



Kindergarten readiness for low-income and ethnically diverse children attending publicly funded preschool programs in Miami



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ABSTRACT

Using data from the Miami School Readiness Project (MSRP), we examine the kindergarten readiness of five cohorts (2002–2007) of children from low-income, ethnically, and linguistically diverse families ($n = 16,176$) in Miami, Florida who experienced three types of publicly funded preschool programs the year before kindergarten: public school-based pre-K, center-based care, or family childcare. Black and Latino children in public school-based pre-K programs consistently demonstrated greater kindergarten readiness when compared with their classmates in center-based and family childcare, controlling for demographic variables and cognitive skills at preschool entry. In most cases, low-income children enrolled in center-based care also exhibited greater kindergarten skills than their classmates who had attended family childcare. Results were the same across ethnic and language groups. Thus, for all groups of children, those who attended public school-based pre-K began kindergarten with a stronger start than their classmates who attended center-based care and family childcare, and they continued to do better at the end of the kindergarten year.

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1. Introduction

There has been growing interest in early childhood programs that promote low-income and ethnically diverse children's school success from an early age, a period that has greater returns on investment than later years (Heckman, 2008). Although parents remain the most important shepherds of children's school success (Belsky et al., 2007), early education programs have received increased political interest, in part, because they are more policy amenable. Today, roughly 53% of children across the country experience some form of regular part- or full-day pre-kindergarten, center-based care, or preschool program during the two years leading up to kindergarten, yet participation among some minority groups remains low, with 56% of Latino children not attending pre-kindergarten or preschool as compared with 43–44% of non-Latino White and Black children (Child Trends, 2014). Even children who attend preschool have experiences that differ dramatically because preschool programs come in many forms including: (1) public school-based pre-K programs (pre-K), which are sponsored

by school districts and housed within public schools targeting all children (universal) or children in poverty (targeted); (2) center-based care, which are licensed or license-exempt programs that are either for- or non-profit institutions spanning across local, individual, and national chains; and (3) family childcare, licensed or not, which encompasses non-relative care housed in a caregiver's home.

Whether different types of publicly funded programs have benefits for children through the transition into kindergarten and beyond remains in question (Hill, Gormley, & Adelstein, 2015; Lipsey, Farran, & Hofer, 2015; Magnuson, Ruhm, & Waldfogel, 2007a; Puma et al., 2010). Considering the rapidly evolving preschool market, and the large public investment in children's education, we need to know which types of publicly funded programs are most effective at preparing children for school. In particular, the large gaps in the academic skills of minority children as compared with White children (National Center for Education Statistics, 2011a, 2011b) necessitate a focus on their experiences early in the life course when development is more malleable (Heckman, 2008).

To address these gaps in knowledge, we use a subsample of low-income and ethnically diverse children from the Miami School Readiness Project (MSRP) to report on their early experiences in several different types of publicly funded programs in Miami-Dade County, between 2002 and 2007. In addressing these objectives,

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we add to the extant literature in a few important ways. Primarily, we focus on the experiences of low-income and ethnically diverse children through kindergarten, which has been lacking in the extant literature. Moreover, prior studies have often grouped pre-K and center-based care into one larger category of 'preschool' (Magnuson, Meyers, Ruhm, & Waldfogel, 2004; Magnuson et al., 2007a), thereby, inhibiting our understanding of the efficacy of different forms of preschool. Third, although family childcare serves a large number of low-income families (Morrissey & Banghart, 2007), such programs have received little empirical attention.

Finally, in addressing our research objectives, we link administrative data sources—data that are collected for administrative and not specifically research purposes—with survey data and direct child assessments. Although administrative data have been largely absent from the existing literature on early care and education programs, these comprehensive systems of information are often collected as part of day-to-day operations for different agencies and can serve as a valuable resource in addressing policy-relevant research questions (for an example of prior studies that have used administrative data see, Fantuzzo, Leboeuf, Rouse, & Chen, 2012). To illustrate the potential of working with administrative data, we couple direct assessments and survey data of children's preschool experiences with administrative data that capture children's kindergarten readiness. When taken together, this study has the potential to inform the discourse on where state and federal financial resources should be allocated and, just as importantly, illustrate the advantages and disadvantages in using administrative data when studying the benefits of different types of early childhood programs.

1.1. Public school-based pre-K programs

Over the last decade, the enrollment of 4-year-old children in state-funded pre-K programs (a large share of which occur in public schools) across the country has increased such that today, 29% of children nationwide attend pre-K programs at age 4 (Barnett, Carolan, Squires, Clarke Brown, & Horowitz, 2015). Although 80% of children in Florida are served by state-funded pre-K, the quality of these programs is poor when compared with other state programs (Barnett et al., 2015). For example, across the U.S., four in ten children experience pre-K programs that meet fewer than 50% of quality standards (e.g., teacher has BA; specialized training in pre-K; child teacher ratio 10:1; assistant teacher with a CDA or equivalent; Barnett et al., 2015). Florida's programs, however, rank in the bottom 10% of states with regard to per-child expenditures (\$2238 vs. national averages of \$4679) and have only met 30% of quality benchmarks. With millions of dollars at stake, there has been growing interest in better understanding how large-scale pre-K programs compare with other publicly funded non-school based centers.

Because pre-K programs are generally housed in public schools, they tend to have more rigorous standards, better teacher education and pay, offer a higher quality experience, and are more likely to have academically oriented curriculum than other childcare arrangements (Barnett et al., 2015; Winsler et al., 2008), each of which has important implications for children's educational prospects (Clarke-Stewart & Allhusen, 2005). Consequently, pre-K programs are likely to produce better school readiness outcomes when compared with center-based and family childcare programs because they are, in general, of higher quality and better regulated. In fact, there is growing evidence to suggest that children enrolled in pre-K exhibit the greatest gains across areas of school readiness (Gormley, Gayer, Phillips, & Dawson, 2005; Magnuson, Ruhm, & Waldfogel, 2007b; Weiland & Yoshikawa, 2013; Winsler et al., 2008) when compared with children in center-based programs or those who have yet to attend pre-K. Children attending

public school pre-K also demonstrate reduced odds of repeating kindergarten (Winsler et al., 2012) and, at least among Black males, are more likely to be identified as gifted later during elementary school (Winsler, Gupta, Kim, & Levitt, 2013). Pre-K attendees can also exhibit sustained benefits through the transition to school (Bassok, French, Fuller, & Kagan, 2016; Forry, Davis, & Welti, 2013; Magnuson et al., 2004, 2007a).

1.2. Subsidized care: center-based care and family childcare

Alternatively, there are subsidized community-based programs (center-based and family childcare), which serve the majority of low-income children (Johnson & Ryan, 2015). During the 2012 fiscal year, roughly \$8.6 billion was spent on child care subsidies for roughly 1.5 million low-income families each month (\$4679 dollars per child; U.S. Department of Health and Human Services, 2014a, 2014b). The primary source of childcare assistance for low-income families has been funding through the Child Care and Development Fund, whereby the federal government and individual states provide subsidies to eligible, low-income, working parents or parents attending school full time. In Florida, eligibility is capped at 150% of the poverty line (Schulman & Blank, 2011) with nine in ten (91%) parents using their subsidies for center-based care and only one in ten (9%) enrolling their children in family childcare (Administration for Children and Families, 2010). Although these programs serve the majority of subsidy-eligible families, we know little about them because most of the literature has examined childcare usage among more affluent populations. We do know, however, that family childcare programs accessible to low-income families are generally of lower quality than center-based care and public school pre-K (Dowsett, Huston, Imes, & Gennetian, 2008; Votruba-Drzal, Coley, & Chase-Lansdale, 2004).

Studies that focus on center-based care have found that children demonstrate gains in school readiness, albeit to a lower degree when compared with children in public school-based pre-K through the end of preschool (Forry et al., 2013; Loeb, Fuller, Kagan, & Carrol, 2004; Magnuson et al., 2007a, 2007b; Winsler et al., 2008). In contrast, children who attend family childcare have been found to exhibit larger disparities in school readiness throughout preschool than children enrolled in center-based care and pre-K (Bumgarner & Brooks-Gunn, 2015; Forry et al., 2013; Loeb et al., 2004).

Three studies that examined children's childcare arrangements in the same community as the present investigation are of note and discussed below. Primarily, Winsler et al. (2008) found that low-income children in Miami Dade County exhibited gains in areas of early academic learning when enrolled in public school-based pre-K and center-based care (family childcare programs were not examined in this study). Building on this work, Ansari and Winsler conducted two follow-up studies and found that: (a) Latino children in family childcare demonstrated fewer school readiness gains throughout the preschool year than their peers in center-based care (Black children and children in pre-K were not examined in this study; Ansari & Winsler, 2012); and (b) among a subsample of the MSRP, low-income children who experienced stable center-based care at ages 3 and 4 made moderate gains in school readiness as compared with children who experienced two years of family childcare, but the small number of children who switched from subsidized care to public school-based pre-K demonstrated the strongest test scores in preschool (Ansari & Winsler, 2013).

None of these authors, however, examined whether these benefits were sustained through the kindergarten year nor did they examine the larger group of children attending public school-based pre-K programs across all five cohorts of the MSRP. Such information is necessary, however, as prior research suggests that the effects of preschool can fade as early as kindergarten (Bloom &

Weiland, 2015; Puma et al., 2010). Thus, this study extends the work of Ansari and Winsler (2012, 2013) and Winsler et al. (2008) by examining whether the initial programmatic benefits observed are sustained through the end of kindergarten.

1.3. Differential preschool effects across ethnic and language groups

There have been calls in the literature for research to go beyond the examination of average program effects and instead examine how children from different backgrounds respond to different programs (Duncan & Magnuson, 2013). This is especially important considering that several studies have documented differential program effects according to children's race and ethnicity (Gormley et al., 2005; Loeb, Bridges, Bassok, Fuller, & Rumberger, 2007; Raikes, Vogel, & Love, 2013) and the fact that in Miami, Florida, the community of interest in the present study, over eight in ten children come from non-White homes (e.g., Black and/or Latino; Census, 2015). Thus, understanding the early school experiences and transitions for diverse groups of children is of growing policy interest.

Although few studies have examined the outcomes of early education programs for Latinos, those that have are mixed. Some suggest that program effects are minimal for Latinos (Raikes et al., 2013) whereas others suggest that Latino children have the most to gain, almost two times as much as their Black peers (Loeb et al., 2007; Weiland & Yoshikawa, 2013) with Mexican-origin children benefiting the most (Gormley et al., 2005). In contrast, others find that Black children demonstrate stronger school readiness gains when enrolled in early childhood programs as compared with their Latino and non-Latino White peers (Bassok, 2010; Puma et al., 2010; Raikes et al., 2013). Such contradictory findings across studies with respect to the outcomes of preschool education could reflect the heterogeneity of the Latino population that results from acculturation status, socio-economic status, and/or recency of immigration. Importantly, the Miami community allows us to study Latino families from a variety of countries including Cuba, Dominican Republic, and Central and South America, thus extending our knowledge of Latino families beyond Mexican families in the U.S. (the predominant culture sampled in prior studies; Census, 2011; De Feyter & Winsler, 2009).

There have also been calls for the examination of English-language learner's (ELLs) preschool experiences so we can understand how better to support the needs of linguistically diverse children during the early years (Barnett, Yarosz, Thomas, & Blanco, 2007; Castro, Páez, Dickinson, & Frede, 2011; Goldenberg, 2008). This point is particularly important in the Miami community where seven in ten children under five come from non-English speaking homes (Census, 2015). Although we know that ELL children often struggle when compared with their non-ELL classmates, largely due to co-occurring poverty (Castro et al., 2011; Laosa & Ainsworth, 2007), less is known about their early school experiences and best practices for promoting the school readiness of ELLs (Castro et al., 2011). Similar to the literature on ethnicity, there is conflicting evidence with regard to ELL status as a possible moderator of program effects. Indeed, some studies suggest that ELL children benefit more from pre-K programs compared with their English-speaking peers (Gormley et al., 2005; Magnuson et al., 2004); others, however, find that children from Spanish-speaking families benefit less from preschool (broadly defined) than English-speaking Latinos (Crosnoe, 2007). Considering that the extent to which ELL children benefit from these arrangements might vary across program types, continued examination of their early school experiences is necessary. We are fortunate with this dataset to have ELL status and ethnicity not confounded, with a sufficient number of both Black

children who were classified as ELLs and Latino children classified as non-ELLs.

1.4. The current study

We address these gaps in the literature by comparing outcomes associated with three different types of publicly funded preschool programs in Miami that ethnically diverse children experienced the year prior to kindergarten: (1) public school-based pre-K; (2) subsidized center-based care; and (3) subsidized family childcare. Specifically, we address the following questions:

1. Controlling for selection effects, which of the three publicly funded programs are associated with stronger performance throughout kindergarten for low-income/ethnically diverse children?
2. Are the kindergarten outcomes associated with attending public school-based pre-K, center-based care, and/or family childcare the same for children from different cultural and language backgrounds?

We expected that overall, children, enrolled in public school-based pre-K would show greater kindergarten readiness than their peers who spent their previous year in the subsidized childcare system (Gormley et al., 2005; Magnuson et al., 2007b; Winsler et al., 2008). We also hypothesized that children enrolled in center-based care would exhibit stronger kindergarten skills than their peers in family childcare (Ansari & Winsler, 2012; Forry et al., 2013; Loeb et al., 2004). Given the conflicting evidence in the extant literature on who benefits most from ECE programs (Crosnoe, 2007; Gormley et al., 2005; Magnuson et al., 2004), we did not make directional hypotheses for differential preschool effects across racial/ethnic and language groups.

2. Method

2.1. Participants

The larger MSRP represents essentially the entire population of 4-year-old children of Miami-Dade County ($n = 41,339$) who were enrolled in public school-based pre-K (fee-supported or Title-1 schools) or receiving subsidies to attend care in the community (center-based or family childcare) between the 2002–2007 school years (Cohort A = 16.7%; Cohort B = 20.7%; Cohort C = 23.5%; Cohort D = 20.8%; Cohort E = 18.4%). In terms of the low-income population more generally, the MSRP represents approximately 55–60% of all low-income 4 year olds in Miami-Dade County. All childcare providers who accepted subsidies and all public school-based pre-K programs in the county participated with recruitment occurring directly through the local agencies that processed and distributed the childcare subsidies and through the public school-based pre-K programs. Families were sent informed consent forms with 8–10% opting out in any given year; afterwards, the county agency provided lists of those who consented to the child assessments and these children were located to complete the child assessments. It is important to note that the MSRP did not collect data on children who were: (1) attending Head Start; (2) not attending any type of childcare (i.e., exclusive parental care); or (3) attending private care without subsidies (i.e., more economically advantaged families). Thus, we had data on all children receiving childcare subsidies or attending public school-based pre-K in the community who consented to participate.

For the purposes of this study, we excluded children who did not arrive to Miami-Dade County public schools for kindergarten ($n = 9441$; attrition of 23%) or those who did not enter school on

Table 1
Demographic characteristics and child outcomes, separated by preschool type.

	Program Type			Overall	F or χ^2
	FCC	CBC	Pre-K		
	% or M (SD)	% or M (SD)	% or M (SD)	% or M (SD)	
<i>Data on full sample of children^a</i>	<i>n</i> = 147	<i>n</i> = 6159	<i>n</i> = 9870	<i>n</i> = 16,176	
Child age at K (months)	65.91 (3.54)	66.05 (3.50)	66.33 (3.51)	66.22 (3.51)	13.49***
Child ethnicity					
% Latino	51.0	64.4	58.8	60.9	54.50***
% Black	49.0	35.6	41.2	39.1	
Child gender					
% male	51.7	51.0	47.8	49.1	16.20***
% female	48.3	49.0	52.2	50.9	
ELL status					
% ELL	48.3	60.7	53.2	56.0	89.64***
% non-ELL	51.7	39.3	46.8	44.0	
Immigrant status					
% born in the U.S.	92.5	89.4	93.0	91.6	62.25***
% born outside of the U.S.	7.5	10.6	7.0	8.4	
Free or reduced lunch					
% yes	92.5	90.0	77.6	82.5	411.78***
% no	7.5	10.0	22.4	17.5	
Preschool entry cognitive skills ^b	43.82 (29.55)	39.68 (27.55)	52.07 (30.95)	47.28 (30.28)	331.27***
<i>Data on subsample of children</i>	<i>n</i> = 60	<i>n</i> = 2564	NA	<i>n</i> = 2624	
Household income/1000	17.71 (7.38)	16.43 (7.63)	NA	16.46 (7.63)	1.65
Family size	3.45 (1.29)	3.31 (1.18)	NA	3.32 (1.19)	0.76
Parent marital status					
% married	3.3	8.5	NA	8.4	2.06
% single, divorced, widowed	96.7	91.5	NA	91.6	
Parent education	11.83 (1.18)	11.55 (1.70)	NA	11.56 (1.69)	1.59

^a The MSRP represents essentially the entire population of 4-year-old children of Miami-Dade County who were enrolled in public school-based pre-K or received subsidies to attend care in the community between the 2002–2007 school years. The subsample for this study included Latino and Black children who took part in the MSRP through the kindergarten year.

^b The measure for children's cognitive skills was based on a scale of 0–100. FCC = Family childcare. CBC = Center-based care. Pre-K = Public school-based pre-K.
*** $p < 0.001$.

time ($n = 291$). We also excluded children who were identified as non-Latino White/other ($n = 3631$) due to small sample size, especially among those who participated in family childcare. Next, we limited our sample to typically developing children (i.e., not including children attending pre-K programs for children with disabilities; $n = 3315$ excluded) and required that children have a preschool assessment of cognitive abilities ($n = 8485$ excluded). These exclusions resulted in a final sample of 16,176 ethnically (39% Black, 61% Latino) and linguistically diverse (56% English Language Learner – ELLs) children (83% received free/reduced lunch in kindergarten, 49% male; for more sample information, see Table 1). Although there is overlap between ELL status and race/ethnicity, 18% of those who identified as Latino were not considered ELLs, and 16% of those who identified as Black were considered ELLs by the school system, which allows us to examine each of these variables independently. Upon kindergarten entry, children were 66 months of age and although 92% were born in the U.S., over half had immigrant parents (Cuba: 48%, Haiti: 17%, Nicaragua: 14%, Columbia: 6%, Dominican Republic: 5%, Honduras: 5%, and Puerto Rico: 5%; De Feyter & Winsler, 2009); unfortunately, data on parents' nativity were not collected for all families and could not be included. Finally, on average, children were scoring slightly below national averages (47th percentile) on measures of cognitive skills upon preschool entry.

At the aggregate level, 61% of families in our sample enrolled their children in public school-based pre-K programs (Cohort A: 53%, Cohort B: 59%, Cohort C: 56%, Cohort D: 64%; Cohort E: 66%), whereas the other 39% were receiving childcare subsidies for care in the community (Cohort A: 47%, Cohort B: 41%, Cohort C: 44%; Cohort D: 36%; Cohort E: 34%). The vast majority of subsidy recipients in our sample enrolled their children in center-based care ($n = 6159$, 98% of subsidy recipients) whereas only a smaller portion attended family childcare at age 4 ($n = 147$, 2%) and these trends

did not change over time. Given sample size differences across programs, we also estimated models with a random sample of children in center-based care ($n = 600$) and public school-based pre-K ($n = 600$), to see if results were a function of large sample sizes, and all results were the same as those reported below.

Although resources at the time were not available to assess childcare quality at all centers, county agencies attempted to get a representative sample from all parts of the city including different types and sizes of centers accepting subsidies. Overall quality of the centers ($n = 288$ centers, $n = 2487$ children) as assessed with the ECERS-R (Harms, Clifford, & Cryer, 1998) was near the cut-off of good quality ($M = 4.92$ on 7-point scale) and, at that time, roughly 10% of the center-based programs were accredited. Subsidized center-based programs had roughly 16 children per teacher and, on average, provided care for 7–8 h a day (see, Winsler et al., 2008). Fifty-six percent of the center-based programs were for-profit institutions (44% were non-profit) and 24% were faith-based programs (76% were non-faith-based). Comparable information was not available for public school-based pre-K programs; however, between the 2002–2004 school years, these programs used the High/Scope curriculum, whereas after 2005, the school district changed to the Houghton Mifflin curriculum. Public school-based pre-K programs operated for 3–4 h per day and were within public schools and, therefore, served children for half the time that the center-based programs did (for those attending full time). Although the definitions and licensing requirements for family childcare programs vary considerably from state-to-state, these programs generally involve a non-relative female caregiver who cares for children in her own home. Because the MSRP did not have comparable information on all three programs, we could not control for structural or process quality or other classroom-level processes.

2.2. Measures

2.2.1. Preschool cognitive skills

The Learning Accomplishment Profile Diagnostic (LAP-D; Nehring, Nehring, Bruni, & Randolph, 1992) was used to control for children's preschool cognitive abilities (counting and matching) at age 4, a year before the child entered kindergarten. Bilingual assessors (teachers in pre-K and outside personnel in subsidized programs) individually tested children's cognitive skills with the LAP-D at the beginning of the preschool year. Assessors from the community were certified in social work or another early childhood field and trained on the instrument over a two-day period by the instrument publisher and the local university. Children's language of assessment was determined by teachers' report of children's strongest language and, when applicable, assessors own impression of which language appeared to be the child's strongest (24% Spanish) after interacting with the child in both languages during an initial rapport-building session. The LAP-D was selected by the community due to high construct validity—the cognitive subscale of the LAP-D is strongly correlated with measures of the Woodcock Johnson (Woodcock, McGrew, & Mather, 2001) and the Peabody Picture Vocabulary Test (Dunn, Dunn, & Dunn, 1997), with correlations ranging from 0.72–0.80 (Hardin, Peisner-Feinberg, & Weeks, 2005). Finally, the LAP-D has demonstrated strong internal consistency both generally ($\alpha = 0.76$ – 0.92 ; Nehring et al., 1992) and within this community ($\alpha = 0.93$ – 0.95 ; Winsler et al., 2008).

2.2.2. Kindergarten readiness assessments

Descriptive information on all of the kindergarten outcomes is available in Table 2 and Table 3 illustrates what assessments were available and administered for each cohort. Note that kindergarten teachers administered all of the kindergarten assessments in English. Between the 2002–2006 school years, the state of Florida implemented the School Readiness Uniform Screening System (SRUSS), to assess the school readiness of all kindergarten students within the first 30 days of the school year. The SRUSS is composed of two screening instruments including the Early Screening Inventory – Kindergarten (ESI-K; Meisels, Marsden, Wiske, & Henderson, 1993) and two subscales from the Dynamic Indicators of Basic Early Literacy Skills (DIBELS; Kaminski & Good, 1996).

The ESI-K was a direct assessment of children's motor, language, and cognitive skills, and was selected by the school system due to its high-reliability of identifying at-risk children, and its strong measurement reliability ($\alpha = 0.89$; Meisels et al., 1993). The ESI-K classifies children's kindergarten readiness into one of three categories (1 = *not ready*; 2 = *getting ready*; 3 = *ready now*). For this study, we used these categories in addition to the total score (0–75 scale).

The district used the DIBELS to measure children's emergent (English) literacy skills. Specifically, the county used two subscales to assess children's alphabet recognition (Letter Naming Fluency) where children were asked to identify lower- and upper-case letters, and sound recognition (Initial Sound Fluency) where children were asked to identify the beginning sound of an orally presented word. The DIBELS classifies children into one of four categories (1 = *above average*; 2 = *low risk*; 3 = *moderate risk*; and 4 = *high risk*). The DIBELS subscales have demonstrated adequate test-retest reliability among ethnically and linguistically diverse children ranging from 0.83–0.93 (for a review see: Goffreda & DiPerna, 2010). We used children's overall scores in addition to their kindergarten readiness classification.

Using school district administrative data, one disadvantage is that the kindergarten assessments changed over time. Specifically, during the 2005–2007 school years, the SRUSS was replaced with the Florida Kindergarten Readiness Screener with the intent of enhancing screening for children's readiness for kindergarten. Both of the DIBELS assessments were still used but instead of the ESI-K,

teachers provided information on children's kindergarten readiness with 19 items from the Early Childhood Observation System (ECHOS; $\alpha = 0.93$, Harcourt Assessment, 2006). The ECHOS is an observational assessment measuring children's literacy, mathematics, social skills, science/social studies, physical development and fitness, and creative arts. Teachers assign children one of three ratings (1 = *not yet demonstrating*; 2 = *emerging and/or progressing*; and 3 = *consistently demonstrating*). In this study, we used both the categories of readiness and each of the six subscale scores.

During the 2002–2003 school year, the school district also administered the Work Sampling System (WSS) as a social-behavioral screener ($\alpha = 0.84$ – 0.95 ; Meisel, Liaw, Dorfman, & Nelson, 1995). Teachers provided ratings of children's performance across five domains of school readiness (social skills, literacy, mathematics, fine motor, and physical development) and children were categorized in one of three categories (1 = *proficient*; 2 = *in progress*; and 3 = *not yet*).

Finally, data on end-of-kindergarten grades were collected from school records, which was the average of all 11 domains, namely: language development, pre-reading, handwriting, math, science, Spanish, social studies, English as a second language, music, art, and physical education on which children received the marks of *unsatisfactory* = 1, *satisfactory* = 2, or *excellent* = 3 (inter-correlations across domains ranged from 0.30–0.80; $\alpha = 0.91$). To ensure the validity of the end of kindergarten grades, we examined the bivariate correlations between children's kindergarten grades and the school entry screeners. These bivariate correlations were modest in size, but statistically significant at $p < 0.001$ (r 's = 0.19–0.41), suggesting that the screeners are tapping more specific aspects of kindergarten skills whereas kindergarten grades reflect a more global assessment of child academic performance. Correlations among the specific subscales of kindergarten readiness and performance are presented in the online Supplementary materials (see online Appendix Table 1).

2.3. Analytic strategy

All analyses were estimated within a regression framework with clustered standard errors at the school level using the TYPE = COMPLEX function in *Mplus* (Muthén & Muthén, 1998–2013), thereby accounting for dependence in child outcomes. We chose to account for nesting at kindergarten because of the shared variance in our outcomes that result from children having the same kindergarten teachers (school ICCs = 0.07–0.26). Each outcome was modeled separately while controlling for several child-level variables that were provided by the school district: gender, age, race/ethnicity, nativity, home language, and free/reduced lunch receipt. To minimize selection bias and address pre-existing differences in children's early learning, we also controlled for children's cognitive skills upon preschool entry (see also, Ansari & Crosnoe, 2015). Finally, to account for the cohort design of the MSRP, we included fixed-period effects (Cohort A–E), which mitigates the detection of spurious associations that may arise due to potential cohort differences.

Although our sample included 16,176 children, not all children had each of the 10 outcome variables (except for kindergarten grades; see Table 3) because assessments changed from year-to-year. When looking within each cohort, however, missing data were minimal (5–10%) and were addressed with multiple imputation using the *Mplus* program (50 datasets). Thus, we only imputed data for children who were eligible for an assessment, but did not have one. Given the binary nature of our focal predictors, and similar to past studies on preschool programs (Magnuson et al., 2004), we provide effect size estimates that correspond to the unstandardized coefficient divided by the standard deviation of the dependent variable. In addition to examining children's continuous scores, we estimated chi-square tests to descriptively examine children's

Table 2
Children’s kindergarten readiness classification and continuous scores, separated by preschool type.

	Program Type				F or X ²
	FCC	CBC	Pre-K	Overall	
	% or M (SD)	% or M (SD)	% or M (SD)	% or M (SD)	
DIBELS Letter Naming	n = 101	n = 3841	n = 7747	n = 11,689	647.95***
% Above average	32.7	40.6	61.0	54.1	
% Low risk	15.8	16.3	15.6	15.8	
% Moderate risk	18.8	16.2	12.4	13.7	
% High risk	32.7	26.9	11.0	16.4	
Continuous score	13.75 (15.12)	15.94 (16.94)	23.45 (17.71)	20.90 (17.81)	246.60***
DIBELS Initial Sound	n = 99	n = 3727	n = 7552	n = 11,378	413.52***
% Above average	22.2	24.3	39.4	34.3	
% Low risk	16.2	17.4	19.8	19.0	
% Moderate risk	33.3	23.3	20.8	21.7	
% High risk	28.3	35.0	20.1	25.0	
Continuous score	7.69 (6.57)	8.16 (10.22)	11.52 (11.06)	10.38 (10.87)	124.61***
ESI-K	n = 125	n = 5453	n = 6502	n = 12,080	165.46***
% Ready now	80.0	85.2	92.4	89.0	
% Getting ready	16.8	12.2	6.6	9.2	
% Not ready	3.2	2.5	1.0	1.7	
Continuous score	21.42 (5.93)	22.07 (5.08)	23.52 (3.98)	22.85 (4.59)	157.91***
ECHOS	NA	n = 299	n = 2794	n = 3093	8.42*
% Consistently demonstrating	NA	39.8	43.8	43.4	
% Emerging/progressing	NA	45.8	47.0	46.9	
% Not yet demonstrating	NA	14.4	9.2	9.7	
Continuous score	BNA	25.27 (8.18)	26.78 (7.36)	26.63 (7.46)	5.60**
WSS Math	n = 37	n = 1823	n = 1440	n = 3300	94.42***
% Proficient	13.5	24.0	36.7	29.4	
% In progress	67.6	60.8	56.0	58.8	
% Not yet	18.9	15.2	7.4	11.8	
Continuous score	5.38 (2.13)	5.93 (1.66)	6.41 (1.62)	6.13 (1.67)	39.05***
WSS Language/Literacy	n = 37	n = 1823	n = 1440	n = 3300	87.79***
% Proficient	10.8	16.7	28.0	21.6	
% In progress	67.6	69.5	64.9	67.5	
% Not yet	21.6	13.8	7.2	11.0	
Continuous score	16.27 (6.48)	17.92 (4.88)	19.62 (4.92)	18.64 (4.99)	52.75***
WSS Social/Personal	n = 37	n = 1823	n = 1440	n = 3300	80.14***
% Proficient	29.7	26.1	39.6	32.0	
% In progress	54.1	63.2	54.6	59.4	
% Not yet	16.2	10.6	5.8	8.6	
Continuous score	26.35 (27.45)	27.67 (7.41)	29.82 (7.47)	28.59 (7.55)	34.74***
WSS Physical/Health	n = 37	n = 1823	n = 1440	n = 3300	25.11***
% Proficient	43.2	46.5	54.4	49.9	
% In progress	48.6	46.0	40.9	43.8	
% Not yet	8.1	7.5	4.7	6.3	
Continuous score	4.38 (1.57)	4.64 (1.25)	4.84 (1.24)	4.72 (1.25)	12.10***
WSS Fine Motor	n = 37	n = 1823	n = 1440	n = 3300	35.88***
% Proficient	27.0	40.6	49.7	44.4	
% In progress	59.5	53.6	46.0	50.4	
% Not yet	13.5	5.8	4.3	5.2	
Continuous score	6.05 (2.36)	6.70 (1.76)	7.04 (1.78)	6.84 (1.79)	18.20***
End of kindergarten grades	n = 140	n = 5941	n = 9568	n = 15,649	
Continuous score	2.25 (0.38)	2.28 (0.41)	2.37 (0.42)	2.33 (0.42)	97.70***

Note: Estimates are without covariates, adjustment for standard errors, or imputation. FCC = Family childcare. CBC = Center-based care. Pre-K = Public school-based pre-K.

* p < 0.05.

** p < 0.01.

*** p < 0.001.

Table 3
Comparison of the kindergarten readiness measures available across the five cohorts in the MSRP.

	Cohort					Sample Size
	A	B	C	D	E	
DIBELS		X	X	X	X	12,343
ESI-K	X	X	X			12,949
ECHOS				X	X	3227
WSS	X					3833
Grades in K	X	X	X	X	X	16,176

Notes: X = measure was available.

proficiency categories. Because the number of children in family childcare was so small for some of these measures (n = 37–140,

depending on outcome), for these contrasts, we interpret findings that were significant at the trend level (i.e., p < 0.10).

3. Results

We discuss our results by presenting each of the pairwise comparisons of the three publicly funded preschool programs. Then, we present the conditional effects of preschool as a function of children's cultural or language background. All focal results are presented in Tables 2 and 4 and the associations between the covariates and child outcomes are provided in Appendix Table 2 in the online Supplementary materials.

3.1. Public school pre-K vs. center-based care

Net of demographic covariates and cognitive skills at preschool entry, children who previously attended public school-based pre-K programs outperformed their classmates who were enrolled in center-based care on 4 of the 5 start of kindergarten measures. These included direct assessments of children's emergent literacy skills (both alphabet and sound recognition) as well as direct assessments (ESI-K) and teacher report (WSS) of children's overall kindergarten readiness. No differences emerged on the ECHOS measure. However, when we examined the subscales of the WSS and ECHOS measures of kindergarten readiness, we found that children in public school-based pre-K outperformed children in center-based care on 8 of the 11 subscales, which included measures of math, literacy, social skills, motor skills, and health. Overall, effect sizes (ES) ranged from 11 to 23% of a *SD*. Children who experienced public school-based pre-K also received higher end-of-the-year grades than their peers who experienced center-based care at age 4 (ES = 10% of a *SD*).

3.2. Public school pre-K vs. family childcare

Larger differences emerged when comparing children who experienced family childcare at age 4 with those who attended public school pre-K. More specifically, children who attended public school-based pre-K entered kindergarten with a stronger start across all outcomes, with effect sizes ranging from 28 to 53% of a *SD*, and these children also did better at the end of the kindergarten year in terms of end-of-the-year grades (ES = 17% of a *SD*). Furthermore, as can be seen in Table 2, chi-square analyses revealed that children who were enrolled in public school pre-K were consistently more likely to be classified as 'above average' or 'proficient' on each of the kindergarten screeners than children in subsidized care.

3.3. Family childcare vs. center-based care

Differences also emerged within the subsidized childcare system: low-income children who experienced center-based care in Miami demonstrated stronger emergent language and literacy skills upon kindergarten entry, as well as academic and fine motor skills when compared with children who used their subsidies to attend family childcare at age 4. Effect sizes ranged from 10 to 35% of a *SD*. There were, however, no differences across these two types of programs in terms of children's social skills and physical health, nor were there any differences in children's end-of-year kindergarten grades (for effect sizes, see Table 4).

3.4. Conditional effects of preschool

Turning to our second research question, we next examined whether the outcomes associated with the three types of childcare programs varied for Black and Latino children as well as ELL and non-ELL children. Results from these analyses revealed that although ELL children generally performed less well on direct

assessments (but not on teacher-reports) of kindergarten readiness, and, in general, Latino children scored higher than Black children on teacher reports of kindergarten readiness, there was no consistent evidence for moderation (full results are available upon request). In other words, all children, regardless of their cultural or language background, equally benefited from public school-based pre-K (as compared with subsidized childcare) and center-based care (as compared with family childcare).

3.5. Robustness checks

For a subsample of children and families ($n=2624$) who had received childcare subsidies, we had information on their parents' marital status, education level, family size, and annual household income. To determine whether the observed associations discussed above result from these factors, we ran additional models examining children's childcare type (center-based care versus family childcare) and their kindergarten readiness for four of the available outcome measures (DIBELS Initial Sound Fluency, DIBELS Letter-Naming, ESI-K, kindergarten grades); unfortunately, for the other outcomes (WSS subscales and ECHOS) and for children in public school-based pre-K, there were not sufficient data to estimate these supplementary analyses. Notably, the differences that emerged between center-based care and family childcare in our focal models remained statistically significant (net of parent covariates) and there were only small differences in the regression coefficients comparing these programs when adjusting for family covariates (see Appendix Table 3 in the online Supplementary materials).

Considering that we could not conduct the above analyses for children in public school-based pre-K programs, we conducted Impact Threshold for Confounding Variables (ITCV; Frank, 2000), which quantify how strongly an unknown variable, such as family confounds, would have to be associated with both the predictor and outcome variables to negate the observed associations. The equation for ITCV is: $r_{xy} - r_{xy}^{\#} / 1 - r_{xy}^{\#}$, where $r_{xy}^{\#} = t / \text{SQRT}[(n - q - 1) + t^2]$, where t is the critical t -value, n is the sample size, and q refers to the number of model parameters. When covariates are included, the equation becomes $\text{ITCV}_{\text{nocovariates}} \times [\text{SQRT}(1 - R_{xg}^2)(1 - R_{yg}^2)]$, where g is the set of covariates, R_{xg}^2 is the R^2 value from a regression predicting the focal independent variable by the covariates, and R_{yg}^2 is the R^2 value from a regression predicting the outcome by the covariates.

Results from these analyses suggest that, on average, a confounding variable would have to correlate with both public school-based pre-K enrollment and the DIBELS subscales at a minimum of 0.37 (Letter Naming; ITCV = 0.14) and 0.33 (Sound Fluency; ITCV = 0.11) to negate our findings. We observed comparable ITCV values for pre-K enrollment and the ESI-K screener (ITCV = 0.12, minimum $r=0.35$). For the WSS and ECHOS subscale measures, ITCV values were smaller, but ranged from 0.03 to 0.12, suggesting that an unobserved confound would need to be correlated with pre-K and these outcomes between 0.18 and 0.35 to reduce our findings to non-significance. Finally, we observed an ITCV value of 0.07 for pre-K enrollment and kindergarten grades (minimum $r=0.25$). Importantly, none of the parental covariates in the MSRP met these benchmarks for preschool selection (correlation range = |0.00–0.09|) or with any of our outcome measures (correlation range |0.02–0.10|); therefore, parental covariates are unlikely to negate the observed link between pre-K attendance and kindergarten readiness and performance.

As mentioned earlier, there were not a sufficient number of non-Latino White/other children in family childcare to include them in our focal models, but we did conduct ancillary analyses to determine whether non-Latino White children also benefited from public school-based pre-K as compared with center-based care. Note that these analyses could only be estimated for a sub-

Table 4
Unstandardized and standardized main effect coefficients for child outcomes.

Child outcomes	Early care and education contrast						R ^{2c}
	Pre-K vs. CBC		Pre-K vs. FCC		FCC vs. CBC		
	B (SE)	β	B (SE)	β	B (SE)	β	
Emergent literacy skills (DIBELS)							
Alphabet recognition	4.07 (0.47)***	0.23	7.80 (1.48)***	0.44	-3.74 (1.43)**	-0.21	0.26
Sound recognition	1.94 (0.27)***	0.18	3.28 (0.71)***	0.28	-1.34 (0.67)†	-0.10	0.11
Overall kindergarten readiness (ESI-K) ^a	0.92 (0.13)***	0.20	1.89 (0.57)***	0.41	-0.97 (0.52)†	-0.21	0.14
Overall kindergarten readiness (ECHOS) ^b	0.99 (0.56)	0.13	-	-	-	-	0.11
Math subscale	0.30 (0.14)†	0.16	-	-	-	-	0.12
Literacy subscale	0.22 (0.18)	0.09	-	-	-	-	0.13
Science/social studies subscale	0.28 (0.11)†	0.16	-	-	-	-	0.06
Social skills subscale	0.26 (0.11)†	0.18	-	-	-	-	0.07
Health/physical development subscale	0.02 (0.06)	0.02	-	-	-	-	0.03
Creative arts subscale	-0.02 (0.08)	-0.01	-	-	-	-	0.04
Overall kindergarten readiness (WSS)	0.70 (0.21)***	0.16	-2.09 (0.83)†	0.47	-1.40 (0.82)†	-0.32	0.07
Math subscale	0.25 (0.07)***	0.15	0.83 (0.27)***	0.50	-0.57 (0.27)†	-0.35	0.07
Literacy subscale	0.92 (0.21)***	0.18	2.63 (0.88)***	0.53	-1.71 (0.88)†	-0.34	0.10
Social skills subscale	1.23 (0.33)***	0.16	2.29 (1.38)†	0.30	-1.07 (1.38)	-0.14	0.10
Health/physical development subscale	0.13 (0.06)†	0.11	0.35 (0.20)†	0.28	-0.21 (0.22)	-0.17	0.03
Fine motor subscale	0.19 (0.08)†	0.11	0.78 (0.34)†	0.43	-0.59 (0.34)†	-0.33	0.05
End of kindergarten grades	0.04 (0.01)***	0.10	0.07 (0.03)†	0.17	-0.03 (0.03)	-0.07	0.23

Note: Although not shown, all models controlled for children's age, ethnicity, ELL status, immigration status, receipt of free/reduced lunch, and preschool entry cognitive skills. Additionally, when different cohorts of children received the same assessments, models controlled for period effects.

^a Data were not available on the ESI-K subscales.

^b There was insufficient cell size to examine children in family childcare who received the ECHOS.

^c All R² values were statistically significant at $p < 0.001$. FCC = Family childcare. CBC = Center-based care. Pre-K = Public school-based pre-K.

† $p < 0.10$.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

set of the outcome measures with sufficient sample size. Results revealed that non-Latino White/other children demonstrated greater kindergarten skills when enrolled in public school-based pre-K than in center-based care on assessments of early alphabet ($ES = 30\%$ of a SD , $p < 0.001$) and sound recognition skills ($ES = 25\%$ of a SD , $p < 0.001$) as well as the ESI-K screener ($ES = 20\%$ of a SD , $p < 0.001$); however, there were no differences in their kindergarten grades ($ES = 1\%$ of a SD , ns). We used post-hoc coefficient comparisons to determine whether the associations between type of care and children's kindergarten outcomes were significantly different across Black/Latino and non-Latino White families (Clogg, Petkova, & Haritou, 1995; Paternoster, Brame, Mazerolle, & Piquero, 1998). These comparisons revealed that there was no evidence for moderation; thus, all groups of low-income children equally benefitted from public school-based pre-K at age 4 as compared with center-based care.

4. Discussion

This study set out to examine the associations between low-income and ethnically diverse children's childcare arrangements at age 4 and their kindergarten readiness and performance among a large sample of children from the Miami community. Although these analyses are descriptive in nature, this study represents a contribution to the literature on early care and education in several ways and underscores the opportunities and costs of working with administrative data that have been largely absent from the field of child development and educational psychology more broadly. The results of this study have four take-home messages.

First, similar to the growing body of literature on preschool education more broadly (Gormley et al., 2005; Magnuson et al., 2007b; Weiland & Yoshikawa, 2013), we found that children who experienced public school-based pre-K during the year before kindergarten exhibited stronger kindergarten readiness and performance a year later than those who received subsidies to attend

center-based and family childcare in the community. Although the public school-based pre-K effect sizes were small when compared with center-based care and small-to-modest when compared with family childcare, these associations exceeded the estimated effects required for programs to justify the associated expenditures (9–15% of a SD ; Magnuson & Duncan, 2014). In fact, the per-pupil cost for subsidized childcare (\$4679 dollars per child; U.S. Department of Health and Human Services, 2014a, 2014b) outweighed that of pre-K (\$3846 dollars per child; Barnett et al., 2015), suggesting that pre-K is likely a good public investment. Compared with other recent evaluations of pre-K programs across the country, the effect sizes reported herein were somewhat smaller than those reported in Boston (45–62% of a SD ; Weiland & Yoshikawa, 2013). The documented effects in the Miami community, however, were on par with the most recent re-analysis of Tulsa's pre-K programs (20–45% of a SD ; Hill et al., 2015) and Tennessee's pre-K programs (9–41% of a SD ; Lipsey et al., 2015), and these estimates were greater than the national estimates derived from the ECLS-K (10–13% of a SD ; Magnuson et al., 2007b). Thus, when taken as a whole, these results suggest that differentiating between center-based care and public school pre-K—which is less often done in the early childhood literature—is necessary for disentangling the benefits of preschool programs.

Why are public school-based pre-K programs more effective in promoting kindergarten readiness than subsidized center-based and family childcare programs? This is likely because of quality standards as well as program emphasis. These programs are housed in public schools and, therefore, tend to have more rigorous standards and offer a higher quality learning experience (Barnett et al., 2015; Bumgarner & Brooks-Gunn, 2015; Winsler et al., 2008). These programs may also ease the transition from preschool to kindergarten (Hines & Winsler, 2016). Even with these studies in mind, continued work is necessary to fully understand the processes that explain differences in program efficacy. Considering that linking state pre-K to public schools may not be possible in many cities

where the facilities are not available, attention must be paid to the mechanisms that are driving our results, which we could not examine with the MSRP data. Factors deserving consideration in future work include program quality (Auger, Farkas, Burchinal, Duncan, & Vandell, 2014), teachers' qualification and education (Bassok, Fitzpatrick, Greenberg, & Loeb, 2016), teacher-child interactions (Hindman & Wasik, 2015), curriculum (Duncan et al., 2015), family engagement (Gershoff, Ansari, Purtell, & Sexton, 2015), classroom composition and peer effects (Ansari, Purtell, & Gershoff, 2016; Justice, Petscher, Schatschneider, & Mashburn, 2011), teachers' use of the English or Spanish language (Burchinal, Field, Lopez, Howes, & Pianta, 2012), and school attendance (Arbour et al., 2016).

Next, and similar to the existing literature (Ansari & Winsler, 2012, 2013; Forry et al., 2013; Loeb et al., 2004), we found some differences within the subsidized childcare system. Specifically, children in center-based care exhibited greater kindergarten skills than their peers in family childcare across a variety of assessments. By the end of the kindergarten year, however, children in center-based care did not exhibit higher school grades from their teachers than their peers who experienced family childcare. We note that our sample of children in family childcare programs was small and for some outcomes we did not have a sufficient sample size to detect significant differences when effect sizes were smaller. These analyses also extend prior work done with the MSRP (Ansari & Winsler, 2012; Winsler et al., 2008) by revealing that the small differences in children's pre-academic skills that were present at the end of preschool—as a function of childcare—were sustained and larger upon kindergarten entry, even after controlling for children's preschool cognitive skills. These results, therefore, underscore the importance of examining the benefits preschool programs through the kindergarten year. If children's kindergarten outcomes were not examined, then it would appear that children in family childcare and center-based care start school with similar abilities (Ansari & Winsler, 2012), but when tracking these children through kindergarten, we find that this is not the case.

Why are center-based programs more effective for promoting kindergarten readiness than family childcare? The differences across these programs are likely due to the quality of family childcare programs that are accessible to the low-income families. In general, family childcare programs are of lower quality and children in these programs experience fewer cognitively stimulating activities as compared with children in center-based care (Dowsett et al., 2008; Votruba-Drzal et al., 2004), which are critical for children's academic development. In other words, during these early years, children benefit most when they are engaged in stimulating interactions with classmates and teachers, which occur less frequently in family childcare settings. An alternative, but equally plausible, explanation that requires continued attention is that families who select center-based care vary systematically from those who select family childcare (Coley, Votruba-Drzal, Collins, & Miller, 2014). Accordingly, an in depth analysis of why low-income families select into different preschool programs is needed (Crosnoe, Purtell, Davis-Kean, Ansari, & Benner, 2016; Thomas, Boller, Johnson, Young, & Hu, 2015).

The third key finding was that despite some of the differences in children's kindergarten readiness as function of race/ethnicity and language minority status, all children—regardless of their cultural or language background—appeared to benefit from public school-based pre-K (vs. subsidized childcare) and center-based care (vs. family childcare). Although the existing literature is ambiguous in terms of who benefits the most from preschool education, this lack of moderation is contrary to a number of studies that have documented greater benefits for different subgroups of children (Crosnoe, 2007; Gormley et al., 2005; Loeb et al., 2007; Weiland & Yoshikawa, 2013). Part of this difference may stem from the fact that our sample of children was all low-income, who are

known to show greater gains from preschool education as compared with more affluent children (Magnuson et al., 2004; Weiland & Yoshikawa, 2013). Relatedly, given the strong support for the Spanish language and culture in Miami, the public school-based pre-K programs in this community might be particularly effective at tailoring their services to the Latino population, thereby minimizing any additional advantages non-Latino and non-ELL Black children may have from these same programs (Bassok, 2010; Puma et al., 2010).

Finally, current national survey data have been unable to monitor and capture the diversity in early care and education programs across the country that are being established by states and the federal government; thus, there has been a growing need for data sources that can adequately capture the diversity of programs within local communities to evaluate their outcomes. This study, which integrated survey data of preschool experiences with administrative data on kindergarten outcomes, illustrates the kinds of research questions that can be addressed by leveraging data that are being collected during day-to-day operations by school districts as well as other agencies. The MSRP is just one of many recent efforts to connect different data sources to inform policy and practice (Chittleborough, Searle, Smithers, Brinkman, & Lynch, 2015; Data Quality Campaign, 2009, 2010; Goldfeld et al., 2015; Ip et al., 2015; Pearce, Scalzi, Lynch, & Smithers, 2015). These integrated data systems hold great promise for expanding our understanding of child development in different community contexts, but this line of research can be further augmented by combining administrative data from different programs and agencies so that we have a richer set of explanatory and outcome variables (Fantuzzo et al., 2012). In using administrative data, we can conduct population-based and policy-relevant research within communities like Miami and elsewhere to inform policy makers and practitioners how to best support the needs of children and families.

4.1. Limitations

Despite these contributions to the literature, there are some limitations of this study. Primarily, the generalizability of our findings is limited as they do not allow us to compare the complete landscape of early care and education programs; for example, we did not have information on children who attended Head Start or who were cared for exclusively by a parent, which require future empirical attention (Zhai, Brooks-Gunn, & Waldfogel, 2014). In other words, in the absence of a true control group who did not receive any type of care, we cannot determine the benefits of any preschool participation as compared with children who stay at home. Even so, these data provide much needed insight into non-Mexican Latino and Black children's early school experiences across three different types of programs that are commonly used in the community.

Another limitation of this study—which is true for most work done in the field of early childhood education—was that the children studied here attended preschool between 2002 and 2007. We know, however, that the landscape of early childhood education has evolved considerably recently due to changes in preschool teaching and learning (e.g., Race to the Top Early Learning Challenge Grants; Common Core standards adopted for preschoolers). For these reasons, continued effort is necessary to understand how the early childhood market has evolved over the last decade, both in Miami and in other communities. Another limitation of this study was the measurements of children's kindergarten readiness, which did not match those used in other nationally representative datasets and, ultimately, limit our ability to make comparisons with prior studies.

Finally, although we controlled for different child-level factors, we could not entirely address selection bias because we did not have full background information for all families—a limitation of working with administrative data. We did, however,

conduct robustness checks, and in each case, these analyses lent confidence to our conclusions. We note that unlike some of the existing literature (Forry et al., 2013), we had access to children's cognitive abilities at preschool entry and, therefore, we were able to take into account many of these pre-existing differences as well as both measured and unmeasured confounds (Ansari & Crosnoe, 2015; NICHD ECCRN & Duncan, 2003). These robustness checks do not change the fact that this is an observational study that does not allow for causal inference. Other, more rigorous, quasi-experimental methods could not be conducted due to data limitations. For example, we could not conduct regression discontinuity because all children had experienced preschool when they received the kindergarten assessments, and we could not conduct instrumental variable analyses because we did not have exogenous variation on which to capitalize. Data permitting, future studies should consider using these more rigorous quasi-experimental methodologies, such as regression discontinuity (Gormley et al., 2005; Weiland & Yoshikawa, 2013), propensity score matching (Bumgarner & Brooks-Gunn, 2014; Hill et al., 2015), or instrumental variables (Crosby, Dowsett, Gennetian, & Huston, 2010; Magnuson et al., 2007b) to get closer to the "causal" estimates of preschool.

4.2. Conclusions

With these associated limitations in mind, the current study capitalized on administrative data to provide timely new analyses of the early school experiences of ethnically and linguistically diverse children from a low-income community. Similar to the growing body of literature on pre-K programs from other parts of the country (Forry et al., 2013; Gormley et al., 2005; Weiland & Yoshikawa, 2013), this study provides further evidence to suggest that Black and Latino children in these settings, during the year prior to kindergarten, entered school with stronger academic, social, and fine motor skills and as evidenced by end-of-year grades, these children continued to do better throughout the kindergarten year. Differences also emerged between children who experienced center-based and family childcare in the community.

With millions of dollars at stake, and the continued debate regarding the efficacy of different types of preschool programs for different groups of children, future studies are still necessary to determine whether investing in public school-based pre-K programs is a better use of financial resources as compared with investments in childcare subsidies. Across the nation, subsidized childcare programs continue to represent a flexible resource and play an important role in the lives of low-income families in supporting parents' employment (the original intent of child care subsidies; Johnson & Ryan, 2015). Simply put, the goals of pre-K (education) and subsidized childcare (flexible care as a means of supporting employment) are different and should be considered in the future when examining the outcomes of these programs. Such inquiry is particularly relevant in light of the difficulty of taking quality programs to scale across different communities. Nonetheless, the results of the current investigation contributes to this effort and provides compelling, but descriptive, evidence to suggest that public school-based pre-K programs can be leveraged to help prepare low-income and ethnically diverse children for school. Thus, based on our findings and the prior literature (Gormley et al., 2005; Weiland & Yoshikawa, 2013), policy-makers should consider continued funding for school-based pre-K.

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <http://dx.doi.org/10.1016/j.ecresq.2016.06.002>.

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