interrupted, children's outcomes suffer. Unstable child care has negative effects on children's behavioral, cognitive, and health outcomes (Bratsch-Hines et al., 2015; Chaudry et al., 2021; Claessens & Chen, 2013; Morrissey, 2009, 2013; Pilarz & Hill, 2014; Schmitt, Mihalec-adkins, Lipscomb, Pratt, & Horvath, 2022; Tran & Weinraub, 2006). Frequent (and/or unpredictable) changes can also interfere with parents' ability to work (Bishop-Josef, Beakey, Watson, & Garrett, 2019; Gordon & Högnäs, 2006; Gordon, Kaestner, & Koreman, 2008). Among low-income and single mothers, there is evidence that unstable care leads to greater parenting stress (Pilarz & Hill, 2017), and that maternal perceptions of child care instability predicts maternal depressive symptoms (Johnson & Padilla, 2019), which in turn may have additional negative impacts on family well-being (Meadows, McLanahan, & Brooks-Gunn, 2007; Surkan, Ettinger, Ahmed, Minkovitz, & Strobino, 2012). Unstable and low-quality arrangements represent a lost opportunity for promoting children's development and parents' employment and self-sufficiency. The COVID-19 pandemic led to increased operating expenses for child care and to the temporary or permanent closure of many programs and schools, exacerbating the shortage of, expense of, and instability in child care (Lee & Parolin, 2021; NAEYC, 2020; Weiland et al., 2021), and in turn, a slow return to the labor force for women, with profound implications for family economic security and gender equality (Alon, Doepke, Olmstead-Rumsey, & Tertilt, 2020; Dang & Nguyen, 2020; Hershbein & Holzer, 2021).

1.2. Child care subsidies

Low-income working parents with children under the age of 13 often qualify for public child care subsidies, which typically operate as portable vouchers, to help pay for the high costs of child care. The Child Care and Development Block Grant (CCDBG) provides funds to states to administer child care subsidies and offers states considerable control over program design, family eligibility requirements, copayment levels, and enrollment and re-enrollment procedures. To be eligible, parents must meet certain state-specific income and work or school participation thresholds or work hours. States also determine what types of child care are eligible for subsidies (e.g., licensed centers or family child care homes, and/or legal but licensed-exempt home-based care). In FY 2019, the federal and state governments together spent about \$6.7 billion to provide about 1.4 million children in nearly 858,000 families child care assistance; about three-quarters of those children attended child care centers, and about 40% of families served had incomes below the federal poverty line (ACF, 2019, 2021a).

Child care subsidies are intended to promote parental labor force participation and children's development, and in doing so, have 2-generation effects (Chaudry et al., 2021). Research finds

that child care subsidies increase parents' labor market activity (Ha, 2009; Morrissey, 2017), reduce families' child care problems (Gennetian et al., 2004; Press, Fagan, & Laughlin, 2006), and help families access regulated and higher-quality care arrangements (Gennetian et al., 2004; Johnson et al., 2014; Krafft et al., 2017; Ryan et al., 2011). Unfortunately, a fraction of eligible families receives child care assistance. In 2018, only about 15% of those eligible for subsidies (by federal rules) received public child care subsidies (Chien, 2021) and, in 2015, fifteen states including Virginia, our state of interest in this study, had wait lists for their subsidy program (Schulman, 2019).

In addition to their limited reach, previous research finds that among those who receive child care subsidies, families' duration of subsidy participation, or spells, tends to be short—typically less than 1 year—and that most exiting families remain eligible (Grobe, Weber, & Davis, 2008; Ha, 2009; Ha & Meyer, 2010; Ha et al., 2012). In general, the most economically disadvantaged families experience the greatest levels of subsidy and care instability (Ha et al., 2012; Henly, Kim, Sandstrom, Pilarz, & Claessens, 2017). While in theory, a child may remain in a subsidized child care arrangement after losing or ending their subsidy, child care is expensive, particularly center-based care (the type of care most commonly used with subsidies [75% in FY 2019] (ACF, 2021b), and typically beyond what a low-income family could afford without a subsidy (Chaudry et al., 2021). Thus, instability in child care subsidy receipt is likely linked with instability in children's child care arrangements. Unstable child care subsidy participation may result from child care arrangements falling through, which is more common in unregulated or home-based settings than in center care (Gordon & Högnäs, 2006), from parents' unstable employment and employment schedules (Carrillo et al., 2017; Chaudry, 2004; Scott & Abelson, 2016), or from requirements regarding re-enrolling or recertifying eligibility for the subsidy system itself.

Whereas ideally, families end their participation in public assistance programs because their economic circumstances improve, much research indicates that many families—even those who remain eligible—exit child care subsidy programs at periods requiring their re-certification of eligibility. This tends to be the case when eligibility re-determination procedures are burdensome (i.e., requiring an in-person visit to a welfare office) (Davis, Krafft, & Forry, 2017; Forry et al., 2013; Grobe et al., 2008). Time- or paper-intensive re-certification procedures can deter continuous program participation and result in a cascade of negative outcomes, particularly for families operating within tight financial or time budget constraints. Turning down last-minute shifts due to a breakdown in child care may lead to job loss which in turn can lead to a loss of subsidy (Henly et al., 2017), together resulting in a loss of household income and in-kind resources for child care. The loss of child care subsidies in particular may have cascading effects for young children via the reduction in household resources (both from the subsidy itself as well as from any changes in parents' employment income due to a loss of child care) and by disrupting their early care and education arrangements and caregiver-child relationships, which can negatively affect children's outcomes (Bratsch-Hines et al., 2015; Claessens & Chen, 2013; Morrissey, 2009; Pilarz & Hill, 2014).

The 2014 reauthorization of the CCDBG made several changes to the law designed to promote child care subsidy stability – and in turn, child care stability – including lengthening the eligibility re-certification period to a minimum of 12 months. Prior to the 2014 CCDBG requirements, some states had shorter recertification periods, presumably leading to shorter spells of receipt and more unstable care. Notably, though, research has found that how these re-certification periods are implemented may vary by locality, despite statewide policy (Krafft et al., 2017).

Virginia and its subsidy program provide a unique context to examine subsidy participation and child care stability. First, to date, patterns of subsidy participation over time have been studied in only a handful of states' programs, including Wisconsin, Oregon, and Maryland, which tend to be less politically, socio-economically, or racially/ethnically diverse than Virginia. In 2016, 36% (216,696) of Virginia's young children lived in low-income families (below 200% of the Federal Poverty Level [FPL]), half of whom lived with 1 or more parents who were employed full time. About half (53%) of Virginia's young children are white, with another 19% Black and 14% Hispanic ([National Center for Children in Poverty, 2022](#)). Virginia contains a mix of rural, suburban, and urban communities. Virginia implemented the 2014 CCDBG requirements described above in October 2018, along with a graduated income threshold for exiting the program – that is, families could have a higher income and continue to receive subsidy than the income level required to first participate in the program, in order to promote continuity in care. Together, these changes may have altered participation, subsidy spells, and duration of subsidy receipt.

Preliminary figures from the federal government reported that an average of 18,700 children in 10,600 families received subsidies each month in Virginia in FY 2019 ([ACF, 2021b](#)). According to the CCDF policy database, as of October 1, 2019, subsidy eligibility in Virginia was limited to low-income families who are employed or in school with children 12 and under. Children ages 13–17 are eligible for subsidies in specific situations, including if a child is in foster care, a child whose family has an open Child Protective Services case, or the family is receiving Temporary Assistance for Needy Families (TANF). Specific income eligibility thresholds vary by region and range from 150% to 250% of the federal poverty guidelines, but in the most populous areas the maximum monthly income threshold for a family of 3 to initially qualify for subsidies was \$3,289 (to continue to receive subsidies, the threshold was \$5978 at redetermination; 2019 figures). Parents may apply online, in person, or by fax, but must provide documentation of identity, employment, income and the child's immunization record. Virginia also requires compliance with child support enforcement (as of October 2017). There are no minimum work hours requirements for eligibility, but all parents must be employed, attending school, or participating in SNAP employment and training, a TANF work program, or other TANF activities ([Dwyer, Minton, Kwon, & Weisner, 2020](#)). In 2019, all subsidies in the state were administered by certificates or portable vouchers, and 88% of children participating in the subsidy system were enrolled in child care centers, and the remaining 12% in home-based child care ([ACF, 2021b](#)). Virginia also has Head Start and public prekindergarten programs that are free of charge to those eligible, but there is greater demand than eligibility and these programs are not available in all communities across the state ([Friedman-Krauss et al., 2020](#)). For families in Head Start or preK, subsidies may be used by those families for wraparound child care (e.g., before/after school or summer care). To date, prior research on child care subsidy stability has focused on other states including Oregon, Wisconsin, and Illinois, which on average contain smaller, more racially homogenous populations.

1.3. The current study

It is well understood that child care instability has negative implications for children's development, family finances, and other types of well-being ([Adams & Rohacek, 2010](#); [Morduch & Schneider, 2017](#); [Bratsch-Hines et al., 2015](#)), and that many low-income families rely on child care subsidies to help pay for child care – but just a fraction of those eligible, and participation varies by child and family characteristics ([Chien, 2021](#)). However, empirical

evidence using recent or longitudinal administrative data, which are less subject to reporting bias regarding subsidy receipt and observes the universe of subsidy recipient, to examine child- or family-level patterns or stability of subsidy participation is limited. In this study, we examined 3 main research questions:

- 1 What is the reach of the child care subsidy program in Virginia?
 - a How does participation compare to other public assistance programs serving low-income families with children?
- 2 What is the stability of child care subsidy program participation in Virginia?
 - a How long are spells of participation in the subsidy program, how many providers are subsidized, and how do spells vary with children's characteristics, particularly age, race, ethnicity, gender, and geography, in a given year?
- 3 How stable is a child's experience of the child care subsidy program over early childhood?
 - a What is the average age children begin to receive subsidy, how many spells do children experience before kindergarten, and what is the duration of these spells of receipt?
 - b How do these measures of subsidy instability vary by children's characteristics and that of their and child care arrangements?

This study addresses these research questions using longitudinal child care subsidy program administrative data from Virginia to examine subsidy stability in 2 ways. First, to address research questions (RQ) 1 and 2, we examined a snapshot of subsidy participants in 2019, investigating the number of participation spells and duration of participation and examining how these measures of participation vary with children's characteristics in a recent year of the program. To provide a child-centered picture of how participation varies over childhood, the focus of RQ3, we examined subsidy program participation from birth through kindergarten among a cohort of children born in 2015. Together, these analyses shed light on the reach and stability of the subsidy program, and of potential disparities in participation and stability.

2. Methods

2.1. Data

We used administrative data from the Virginia Department of Social Services (VDSS) that were collected between 2015 and 2019 as part of program administrative processes to document patterns in child care subsidy receipt. The data are housed in the Virginia Longitudinal Data System, which was developed to facilitate and support research of the state's policies and programs ([VLDS, 2022](#)). The VDSS administrative data contain child-level demographic information on sex, race, ethnicity, age, zip code and county of residence, as well as months of subsidy participation, annual value of the subsidy, annual value of the child care copay, and providers reimbursed, as well as participation in 2 other public assistance programs: the Supplemental Nutrition Assistance Program (SNAP; formerly known as food stamps) and Temporary Assistance to Needy Families (TANF; cash welfare).

2.1.1. Sample 1: Snapshot of subsidy participants in 2019 (2019 Snapshot Sample)

We created 2 different analytic samples for this study. First, we focused on the universe of children who participated in the subsidy program in the 2019 calendar year ($n = 29,122$). For this sample, we investigated the stability of child care subsidy receipt and of subsidized arrangements in 2019. For this sample, both left and right censoring is an issue; that is, individuals who began to receive subsidy prior to the beginning of our time period (before January 1, 2019) would have left censored observations, and those

that continued to receive subsidy after the end of our time period (after December 31, 2019) would be right censored. In both cases, their subsidy receipt spells or durations would appear shorter than they were. However, since we have panel data, we are able to observe the full duration of spells that began prior to 2019. As a consequence, when calculating spell duration, we present descriptive statistics calculated both correcting for left censoring and uncorrected. However, we lack data following December 2019 needed to make this adjustment to right censoring.

2.1.2. Sample 2: Cohort of children born in 2015 who participated in the subsidy program at least once before kindergarten (2015 Cohort Sample)

Our second analytic sample includes the cohort of children born in 2015 and for which we are able to observe child care subsidy program participation between 2015 and 2019 in Virginia, that is from birth to the year in which they turn age 4 ($n = 6,267$). Some children in the 2015 Cohort Sample appear also in our 2019 Snapshot Sample: the 2015 Cohort Sample comprises about 13% ($n = 3,761$) of our 2019 Snapshot Sample ($n = 29,122$). For this 2015 cohort of children, we can observe their entire participation history over this 5-year period (the total months on subsidy receipt, the number of subsidy spells, the number of providers paid, and total subsidy hours and cost). While child care subsidy spells may be right-censored in that we do not observe participation beyond 2019, there is no left censoring since we began our observation window in the birth year. Although we do not have access to 2020 data at the point of publication, in practice we know that most children experienced a break in child care provider arrangements during the early part of 2020 so the extent of right censoring is likely not large.

2.2. Measures

In both samples, we observed child care subsidy program participation information, which serve as our main independent variables, and a range of child- and household-level characteristics. Subsidy participation and stability information includes: the number of child care subsidy spells (observable uninterrupted periods of monthly receipt of the child care subsidy) that crossed into 2019 ($n = 32,702$); the length of all spells that occurred in 2019 (both with and without left censoring); the number of spells per child observed in 2019; and the number of providers in 2019 per child. We also report annual payment amounts (subsidy payments, copayments, and the total). Finally, we report the total annual and monthly number of hours of care reimbursed for each child and the average total hourly cost (annual cost/annual hours). For each of these outcomes, we observed how these indicators vary by the gender, race, age and metropolitan residence of the child. These descriptive measures for 2019 provide a strong empirical framework for understanding the extent that child care stability existed (and for whom and in what contexts) before the start of the COVID-19 pandemic.

The raw DSS data files contain race/ethnicity flags for American Indian/Alaska Native, Other, Asian, Black, Hawaiian/Pacific Islander, White, and Hispanic. Using these flags, we construct race/ethnicity indicators for Hispanic, Non-Hispanic White and Non-Hispanic Black (hereafter referred to as White and Black). We focus on these 3 groups because they represent around 98% of the children in both the 2019 calendar year and 2015 cohort samples. Given the longitudinal structure of the 2015 cohort sample, race/ethnicity and gender indicators are time-varying for some children. For these children, we assign the mode race/ethnicity and gender. For observations with 2 modes, we take the race/ethnicity that appears first in time. We classify counties as urban/rural using the

metro/nonmetro designations from the 2013 Economic Research Service Urban Rural Continuum Codes: 53 of Virginia's county equivalents (counties and independent cities) were classified as rural (nonmetropolitan) and 81 as urban (metropolitan). Child care cost amounts in the raw DSS files are nominal dollars. We convert all costs to 2019 dollars using the Consumer Price Index adjustment factor for All Urban Consumers.

2.3. Analytic approach

We used a series of descriptive bivariate and multivariate analyses to examine child care subsidy program participation and stability, and the factors associated with subsidy stability. First, using the 2019 Cohort Sample, to address RQ1, we examined subsidy program participants that year, and their characteristics, and then compared participation in the child care subsidy program in SNAP and TANF. Our main models display the results from unconditional OLS regression analyses to compare dependent variables across groups. However, we also ran between-group ANOVA models, which provide substantively similar results (available from the authors upon request).

Then, we document the overall stability of the child care subsidy program and examine how variation in stability is explained by child demographics (RQ2). Specifically, we present multivariate regression models of the conditional differences in our main outcomes of interest: number of months of subsidy coverage in 2019, censored spell length, the number of spells in 2019, the number of providers in 2019. Our main models use OLS regressions to predict subsidy stability measures from child and child care characteristics (Tables 4 and 8). However, because of the non-normal distribution of several of our outcomes (e.g., number of spells), we also conducted analogous logit and negative binomial regressions. These produced substantively similar results to our main models, but reducing the dependent variable to 2 categories collapsed meaningful, policy relevant differences (e.g., spell lengths of less than 12 months, vs 12 months, vs more than 12 months relate to subsidy recertification periods; results are available upon request). In each of our models, we controlled for the demographic characteristics of the child that we can observe in the administrative data: age, gender, race/ethnicity, and county of residence, which we define as urban/rural. We expected children in racial/ethnic minority families to have less stable subsidy participation, but given the dearth of research examining the other characteristics, lack specific hypotheses about age, gender, or geography. In subsequent models, we added controls for the total hours of care and costs (subsidy and copayment) in 2019 to examine whether the quantity of or cost of care accounted for differences in stability. Specifically, higher-cost and full-time or formal care, particularly centers, may be more reliable and provide higher quality than lower-cost, informal care arrangements (Gordon & Högnäs, 2006), and more stable care arrangements may contribute to more stable child care subsidy receipt.

Next, we investigated the stability of child care subsidy participation over early childhood (RQ3). Among our 2015 Cohort Sample, we document the age of first receipt, total months of receipt, spell length, number of spells, and number of providers. Like our 2019 sample, we also used multivariate regression models to analyze how demographic characteristics (age of first receipt, gender, race/ethnicity, county of residence, total hours, and costs) independently explain variation in our outcomes of interest. Again, we expected children of color to have less stable subsidy program participation over their early childhoods, but lacked hypotheses regarding other characteristics.

Percentage of Children in Virginia Receiving Child Care, SNAP, or TANF, 2019

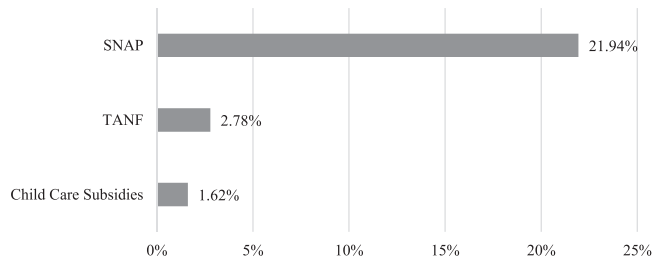


Fig. 1. Percentage of children in Virginia receiving child care, SNAP, or TANF, 2019. Notes: Figures represent the percentage of children participating in each program (from the VLDS: 30,034 children participated in child care subsidies, 407,287 in SNAP, and 51,606 in TANF in 2019) divided by the total number of children ages 0–17 in Virginia in 2019 (U.S. Census Bureau, N = 1,856,489). Data Source: U.S. Census Bureau & Virginia Longitudinal Data System. Eligibility information, age group served and enrollment gaps differ for each program; see paper narrative for details.

Table 1
Summary statistics.

	2019	2015 cohort
Female	50%	51%
Race/Ethnicity		
White	28%	26%
Black	65%	62%
Hispanic	7%	12%
Age		
0–23 m	16%	
2–3	26%	
4–5	23%	
6+	35%	
Urban	91%	90%
Observations	29122	6267

Note: Data Source: Virginia Longitudinal Data System

3. Results

3.1. Child care subsidy participation in 2019

To address RQ1, examining the reach of Virginia’s child care subsidy system, we use our 2019 Cohort Sample. Consistent with national figures (Chien, 2021), we find that the program reached relatively few children in Virginia in 2019 (n=30,034). (Note the aggregate count here differs from that used in the spell analysis [n=29,122] because we dropped individuals with inconsistent month and year of births to facilitate construction of more accurate age measures for the spell analysis.) In contrast, SNAP and TANF reached 407,287 and 51,606 children, respectively, in the state that same year. Less than 2% of children in Virginia received child care subsidies at any point in 2019, compared to about 22% for SNAP, as shown in Fig. 1. Notably, SNAP is an entitlement program, whereas child care subsidies and TANF are federal block grants to states funded to serve small fractions of those eligible.

As shown in Table 1, the vast majority—91%—of children who participated in the subsidy program lived in urban counties. About 65% of participating children were Black, 28% were White, and 7% were Hispanic. In terms of the age distribution of child who received subsidies, only 16% of children participating in the child care subsidy system in Virginia in 2019 were under age 2, despite the high expense of child care during the infant and toddler years. A plurality of subsidy participants (35%) was school-aged (6–13 years), using subsidies for before/after school and summer care. Approximately equal proportions of participants were 2 or 3 years

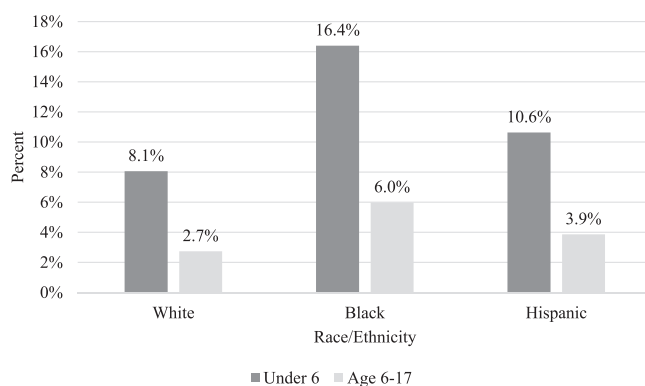


Fig. 2. Percentage of children receiving child care subsidies among those connected to Virginia’s DSS system, by Race/Ethnicity.

Notes: Percentages represent the proportion of children of that age in the DSS system (and thus low-income and potentially eligible for child care subsidies) who participated in subsidy in 2019, by race/ethnicity and age. The total number of children in the DSS system under age 6 is 152,544 and for children 6–17 is 267,058. Figures do not control for income or other background characteristics. Data Source: Virginia Longitudinal Data System; 2019.

old (26%), or 4 or 5 years old (23%; preschool aged). About 0.5% of our 2019 sample (n = 144) were aged 13 to 17.

Child care subsidy participation patterns varied by child race and ethnicity in Virginia, again similar to patterns found nationally (Chien, 2021). As shown in Fig. 2, about 8% of White children under age 6 who were enrolled in any Virginia Department of Social Services (DSS) program available to low-income households received subsidies in 2019, the lowest of any racial/ethnic category. This number compares to 16% of Black children and 11% of Hispanic children.

3.2. Stability of child care subsidy participation

To examine RQ2, we again use data from our sample of children who received the subsidy at any point in 2019 (2019 Snapshot Cohort). As shown in Table 2, we find that the average length of a spell of subsidy receipt length was 14.7 months without left censoring. Using these uncensored data, 57% of children had spells that lasted less than 12 months, 21% lasted into the second year and 19% lasted more than 2 years. Four percent had spells that were exactly 12 months in length, suggesting that a family exited the subsidy system at their recertification period. Spell lengths greater than 12 months indicate that parents successfully recertified eligibility for the subsidy program at least once, which only accounted for two-fifths of spells in 2019. Children who were male and older had longer average spell lengths, relative to female and younger children while Black and rural children had shorter spell lengths than White and urban children. Unsurprisingly, when we focused on spell lengths using left censored data (i.e., with our observation window beginning in January 2019), we found that spell lengths were much shorter, averaging 7.1 months. The differences by child and family characteristics were less pronounced but remained consistent with the censor-corrected results.

Turning to Table 3, we found that among children who participated in the subsidy program in 2019, they experienced a mean of 1.12 spells of subsidy receipt. Nearly 9 in 10 (89%) had only 1 observable spell, 10% had 2 spells, and 1% had 3 or more spells within 2019 alone. Black children, those living in rural areas, and older children had more spells (P < 0.01), but the differences were not substantively meaningful. Child aged 2–3 and 4–5 years averaged longer months of receipt, more subsidy spells, and longer hours in care compared to infants and toddlers (under 24 months) and school-age children (6 years and older).

Table 2
2019 child care subsidy spell duration (with and without left censoring correction).

	Gender		Race/Ethnicity			Age				County residence		
	All	Female	Male	White	Black	Hispanic	0–23M	2–3 years	4–5 years	6 and up	Urban	Rural
<i>Spell duration (w/censoring adjustment)</i>												
Average spell length	14.68	14.46	14.91***	15.50	14.29***	14.97	6.75	12.17***	16.30***	17.69***	14.81	13.31***
	(10)	(9)	(10)	(10)	(9)	(9)	(5)	(10)	(12)	(10)	(10)	(8)
<12 months	0.57	0.57	0.56**	0.55	0.57***	0.58***	0.84	0.57***	0.49***	0.53***	0.56	0.63***
	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(0)	(1)	(1)	(1)
12 months	0.04	0.03	0.04	0.03	0.04***	0.04	0.04	0.05***	0.04	0.03**	0.04	0.03*
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
13–24 months	0.21	0.21	0.21	0.21	0.21	0.18***	0.12	0.26***	0.23***	0.18***	0.21	0.17***
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
>24 months	0.19	0.19	0.20***	0.21	0.18***	0.20	0.00	0.12***	0.24***	0.26***	0.19	0.17***
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
<i>Spell duration (no censoring adjustment)</i>												
Average spell length	7.07	7.02	7.12**	7.15	7.04**	7.09	5.66	7.37***	7.48***	7.06***	7.13	6.47***
	(7)	(7)	(7)	(7)	(7)	(7)	(5)	(7)	(8)	(7)	(7)	(6)
<12 months	0.71	0.72	0.70***	0.70	0.71	0.73**	0.89	0.69***	0.67***	0.69***	0.70	0.75***
	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
12 months	0.29	0.28	0.30***	0.30	0.29	0.27**	0.11***	0.31***	0.33***	0.31***	0.30	0.25***
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Observations	32,702	16,527	16,175	9059	21,220	2423	3906	8096	7958	12,742	29,745	2957

Notes: Table displays mean values; median values in parentheses. Urban/Rural status is defined as the urban/rural status at the end of the child's latest 2019 spell. Age represents child age at the end of a spell. T tests for differences in means for gender, race/ethnicity, age, and county of residence are relative to female, NH White, 0–23 Months, and urban categories, respectively.

*** P < 0.01.
** P < 0.05.
* P < 0.1.

Table 3
2019 child care subsidy number of spells, number of providers, annual cost, and annual hours.

	Gender		Race/Ethnicity			Age				County residence		
	All	Female	Male	White	Black	Hispanic	0–23M	2–3 years	4–5 years	6 and up	Urban	Rural
Months of total receipt	7.94	7.90	7.98*	7.94	7.95	7.87	6.71	8.27***	8.32***	8.02***	7.99	7.45***
	(8)	(8)	(9)	(8)	(9)	(8)	(6)	(9)	(9)	(9)	(9)	(8)
Number of spells	1.12	1.12	1.12	1.11	1.13***	1.11	1.07	1.10***	1.12***	1.17***	1.12	1.15***
	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
1	0.89	0.89	0.89	0.90	0.88***	0.90	0.93	0.91***	0.89***	0.86***	0.89	0.87***
	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
2	0.10	0.10	0.10	0.09	0.11***	0.09	0.06	0.09***	0.11***	0.13***	0.10	0.12***
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
3+	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01***	0.01***	0.02***	0.01	0.02***
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Number of providers	1.04	1.04	1.04	1.04	1.05***	1.04	1.04	1.05	1.05	1.03***	1.04	1.02***
	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
1	0.96	0.96	0.96	0.96	0.96***	0.96	0.96	0.95*	0.95	0.97***	0.96	0.98***
	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
2	0.04	0.04	0.04	0.03	0.04***	0.04	0.04	0.05*	0.05	0.03***	0.04	0.02***
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
<i>Child care cost, hours</i>												
State subsidy Pmt (\$)	4871	4845	4897	4941	4744***	5701***	5524	5769***	5227***	3690***	5084	2666***
	(4120)	(4086)	(4153)	(3998)	(4103)	(4817)	(4515)	(5140)	(4631)	-3154	(4368)	(2207)
Parental Copay (\$)	376	384	369*	411	345***	514***	197	372***	448***	415**	389	245***
	(0)	(0)	(0)	(12)	(0)	(59)	(0)	(0)	(24)	(23)	(0)	(0)
Proportion \$0 Copay	0.52	0.52	0.52	0.49	0.54***	0.46**	0.65	0.52***	0.49***	0.48***	0.52	0.52
	(1)	(1)	(1)	(0)	(1)	(0)	(1)	(1)	(0)	(0)	(1)	(1)
Total child care Pmt (\$)	5247	5228	5266	5352	5089**	6215***	5721	6141***	5675	4105***	5473	2911***
	(4527)	(4480)	(4569)	(4398)	(4503)	(5273)	(4700)	(5545)	(5054)	(3600)	(4808)	(2528)
Total hours of care	1110	1104	1117	1128	1101***	1127	1109	1373***	1210***	856**	1121	998**
	(1079)	(1062)	(1089)	(1080)	(1073)	(1080)	(999)	(1449)	(1238)	(866)	(1089)	(933)
Hours/month	132	132	132	134	131***	135	154	157***	138***	100**	149	100**
	(130)	(129)	(130)	(135)	(128)	(130)	(166)	(170)	(145)	(104)	(161)	(104)
Cost/hr	4.79	4.79	4.79	4.73	4.73	5.52***	5.24	4.51***	4.71***	4.85***	4.96	3.04***
	(4.54)	(4.54)	(4.54)	(4.38)	(4.53)	(5.34)	(5.01)	(4.14)	(4.44)	(4.61)	(4.72)	(2.91)
Observations	29,122	14,697	14,425	8153	18,787	2182	4686	7457	6693	10,286	26,555	2567

Notes: Table displays mean values; median values in parentheses. Urban/Rural status is defined as the urban/rural status at the end of the child's latest 2019 spell. Age indicates child's "max mode" 2019 age. Costs reflect the 2019 calendar year. T tests for differences in means for gender, race/ethnicity, age, school age, and county of residence are relative to female, NH White, 0–23 Months, 0–5, and urban categories, respectively.

* P < 0.1.
** P < 0.05.*** P < 0.01.

The average number of child care providers used sequentially paid by the subsidy program per child participating in 2019 was 1.04. (A small subset of recipients had more than 1 provider in the same month [$n = 80$ or 0.28% of the sample], but most of these cases [$n = 53$] are a transition month to a new provider and as such captured with our sequential measure.) Most children participating in the subsidy program in 2019 had only 1 subsidized provider (96%), and only 4% of children had 2. Black children had more subsidized providers than White children while older and children in rural areas had more provider stability ($P < 0.01$), although these differences are not practically meaningful. The number of providers did not differ by the gender of the child. The average child was in subsidized care for 1110 hours in 2019 (median = 1079), or 21 hours per week over 52 weeks (132 hours per month). Black children, school-aged children and children in rural areas spent less time in subsidized care in 2019 ($P < 0.01$). Importantly, this is likely an undercount of the total number of child care providers and hours in care, as the administrative data contain information about providers the subsidy program pays and not all arrangements in which the child regularly attends.

Turning to the cost of subsidized child care arrangements, total observed costs (subsidy program portion plus family copayment) among those who participated in the subsidy program averaged \$5,247 across the year in 2019 (median = \$4,527) with an average of \$4,871 (median = \$4,120) total paid by the subsidy program and \$376 (median = \$0) paid by parents in copayments. Average total costs of subsidized child care (subsidy program portion plus family copayment) were higher for Hispanic and lower for Black children, (relative to White children), children aged 2–3 years (relative to 0–23 months), and those in urban areas ($P < 0.01$). Average copays and state subsidies were highest for Hispanic children and lower for Black children and those in rural areas ($P < 0.01$). The computed mean total cost per hour of subsidized child care was \$4.79 (median = \$4.54). This hourly rate of care, potentially a proxy for the use of licensed or higher-quality of care, both of which tend to be more expensive, was higher among Hispanics, infants, and those in urban areas relative to their counterparts ($P < 0.01$). Differences in the average hourly cost of care were particularly large between urban and rural children (\$4.96 vs \$3.04) and Hispanic children (\$5.52 vs \$4.73 for White and Black children).

Finally, we estimate separate OLS regression models of months of subsidy coverage in 2019, spell duration, number of spells in 2019, the number of providers in 2019, and, in some models, the log of total 2019 observed hours and cost of child care (subsidy plus copayment) conditional on child race/ethnicity, age, and geography. We estimate models both with and without controlling for the log of total annual cost and hours.

As shown in Table 4, controlling for the gender, age of child, county of residence, and cost and hours, Hispanic children averaged fewer months of child care subsidy coverage in 2019, shorter spells, and more child care providers than did White children. Black children experienced more months of coverage, spells, and providers than White children, although none of the coefficients is meaningful. Interestingly, Hispanic children had, on average, 13% higher total child care subsidy payouts (subsidy plus copayment), while Black children had 3% lower payouts, than White children. Results indicate that, as expected, as children age, the total number of months of subsidy coverage and spell durations increase, as did the number of subsidy spells. Relative to infants, however, average annual costs were 13% higher for children aged 2–3 years but 38% lower for school-aged children (6–13 years). Finally, we observed significant differences by the urban or rural designation of the county of residence. When controlling for hours and costs, children who lived in urban areas had slightly fewer months of subsidy coverage, shorter spells, and more instability in providers, although the practical significance of the coefficients is question-

able. Importantly, the average cost of children in urban areas was 97% more per year than in rural areas, which is partly a reflection of more hours of care and partly due to higher average hourly costs.

3.3. Stability of child care subsidy participation across early childhood

To address RQ3, we used data from our unique panel data containing the universe of child care subsidy data to explore patterns in cumulative receipt of child care subsidies over the entire early childhood period by focusing on a cohort of children born in 2015 who received subsidy at any point from 2015 through 2019 (2015 Cohort Sample). Among this cohort, one-quarter had first received the subsidy before their first birthday, 29% received the subsidy for the first time between 1 and 2 years of age, another 22% received the subsidy for the first time at age 2, 15% at age 3, and 8% at age 4. Table 5 shows significant racial and ethnic differences in the timing of entering the subsidy program, with White children participating at older ages than Black or Hispanic children.

Table 6 reveals that, for the 2015 Cohort Sample, individual spells of subsidy receipt averaged 11.83 months (median = 9 months) with 61% lasting less than 12 months, 22% between 1 and 2 years, and 13% lasting more than 2 years. Again, 4% of spells were exactly 12 months. Spell lengths and patterns were similar to those found above with the 2019 Snapshot Sample, although slightly shorter, possibly due to the 2018 policy changes to the Virginia subsidy system or children's ages over time. Spells were longer for White children and those in urban areas ($P < 0.01$). Table 7 displays summary statistics for months of total receipt, spells, number of providers, and annual costs/hours for the 2015 cohort. On average, the 2015 cohort received the child care subsidy for 16.84 months in the first 5 years of life (totaling all spells of receipt; median = 13 months) with receipt longer for White, male and urban children. In total, the 2015 cohort averaged 1.42 spells with 70% having just 1 spell of receipt, 20% of children 2 spells, and 9% 3 or more spells through the end of 2019. Average spell length increased as children grew older (16.13 months at age 4 vs 4.23 before their first birthday), unsurprising given that older children had more opportunity to receive subsidy. In total, across all spells, White and rural children had fewer spells than did Black and urban, respectively, although the magnitude of the difference is small ($P < 0.05$).

The median number of subsidized providers for the 2015 Cohort Sample was 1 but the mean was 1.37, reflecting that 7% of children had 3 or more providers and 22% had 2 providers. Once again, White, and rural children have fewer subsidized child care providers while receiving subsidy than did Black and urban children, respectively ($P < 0.01$).

Among children in the 2015 Cohort Sample, the total state payout for subsidized child care per child in the first 5 years of life averaged \$10,840 and the median was \$7,593. The total parental copay for subsidized child care over the same period averaged \$693 but the median was only \$44, reflecting the fact that 47% of parents had a zero copay. Significant differences exist in child care costs. State payments were higher for White children ($P < 0.05$), boys ($P < 0.05$) and in urban areas ($P < 0.01$), relative to their counterparts. Parental copayments were also higher in urban areas ($P < 0.01$). Child care subsidies covered an average of 2715 hours (median = 2088) of care over the first 5 years of life (148 hours per month), about 543 hours per year or 10 hours per week. Male ($P < 0.05$) and urban residence ($P < 0.01$) children averaged significantly more hours of child care subsidies. Among the 2015 Cohort Sample, urban and male children received 479 and 128 more subsidized hours of care, respectively, across their first 5 years than their rural and female counterparts.

Table 4
Predicting child care subsidy instability among subsidy participants in Virginia in 2019: multivariate OLS model results.

	(1) Months	(2) Length	(3) Spells	(4) Providers	(5) Months	(6) Length	(7) Spells	(8) Providers	(9) Log hours	(10) Log total payment
Black	0.06*	-0.05	0.02***	0.01***	0.00	-0.12*	0.02***	0.01**	-0.02	-0.03*
Hispanic	-0.16***	-0.18**	0.00	0.00	-0.09	-0.08	-0.00	0.00	0.00	0.13***
Female	-0.05**	-0.05	0.00	-0.00	-0.09*	-0.10**	0.00	-0.00	-0.01	-0.01
2–3	0.67***	0.44***	0.03***	0.00	1.56***	1.24***	0.03***	0.01*	0.28***	0.13***
4–5	1.19***	0.79***	0.05***	0.00	1.61***	1.13***	0.06***	0.01	0.14***	0.03
6+	2.15***	1.52***	0.09***	-0.01	1.31***	0.60***	0.10***	-0.01***	-0.24***	-0.32***
Urban	-0.32***	-0.19**	-0.02	0.02***	0.56***	0.70***	-0.03***	0.02***	0.20***	0.68***
Log total hours (2019)	2.98***	2.76***	0.02**	0.01***						
Log total cost (2019)	0.43***	0.50***	-0.03***	0.01						
Constant	-16.44***	-16.05***	1.20***	0.90***	6.25***	5.78***	1.09***	1.02***	6.51***	7.66***
Observations	29,122	32,702	29,122	29,122	29,122	32,702	29,122	29,122	29,122	29,122

Notes: Standard errors clustered at the child care case ID and in parentheses.

* $P < 0.10$.

** $P < 0.05$.

*** $P < 0.01$.

Table 5
Age of first receipt of child care subsidy in Virginia for a 2015 birth cohort, by race/ethnicity.

	(1) White	(2) Black	(3) Hispanic	(4) Total
0–11 m	19.16%	27.52%	25.98%	25.18%
1	27.22%	30.01%	28.61%	29.12%
2	26.16%	20.81%	20.21%	22.12%
3	17.98%	14.21%	15.62%	15.35%
4	9.49%	7.45%	9.58%	8.23%
Total	100%	100%	100%	100%
Observations	1613	3892	762	6267

Notes: Sample contains all children born in 2015 receiving child care subsidy at any point between 2015 and 2019. Data Source: Virginia Longitudinal Data System; 2019.

control for age of first receipt. Results are shown in Table 8. As with the results with the 2019 sample (shown in Table 4), Black children experienced less stable subsidy receipt – fewer months of receipt, shorter spell lengths but more spells and more subsidized providers compared to White children. Hispanic children received subsidies for fewer months and for fewer spells, and averaged fewer subsidized providers over their first 5 years, compared to White children. These results were true in models controlling for hours of care and the cost of care, although the size of the differences diminished when controlling for these child care characteristics, suggesting that the characteristics of child care arrangements may account for some of the instability in subsidy receipt but not all.

4. Discussion

The child care subsidy program plays an important role in helping children in low-income families attend child care and in enabling their parents' labor force participation, but stable child care

Finally, we ran regression models using our 2015 Cohort Sample to predict measures of subsidy stability that were analogous to those run above using the 2019 Cohort Sample, but also con-

Table 6
2015 Cohort child care subsidy spell duration.

	All	Gender		Race/Ethnicity			Age				County residence		
		Female	Male	NH White	NH Black	Hispanic	0-11m	1	2	3	4	Urban	Rural
<i>Spell duration</i>													
Average spell length	11.83	11.70	11.96	13.07	11.47***	11.25***	4.23	7.40***	9.36***	11.94***	16.13***	11.92	11.00**
	(9)	(8)	(9)	(9)	(8)	(8)	(4)	(6)	(8)	(10)	(12)	(9)	(8)
<12 months	0.61	0.62	0.61	0.58	0.62***	0.63***	1.00	0.76**	0.68**	0.57**	0.48**	0.61	0.66**
	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(0)	(1)	(1)
12 months	0.04	0.04	0.04	0.03	0.04**	0.05**	0.00	0.05***	0.05***	0.06***	0.03***	0.04	0.03**
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
13–24 months	0.22	0.22	0.21	0.22	0.22	0.21	0.00	0.19***	0.22***	0.26***	0.25***	0.22	0.20
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
>24 months	0.13	0.12	0.13	0.16	0.12***	0.11***	0.00	0.00	0.05***	0.11***	0.24***	0.13	0.11
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Observations	8921	4516	4405	2143	5818	960	593	1441	1825	1529	3533	8060	861

Notes: Table displays mean values; median values in parentheses. Urban/Rural status is defined as the urban/rural status at the end of the child's most recent spell. Age represents child age at the end of a spell. T tests for differences in means for gender, race/ethnicity, age, and county of residence are relative to female, NH White, 0–11 months, and urban categories, respectively.

* $P < 0.1$, ** $P < 0.05$.

*** $P < 0.01$.

Table 7
2015 Cohort child care subsidy number of spells, number of providers, annual cost, and annual hours.

	All	Gender		Race/Ethnicity			County residence	
		Female	Male	White	Black	Hispanic	Urban	Rural
Months of total receipt	16.84 (13)	16.50 (13)	17.18** (13)	17.36 (14)	17.14 (14)	14.18*** (11)	17.06 (14)	14.84*** (11)
Number of spells	1.42 (1)	1.41 (1)	1.44 (1)	1.33 (1)	1.49*** (1)	1.26** (1)	1.43 (1)	1.35** (1)
1	0.70 (1)	0.71 (1)	0.70 (1)	0.76 (1)	0.66*** (1)	0.81*** (1)	0.70 (1)	0.75** (1)
2	0.20 (0)	0.20 (0)	0.21 (0)	0.18 (0)	0.23*** (0)	0.12*** (0)	0.21 (0)	0.19 (0)
3+	0.09 (0)	0.09 (0)	0.09 (0)	0.06 (0)	0.11*** (0)	0.06 (0)	0.10 (0)	0.07** (0)
Number of providers	1.37 (1)	1.38 (1)	1.36 (1)	1.31 (1)	1.42*** (1)	1.22*** (1)	1.38 (1)	1.23*** (1)
1	0.72 (1)	0.71 (1)	0.72 (1)	0.76 (1)	0.68*** (1)	0.80** (1)	0.71 (1)	0.81*** (1)
2	0.22 (0)	0.21 (0)	0.22 (0)	0.18 (0)	0.24*** (0)	0.18 (0)	0.22 (0)	0.16*** (0)
3+	0.07 (0)	0.07 (0)	0.06* (0)	0.06 (0)	0.08*** (0)	0.02*** (0)	0.07 (0)	0.04*** (0)
<i>Child care cost, hours</i>								
State subsidy payment	10,840 (7593)	10,550 (7402)	11,143** (7746)	11,404 (7709)	10,706** (7731)	10,328** (6871)	11,411 (8186)	5800*** (3621)
Parental Copay	693 (44)	695 (51)	691 (34)	741 (50)	629** (12)	921*** (245)	718 (52)	469*** (0)
Proportion \$0 Copay	0.47 (0)	0.46 (0)	0.47 (0)	0.46 (0)	0.49** (0)	0.35*** (0)	0.46 (0)	0.53*** (1)
Total child care payment	11,533 (8160)	11,245 (7956)	11,834** (8268)	12,145 (8262)	11,335** (8175)	11,249* (7510)	12,130 (8793)	6269*** (3881)
Total hours of care	2715 (2088)	2652 (2061)	2780** (2115)	2842 (2178)	2742 (2151)	2305*** (1746)	2763 (2142)	2284*** (1589)
Cost/hour	4.29 (4)	4.31 (4)	4.28 (4.02)	4.27 (3.93)	4.20 (3.97)	4.82*** (4.46)	4.46 (4.14)	2.81*** (2.61)
Observations	6267	3201	3066	1613	3892	762	5629	638

Notes: Table displays mean values; median values in parentheses. Urban/Rural status is defined as the urban/rural status at the end of the child's most recent spell. Costs reflect the full 2015–2019 period. T tests for differences in means for gender, race/ethnicity, and county of residence are relative to female, NH White, and urban categories, respectively.

*** $P < 0.01$.
** $P < 0.05$.
* $P < 0.1$.

Table 8
Predicting child care subsidy instability among 2015 cohort: multivariate OLS model results

	(1) Months	(2) Length	(3) Spells	(4) Providers	(5) Months	(6) Length	(7) Spells	(8) Providers	(9) Log hours	(10) Log total payment
Black	-0.83*** (0.20)	-1.51*** (0.24)	0.12** (0.02)	0.07*** (0.02)	-1.62*** (0.35)	-1.54*** (0.25)	0.11*** (0.02)	0.06*** (0.02)	-0.08** (0.03)	-0.11*** (0.03)
Hispanic	-2.23*** (0.29)	-0.06 (0.32)	-0.07** (0.03)	-0.09*** (0.02)	-4.05*** (0.48)	-0.24 (0.33)	-0.10*** (0.03)	-0.12*** (0.02)	-0.25*** (0.05)	-0.15*** (0.05)
Female	-0.13 (0.17)	0.09 (0.18)	-0.02 (0.02)	0.03** (0.02)	-0.60** (0.29)	-0.04 (0.19)	-0.02 (0.02)	0.02 (0.02)	-0.06** (0.03)	-0.06** (0.03)
Age at first receipt										
1	-2.48*** (0.27)	-2.31*** (0.35)	-0.18*** (0.03)	-0.14*** (0.03)	-4.07*** (0.50)	-4.51*** (0.35)	-0.20*** (0.03)	-0.17*** (0.03)	-0.18*** (0.04)	-0.20*** (0.04)
2	-4.92*** (0.26)	-5.04*** (0.42)	-0.32*** (0.03)	-0.26*** (0.03)	-8.00*** (0.47)	-9.11*** (0.41)	-0.36*** (0.03)	-0.32*** (0.03)	-0.37*** (0.04)	-0.37*** (0.04)
3	-7.37*** (0.27)	-9.36*** (0.48)	-0.45*** (0.03)	-0.35*** (0.02)	-13.73*** (0.45)	-16.03*** (0.45)	-0.54*** (0.03)	-0.47*** (0.03)	-0.78*** (0.04)	-0.72*** (0.04)
4	-3.95*** (0.40)	-11.08*** (0.55)	-0.45*** (0.03)	-0.30*** (0.02)	-19.22*** (0.43)	-22.07*** (0.47)	-0.66*** (0.03)	-0.59*** (0.02)	-1.85*** (0.06)	-1.77*** (0.05)
Urban	-1.81*** (0.33)	-1.11*** (0.38)	0.05* (0.03)	0.07*** (0.02)	2.46*** (0.50)	0.59* (0.35)	0.07** (0.03)	0.15*** (0.02)	0.35*** (0.05)	0.82*** (0.05)
Log total hours (2019)	5.49*** (0.36)	2.12*** (0.30)	0.16*** (0.03)	0.11*** (0.02)						
Log total cost (2019)	2.89*** (0.31)	1.48*** (0.30)	-0.05* (0.03)	0.05** (0.02)						
Constant	-43.47*** (1.00)	-24.55*** (0.91)	0.81*** (0.07)	0.19*** (0.05)						
Year and month FE	No	Yes	No	No	No	Yes	No	No	No	No
Observations	6267	8921	6267	6267	6267	8921	6267	6267	6267	6267

Notes: Standard errors clustered at the child care case ID and in parentheses.

* $P < 0.10$.
** $P < 0.05$.
*** $P < 0.01$.

is key for both children's development and parents' economic outcomes. This study used longitudinal administrative data from the Commonwealth of Virginia to examine child care subsidy participation and stability in participation. Specifically, we examined patterns of subsidy receipt in the 2019 calendar year, and then across the early childhood period for a cohort of children who were born in 2015 and received subsidy at any point over a 5-year period. These 2 samples provide unique insights into child-level subsidy participation patterns over time, as well as a snapshot of participants in the most recent pre-pandemic year. We also examined how subsidy program participation and stability varied with children's characteristics and geography.

4.1. Subsidy participation spells are brief

Prior state-specific research suggests that spells of receipt of child care subsidies are short (Grobe et al., 2008; Ha, 2009; Ha, Joshi, Schneider, & Hardy, 2020; Ha, Thomas, Byrne, & Miller, 2020). Using recent administrative data in Virginia, we also find that spells or duration of subsidy participation are short; among children who had received a subsidy in 2019, the average spell length was 14.7 months, with a median of 10. Notably, these figures follow Virginia's implementation of 12-month continuous eligibility and a graduated income threshold for exiting the subsidy program in October 2018 (Schulman, 2021), both of which should have increased stability and continuity of subsidy receipt relative to prior years. Indeed, among children born in 2015 who had ever received subsidy, their average and median spell lengths were lower (11.8 and 9 months, respectively), less than a year.

4.2. Racial and ethnic disparities in subsidy stability

Novel to our study are the identified meaningful racial and ethnic differences in subsidy stability, with families of color generally experiencing greater instability. Across our analyses, participation in the child care subsidy program was less stable for Black children who averaged more spells and also more providers. The median White child spent 1 more month (13% longer) receiving subsidy compared to the median Hispanic or Black child (9 and 8 months, respectively). While spells for all racial and ethnic groups were brief, longer durations of child care assistance receipt likely contribute to more stable economic outcomes and family routines, whereas the opposite is true for shorter spells. In models that control for child care characteristics that may serve as proxies for quality and duration, these racial differences remain but are diminished, suggesting that potentially changes in child care arrangements may account for some but not all of the changes in subsidy receipt. While we observe instability in subsidy participation and not in child care arrangements, it is likely that this instability in subsidies is an indicator of changes in children's care arrangements, given the high cost of regulated child care, and these changes have implications for children's development (Chaudry et al., 2021).

Over the course of their early childhoods, Black and White children showed no differences in the total length of subsidy coverage, suggesting more frequent changes in subsidy participation for Black children relative to their White counterparts. Hispanic children also had more providers and shorter subsidy spells, but higher subsidy payouts, indicating the use of more expensive (and potentially higher quality) care. Notably, though, fewer children in our sample were Hispanic than in the population of Virginia, so these identified differences warrant further research to assess whether they represent a trend or generalize beyond subsidy participants in Virginia. Importantly, these racial and ethnic differences remained when other background and geographic characteristics were controlled; therefore, some unexplained or unmea-

sured factors – potentially differences in household preferences, resources, parental job characteristics, access to social welfare agencies or case workers, or discrimination in the subsidy or child care systems – may be driving these differences in subsidy stability. Further, in Virginia, the subsidy program is administered at the county level, and while we examined an urban/rural distinction, county-level geographic differences in program administration and stability may be meaningful (Krafft et al., 2017). Future studies using qualitative or in-depth surveys may be able to shed light on this. Racial and ethnic differences in participation point to subsidies as a potential tool for promoting equity in access to early childhood education, particularly in the early years. However, its overall lack of reach and its short spells of participation limit the subsidy's program to accomplish its goals in supporting parents' work and children's child care quality, of which stability and consistency is a key component (Zaslow, Burchinal et al., 2016).

4.3. Geographic and gender disparities in subsidy stability

To date, little research has examined geographic differences in the stability of subsidy participation or in child care. Our results show large differences between children in the subsidy program depending on the counties in which they lived across all of the outcomes, including subsidized provider stability and spells. In general, rural child care was more stable and less expensive than in urban areas, but in our sample, nearly 9 in 10 children receiving subsidy lived in urban communities. This may reflect the general demographic trends of where children in Virginia live, as well as geographic differences in child care supply and participation (Anderson & Mikesell, 2019; Morrissey, Allard, & Pelletier, 2022), income (Thiede, Lichter, & Slack, 2018), or in attitudes regarding traditional gender roles and maternal employment (Kristin, 2017). Notably, our analyses present the picture of subsidy participation and stability prior to the COVID-19 pandemic, which devastated the early care and education sector, increasing expenses and decreasing supply while also driving mothers out of the labor force (Lee & Parolin, 2021; Schindler & Sandstrom, 2021). How the sector recovers in Virginia and elsewhere remains an important issue for future research.

Our findings regarding males experiencing more subsidized care and generally more stable subsidy participation adds to the small body of work indicating that females constitute smaller shares of children receiving subsidy found using administrative data in other states (Pilarz et al., 2016), although to date, we do not know of other research examining the role of child gender in subsidy or child care instability. In light of the identified gender differences in child care use and gender differences in different types of outcomes from early childhood education programs (Duncan & Magnuson, 2013), more research is needed.

4.4. Participation in the child care subsidy program

Consistent with prior research finding that nationally a small fraction of children in low-income working families participate in the child care subsidy program (Chien, 2021), we found that, even prior to the COVID-19 pandemic, Virginia's subsidy program did not reach many children—fewer than 30,000 in 2019. Only 16% of these children (about 4700) were under the age of 2, indicating that the subsidy program enrolled fewer than 2% of all children under age 2 in the state in 2019. These figures pale in comparison to participation rates in SNAP, which served more than 1 in 5 children in 2019. This disparity is not surprising given that SNAP is an entitlement program—meaning if an individual is eligible and applies, that individual receives benefits—compared to subsidies or TANF, both of which are block grants to states with capped amounts that are inadequate for serving the need. Moreover, funding to

both block grants is much lower relative to the number of households eligible for these programs. Indeed, under the broad federal rules, only an estimated 1 in 6 children who are eligible receive subsidies nationally (Chien, 2021). Legislative proposals that would provide greater investment and transform child care subsidies for children under 5 have received recent public attention and debate.

Similar to research using national data (Chien, 2021), we found that subsidy program participation varied with family characteristics such that children of color were more likely to participate than White children, likely at least partially driven by racial and ethnic differences in income, wealth, and economic instability (Heflin & Morrissey, 2022; McKernan, Ratcliffe, Simms, & Zhang, 2014). Novel to our analyses, however, are findings surrounding differences in the age at which children begin participating in the subsidy system, with Black and Hispanic children more likely to begin during the infant and toddler years than their White counterparts.

4.5. Implications and policy and research

Our descriptive findings have several implications for policy. First, given the importance of the infant and toddler years for children's long-term outcomes (Committee on Integrating the Science of Early Childhood Development Youth, and Families & Press, 2000), the very high costs and short supply of high-quality infant-toddler child care (Chaudry et al., 2021), and our findings that children of color enter the subsidy system at younger ages, policies that expand early participation in the subsidy program and that enhance stability in receipt among families with very young children—for example, lengthening recertification periods for those with children under age 2, or providing funding specifically to build or expand infant child care—may be effective means of promoting racial equity. Second, and relatedly, our findings indicate that children of color participated in the subsidy program at earlier ages, which may reflect lower access to paid family leave, for which Virginia lacks a program. Third, state efforts that reduce burdens to recertifying eligibility or to promoting continuity may also promote racial equity, such that Black children were more likely to experience short and more frequent spells of subsidy receipt. Conversely, policies that increase burdens – additional paperwork requirements for example – may widen racial disparities in subsidy instability. Finally, while our study was not designed to evaluate the subsidy policy changes Virginia implemented in 2018 (extending eligibility redetermination to 12 months and increasing the income threshold for exiting the program), the basic descriptive analyses here for our cohort born in 2015 provides suggestive evidence that subsidy spells were longer following the changes. However, because we follow a cohort of children over time, it is possible that this was driven by children's age such that subsidy receipt in the preschool period is more stable than in the infant-toddler period, for example. More research on these changes (which also coincided with subsidy rate increases to providers and paternity enforcement procedures) and how they may have narrowed or exacerbated racial or ethnic gaps in subsidy participation or stability is needed.

4.6. Limitations

Our findings must be interpreted within the study's limitations. First, by definition, the administrative data only contain subsidy or other public program participants, when they are participating in the programs. That is, we lack information on all of the child care arrangements children attend, particularly those not receiving public subsidy from Virginia's program, and our results do not shed light on how participants differ from non-participants in demographic characteristics or child care use or stability, or whether the

arrangements children attended changed upon entering or exiting the subsidy program. Second, our findings provide descriptive analyses of child care subsidy program participants, the stability of participation, and how child and family factors predict various metrics of stability, but we cannot identify the mechanisms underlying these differences (e.g., why child care subsidy participation is less stable, on average, in urban areas). Finally, the time period studied is prior to the beginning of the COVID-19 pandemic, which led to dramatic job loss, the temporary or permanent closure of many child care programs, increased child care costs, and other dramatic changes in the lives daily routines of families and children (Gassman-Pines & Gennetian, 2020; Lee & Parolin, 2021; Weiland et al., 2021), and more research is needed to understand how child care subsidy participation and stability were affected. Importantly, though, our findings indicate that going into the pandemic, many children and parents, particularly Black children, experienced short and frequent spells of subsidy receipt; the child care and school closures and uncertainty during the pandemic likely added considerably more instability and unpredictability to families' lives. Despite these limitations, this study uses unique, longitudinal administrative data from a large, diverse state, providing important insights into the characteristics of and patterns of use of the child care subsidy program among the universe of participants in recent years. These recent data and results provide a valuable pre-pandemic snapshot and cohort study across early childhood that can inform ongoing debates regarding child care policy at the federal and state levels.

5. Conclusion

In sum, our analyses indicate that child care subsidies reach a tiny fraction of young children, including very few infants and toddlers, and participation is typically marked with short spells and instability—and this instability is more common among children of color. Even among children born in 2015 who received a subsidy at any point before their fifth birthday—a relatively small proportion of young children living in the state—subsidies supported an average of only 10 hours per week of care over their first 5 years, and the typical period of participation was less than a year. Given the high expense of child care for young children and the devastating effects of the pandemic for young children's learning, maternal employment, and child care availability and costs (Weiland et al., 2021), expansions in child care subsidies to reach more families may help narrow income, racial, and ethnic access to child care and early learning opportunities.

Authors' contributions

Dr. Morrissey led the conceptual design, drafted sections of the manuscript, and helped secure external funding. Dr. Heflin added to the conceptual design, drafted sections of the manuscript, was PI on external funding, and helped access the data. Mr. Fannin added to the conceptual design, analyzed the data, and revised the manuscript. All authors are responsible for reported research and all authors have participated in the concept and design, analysis and interpretation of the data, drafting and revising of the manuscript, and have approved the manuscript as submitted.

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Disclosures

None.

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