Journal of Educational Psychology
2014, Vol. 106, No. 4, 1066–1079

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0022-0663/14/$12.00 http://dx.doi.org/10.1037/a0036799

Montessori Public School Pre-K Programs and the School Readiness of Low-Income Black and Latino Children

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Within the United States, there are a variety of early education models and curricula aimed at promoting young children's pre-academic, social, and behavioral skills. This study, using data from the Miami School Readiness Project (Winsler et al., 2008, 2012), examined the school readiness gains of low-income Latino ($n = 7{,}045$) and Black ($n = 6{,}700$) children enrolled in 2 different types of Title-1 public school pre-K programs: those in programs using the Montessori curriculum and those in more conventional programs using the High/Scope curriculum with a literacy supplement. Parents and teachers reported on children's socio-emotional and behavioral skills with the Devereux Early Childhood Assessment (Lebuffe & Naglieri, 1999), whereas children's pre-academic skills (cognitive, motor, and language) were assessed directly with the Learning Accomplishment Profile–Diagnostic (Nehring, Nehring, Bruni, & Randolph, 1992) at the beginning and end of their 4-year-old pre-K year. All children, regardless of curriculum, demonstrated gains across pre-academic, socio-emotional, and behavioral skills throughout the pre-K year; however, all children did not benefit equally from Montessori programs. Latino children in Montessori programs began the year at most risk in pre-academic and behavioral skills, yet exhibited the greatest gains across these domains and ended the year scoring above national averages. Conversely, Black children exhibited healthy gains in Montessori, but they demonstrated slightly greater gains when attending more conventional pre-K programs. Findings have implications for tailoring early childhood education programs for Latino and Black children from low-income communities.

Keywords: Montessori, curriculum, school readiness, public school pre-K, poverty

Over the last decade, we have seen a significant increase in the rate of young children living in poverty, where today, one in five are considered poor (U.S. Census Bureau, 2011). Poverty has important implications for children's early development and is associated with increased risk of school failure (Duncan & Magnuson, 2005; Gershoff, Aber, Raver, & Lennon, 2007; Huston & Bentley, 2010). Across the United States, sizable gaps in children's school achievement are documented across income and ethnic lines as early as kindergarten (Duncan & Magnuson, 2005; Magnuson & Waldfogel, 2005), and once these gaps in early learning are established, children from disadvantaged backgrounds are less likely to catch up to their more affluent peers (Reardon, 2011). To eliminate such gaps in school achievement, efforts target children before kindergarten entry because those who enter kindergarten more ready to learn do better in school and are less likely to be retained and/or drop out (Duncan et al., 2007; Magnuson, Meyers, Ruhm, & Waldfogel, 2004; Winsler et al., 2012).

Today, early care and education programs (e.g., center-based care, family childcare, public pre-K programs, and Head Start) are an increasingly common experience for young children before kindergarten entry (Laughlin, 2013). These early services are seen as an opportunity to promote children's early school readiness (Ansari & Winsler, 2013; Burchinal, Peisner-Feinberg, Bryant, & Clifford, 2000; Dearing, McCartney, & Taylor, 2009; Gormley, Gayer, Phillips, & Dawson, 2005; Loeb, Fuller, Kagan, & Carrol, 2004; Magnuson et al., 2004; Magnuson, Ruhm, & Waldfogel, 2007; Winsler et al., 2008, 2012). Along with the facilitation of children's early skills, the benefits of high-quality early education programs have been documented to last through the middle-school and high-school years (Dearing et al., 2009; Miller & Bizzell, 1984; Vandell et al., 2010). Although the type and quality of services vary greatly, it is generally suggested that, on average, public school pre-K programs promote children's pre-academic, social, and behavioral development (Gormley et al., 2005; Magnuson & Waldfogel, 2005; Winsler et al., 2008). Note, however, quality preschool programs are often unavailable to children from disadvantaged backgrounds (Clarke-Stewart & Allhusen, 2005; Dearing et al., 2009; Fuller, Holloway, & Liang, 1996; Magnuson et al., 2004), and these differences in access to preschool exist across racial and ethnic lines (Magnuson & Waldfogel, 2005).

This article was published Online First May 12, 2014.

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The project on which this article is based was funded by the Early Learning Coalition of Miami-Dade/Monroe. This work was also supported by Eunice Kennedy Shriver National Institute of Child Health and Human Development Grant T32 HD007081-35 (Principal Investigator: Kelly Raley) awarded to the Population Research Center at the University of Texas at Austin. We thank all the children, families, and agencies that participated and made the Miami School Readiness Project possible.

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Consequently, there has been growing interest among researchers, policy makers, practitioners, and parents in the type of education young children receive as a means for fostering children's school readiness, especially for children from minority and low-income backgrounds.

Within the United States, there are increasing numbers of early education models/curricula (e.g., Montessori and High/Scope) aimed at improving children's early learning (Lillard, 2008); yet, preschool curricula, the instructional blueprints and materials for promoting children's early skills, have received little empirical attention (Clements, 2007). Classroom curriculum is important because it provides clear guidelines for learning objectives and selecting/implementing activities that meet children's developing needs. Although the goal of all programs is to provide learning opportunities for children, how best to do that remains contested and requires continued evaluation to determine the effects of different curricula on children's early school success (Barnett et al., 2008).

High/Scope Curriculum

High/Scope curriculum (Hohmann & Weikart, 2002), which balances child-initiated and teacher-directed activities, is one of the most frequently used and researched curricula in early education programs. The four principles of the High/Scope model include the following: active learning, positive child–adult interactions, a child-friendly environment, and consistent routines. The power of learning comes from children's own initiative, whereby children are allowed to act on their own desire to explore and make choices regarding the activities they want to do for the day, with whom they want to play, and how they will play (Hohmann & Weikart, 2002). There is also a strong emphasis on children as "intentional learners," whereby children plan, carry out, and review their activities throughout the school day. Classrooms are organized to maximize children's learning so they can independently navigate throughout the day with centers (e.g., dramatic play, arts/crafts, science) that meet their needs. Teachers organize the environment, materials, and routines to facilitate active learning and, more importantly, to foster a positive social environment through small- and large-group (e.g., music, reading, games) activities. Throughout the day, the role of teachers is to observe, extend, and facilitate opportunities for active learning and scaffold actions to best support children's development (Hohmann & Weikart, 2002).

In smaller experimental trials (e.g., Perry Preschool), children exposed to High/Scope have been found to exhibit better outcomes, both short- and long-term, compared to children in Direct Instruction classrooms who show substantially worse socioemotional development (Schweinhart et al., 2005). In larger, less intensive programs, however, the efficacy of the High/Scope curriculum remains mixed (Preschool Curriculum Evaluation Research Consortium [PCER], 2008). In fact, roughly a quarter (22%) of Head Start programs nationwide utilize the High/Scope model (Zigler & Bishop-Josef, 2006), but most have not produced the same impact as the Perry Preschool program (Duncan & Magnuson, 2013; Puma et al., 2010). Note, however, that in general, most large-scale preschool curricula (e.g., Bright Beginnings, Doors to Discovery, Literacy Express, Early Literacy and Learning Model) have been deemed rather ineffective in promoting children's early academic achievement, social skills, and behavior (PCER, 2008).

Montessori Curriculum

Among other noteworthy curricula are Montessori programs, which have existed for over 100 years and continue to increase in popularity—today, these programs are used in over 4,000 schools (Cossentino, 2005). Montessori programs are often characterized by mixed-age classrooms that facilitate individualized learning, and compared to more conventional programs, they contain less teacher-directed structure, which allows for more child-directed activities that promote children's early academic, social, and behavioral development (Lillard & Else-Quest, 2006). Unlike most traditional programs, Montessori curricula emphasize learning that is tailored to each individual child's interests, learning style, and needs (Lillard, 2008) while also placing greater emphasis on the development of fine motor skills through practical life materials (Montessori, 2004). Montessori classrooms have large open spaces, which allow children to spread out and work on activities independently and learn at their own pace and skill level. The materials/activities are arranged so that children progress from simple to complex and from concrete to abstract materials, and once children master these tasks, they move on to more challenging activities (Lillard, 2008). Further, Montessori classrooms provide less frequent teacher instruction and place a greater emphasis on collaboration among children, whereby younger children receive stimulation from older children, who in turn benefit from serving as role models.

The small, but growing, body of literature on Montessori education suggests that children enrolled in Montessori classrooms—both during the preschool and the kindergarten years (Kayili & Ari, 2011; Lillard, 2012; Lillard & Else-Quest, 2006) and even during the later years in elementary school, middle school, and high school (Dohrmann, Nishida, Gartner, Lipsky, & Grimm, 2007; Lillard & Else-Quest, 2006; Rathunde & Csikszentmihalyi, 2005)—demonstrate greater gains in academic, socio-emotional, and behavioral skills than children enrolled in more conventional programs. Some even suggest that the benefits of Montessori preschool programs, at least for Black males, are sustained through high school (Miller & Bizzell, 1984). Dohrmann et al. (2007), who examined the academic achievement of high school students who attended Montessori programs from preschool to fifth grade within Milwaukee Public Schools, found that students demonstrated sustained academic benefits (math and science) 5 years after they returned to traditional programs. Compared to students who attended traditional public schools, students who experienced Montessori also exhibited higher scores on assessments of math and science (Dohrmann et al., 2007). Existing randomized trials also indicate that inner-city elementary-age children attending Montessori programs exhibited higher scores across areas of early achievement, social skills, and behavior compared to children enrolled in more traditional educational programs (Lillard & Else-Quest, 2006). Similarly, children in Montessori classrooms have been documented as exhibiting higher executive functioning compared to their peers who were also in the lottery for Montessori, but who were not chosen (Lillard & Else-Quest, 2006). These benefits have also been documented for children in preschool (Lillard, 2012), whereas kindergarten-age children in Montessori have dem-

onstrated much stronger fine motor skills (Rule & Stewart, 2002), which has important implications for later academic achievement (Carlson, Rowe, & Curby, 2013; Grissmer, Grimm, Aiyer, Murrah, & Steele, 2010).

Other evaluations of Montessori curriculum are more mixed and suggest that the Montessori method does not promote school-age children's early skills any more than traditional programs (Cox & Rowlands, 2000; Lopata, Wallace, & Finn, 2005). Specifically, Cox and Rowlands (2000) examined young children's creativity when enrolled in alternative forms of education (Steiner and Montessori) and traditional public schools. Results indicated that children in Montessori programs exhibited similar levels of creativity as their peers in more traditional programs but less than children in Steiner schools. Further, there is some evidence suggesting that urban Montessori programs are not better than traditional public schools with regard to promoting school-age children's long-term cognitive skills (Lopata et al., 2005). Although school-age children in Montessori programs scored higher on assessments of math compared to their peers in open magnet schools (roughly two thirds of a *SD*), by middle school, the children in Montessori programs were doing much worse on assessments of language, but they showed no differences in math abilities (Lopata et al., 2005).

Variability in Montessori Effects

Although children from all racial/ethnic groups benefit from preschool, there has been growing evidence to suggest that the magnitude of the benefits vary across groups (Currie & Thomas, 1995; Gormley et al., 2005; Loeb, Bridges, Bassok, Fuller, & Rumberger, 2007; Raikes, Vogel, & Love, 2013). Emerging data are somewhat contradictory, with some suggesting that Latino children have the most to gain from early education (Gormley et al., 2005; Loeb et al., 2007; Weiland & Yoshikawa, 2013), whereas others suggest that Black children benefit more with Latinos exhibiting minimal benefits (Bassok, 2010; Currie & Thomas, 1995; Puma et al., 2010; Raikes et al., 2013). Accordingly, there have been calls in the literature for the continued examination of different early education programs and curricula to determine the best method for enhancing Latino children's early learning and behaviors (Brooks-Gunn, Love, Raikes, & Chazan-Cohen, 2013; Garcia & Jensen, 2009). In other words, simply looking at average impacts of early childhood programs is not enough (Duncan & Magnuson, 2013), and examination of ethnicity as a potential moderator of preschool/curricular effects is necessary especially considering the rapidly growing population of Latino children (U.S. Census Bureau, 2011). Examination of ethnic group differences is particularly important in the context of Montessori programs. Since its inception, Montessori curricula have been tailored to individual children's learning (Morrison, 2007), which affords each child the opportunity to learn at their own pace and would be particularly important for Latino children who frequently speak a language other than English at home (72%; U.S. Census Bureau, 2010). Further, one of the cornerstones of the Montessori method is the incorporation of children's culture in the classroom (Montessori, 1994), which some argue (Garcia & Jensen, 2007, 2009) is imperative for the early school success of young Latino children. Accordingly, given these unique features of the Montessori program, it is important to differentiate between disadvantaged ethnic subgroups to determine whether certain children benefit more than others from Montessori education.

Gaps in the Literature and the Current Study

Although there has been rapid growth of the Montessori curriculum, there continues to be limited and inconsistent empirical support for such programs, especially during the early childhood years (Cox & Rowlands, 2000; Lillard, 2012). To date, not many studies in the Montessori literature have focused on children's school achievement (Borman, Hewes, Overman, & Brown, 2003), and there are even fewer studies that examine the impact of Montessori programs on children's socio-emotional and behavioral development, both of which are now recognized as important domains of early learning (Heckman & Kautz, 2012; Liew, 2012; Raver, 2003). In general, Montessori programs attract families of greater economic means whose children might show higher starting points and greater gains over time than for children from low-income urban communities, regardless of curriculum. As a result, the literature on Montessori education has often been limited to rather homogenous, higher income, or White samples (Lillard, 2012), and therefore, the extent to which Black and Latino children from low-income backgrounds demonstrate gains across pre-academic, socio-emotional, and behavioral skills in Montessori programs is not clear and requires attention. To our knowledge, no study to date has explicitly explored outcomes of Montessori preschool programs for Latino children. Accordingly, we examine gains in children's pre-academic, social, and behavior skills across the 4-year-old pre-K year for Black and Latino children enrolled in two types of Title-1 public school pre-K programs—conventional programs and those closely following Montessori curriculum.

We use a subset of the data from the Miami School Readiness Project (MSRP; Winsler et al., 2008, 2012)—a large-scale, county-wide, university-community applied partnership and program evaluation—to address the following research question: (1) Are there differences in children's school readiness over the course of the pre-K year as a function of curricula (Montessori vs. conventional)? Further, considering the call for the examination of different curricula for Latino children (Brooks-Gunn et al., 2013; Garcia & Jensen, 2009) and evidence suggesting that the benefits of early education programs may vary as a function of children's race/ethnicity (Currie & Thomas, 1995; Gormley et al., 2005; Raikes et al., 2013), we also explored whether (2) children's ethnicity (Latino vs. Black) moderates the relation between curriculum and children's school readiness.

Regardless of curriculum, we believed that all children would exhibit gains across all domains of early learning during the pre-kindergarten year. Considering that some of the more rigorous studies have shown that children demonstrate greater pre-academic and behavioral gains when enrolled in Montessori programs (Lillard, 2012; Lillard & Else-Quest, 2006), we anticipated that Montessori programs would foster greater skill gains across pre-academic, socio-emotional, and behavioral skills than more traditional programs. With regard to potential differences according to ethnicity, we were unsure what to expect because most of the prior Montessori literature has used predominantly White samples, and even in the prior work that has examined Montessori among urban children (Lillard & Else-Quest, 2006; Lopata et al.,

2005), no distinctions have been made between subgroups (i.e., Latino, Black, Asian). However, given the unique features of the Montessori program (i.e., curricula tailored to individual children's learning and incorporation of children's culture), it is possible that young Latinos would do better than their Black peers in these classrooms.

Method

Participants

This study uses a subsample of data from the MSRP involving Latino (n = 7,045) and Black (n = 6,700) children enrolled in high-poverty, Title-1 public school pre-K programs in the city of Miami at 4 years of age. Note that a small number of children (approximately 1% of the larger MSRP) identified as both Latino and Black, and for the purpose of our analyses, these children were excluded. Among a subsample of children from this community, prior work shows that less than 10% of children were foreign-born; however, 50% of children had parents born outside of the United States (Cuba: 48%, Hati: 17%, Nicaragua: 14%, Columbia: 6%, Dominican Republic: 5%, Honduras: 5%, and Puerto Rico: 5%; De Feyter & Winsler, 2009). Children were included from all five years/cohorts (2002–2007) of the MSRP (Cohort A, 16.6%; Cohort B, 20.5%; Cohort C, 24.5%; Cohort D, 19.7%; Cohort E, 18.7%). Eight of the public schools used Montessori pre-K curriculum (n = 770 children), whereas the rest of the pre-K programs used a more conventional High/Scope curriculum supplemented with a literacy component (either the Building Early Language and Literacy [BELL] or the Houghton-Mifflin-Harcourt [HMH]; 120 schools, n = 12,975 children).[1] Unfortunately, for the High/Scope classrooms, we do not have information regarding which children received the BELL or HMH literacy supplement; thus, we cannot distinguish between the two, and these groups were combined into the High/Scope curriculum.

On average, children in Montessori and conventional programs were 4 years and 6 months of age (SD = 3.53 months) at the beginning of the school year (see Table 1 for available demographic information by group). All participants attended Title-1 schools, which are defined by over 75% of the children attending the school qualifying for free/reduced lunch (FRL) status. Due to participation in the larger MSRP project, we had access to children's FRL status during their following kindergarten year if they remained in the public schools (n = 709, 92% of children in Montessori pre-K; n = 12,325, 95% of children in traditional pre-K). Children in Montessori programs were somewhat more likely to receive FRL (95%) during their kindergarten year than children attending more traditional preschool programs (90%), $\chi^2(1, N = 13{,}034) = 14.23$, $p < .001$.[2] Also, and as can be seen in Table 1, Latino children in our sample were more likely to attend traditional preschool programs and were less likely to be in Montessori. Correspondingly, Black children in this sample were overrepresented in Montessori classrooms, $\chi^2(1, N = 13{,}745) = 169.92$, $p < .001$. As can be expected given this ethnic difference, children in Montessori were also more likely to speak English at home than children in more traditional programs, $\chi^2(2, N = 13{,}034) = 215.36$, $p < .001$. Given the uneven distribution of Blacks and Latinos across programs, we also examined the home language within the Latino population only. Results from these analyses suggest that Latinos in Montessori were slightly more likely to come from Spanish-speaking homes (87%) than their Latino peers in conventional programs (81%), $\chi^2(2, N = 6{,}965) = 6.86$, $p < .05$.

Table 1
Demographic Characteristics of Children in Title-1 Public Schools

Variable	Program type: Montessori	Program type: Conventional	F or χ^2
Child age (in months)	n = 770	n = 12,975	0.02
M (SD)	54.27 (3.56)	54.29 (3.52)	
Child gender	n = 770	n = 12,975	0.04
% male	49.9	49.7	
% female	50.1	50.3	
Child ethnicity	n = 770	n = 12,975	169.92*
% Latino	28.4	52.6	
% Black	71.6	47.4	
Home language (all children)	n = 709	n = 12,325	215.36*
% English	73.1	45.7	
% Spanish	26.4	45.4	
% other	0.5	7.4	
Home language among Latinos	n = 208	n = 6,757	6.86*
% English	12.5	16.8	
% Spanish	87.5	81.4	
% other	0	1.8	
LAP-D assessment language	n = 311	n = 6,423	3.93
% English	89.5	92.2	
% Spanish	10.5	7.6	
Free or reduced lunch	n = 709	n = 12,325	14.23*
% yes	94.2	89.9	
% no	5.8	10.1	

Note. LAP-D = Learning Accomplishment Profile–Diagnostic.
* $p < .05$.

The uneven spread of ethnicity across Montessori could be partly due to the fact that neighborhoods in this city tend to be fairly segregated with areas that are largely Latino and areas that are largely Black (U.S. Census Bureau, 2010), and indeed, five of the eight Montessori programs were in predominantly Black communities, and therefore, Latinos may have had less access to Montessori programs. However, the eight Montessori programs were magnet/charter schools, and, thus, families were allowed to apply to enroll their children from other geographic areas in the district. Because the schools were unable to accommodate all children, families wishing to enroll their children in the Montessori programs had to apply through the pre-K lottery. It is likely that some children in the conventional programs had entered the Montessori lottery and were unsuccessful. It is also important to note that the conventional pre-K programs also tended to be in fairly mono-ethnic (i.e., largely Black or Latino) neighborhoods, and that by definition, all children, regardless of curricula, attended low-income, Title-1 schools (75% FRL

[1] We re-ran analyses with a random selection of 800 children in conventional programs to make sure that the statistical significance of our results reported below was not due to the large sample size of children in conventional programs. Results from these randomly selected 800 cases were the same.

[2] We re-ran the models described below controlling for FRL status, and all results were the same as those reported below; therefore, to maximize our sample size, we report results without controlling for FRL status.

eligibility) and neighborhoods (income below $30,000; U.S. Census Bureau, 2010).

There were other notable differences between the Montessori programs and the more conventional pre-K programs that followed the High/Scope curriculum. Although all classrooms had a child–adult ratio of 18–2, Montessori classrooms were likely staffed by more educated lead-teachers. Specifically, Montessori programs in this district required teachers to have a master's degree, whereas more conventional programs required only a bachelor's degree. Similar to other conventional pre-K programs, each classroom was also staffed with one assistant teacher who had received a bachelor's degree. Teachers in the Montessori classrooms also had received special teacher training and certification to become official Montessori teachers. Accordingly, Montessori programs in this study, at least with regard to training, we believe were as rigorous as those considered classic Montessori programs (Lillard, 2012). Further, to meet the needs of the curriculum, complete Montessori materials and activities were also provided. Although fidelity information is not available, we believe the participating Montessori programs fall close to "classic" Montessori programs (as opposed to "supplemented" programs; Lillard, 2012), with the exception of mixed-age classrooms, which is often seen in traditional Montessori programs.

Measures

Cognitive, language, and fine motor skills. Children's preacademic skills were assessed through the Learning Accomplishment Profile–Diagnostic (LAP-D; Nehring, Nehring, Bruni, & Randolph, 1992), which was chosen by the community because it lined up with the states' Early Learning Performance Standards, was available in Spanish (piloted and standardized in this community) and English, and was for large-scale use. The LAP-D is a national norm-referenced instrument with strong internal consistency reliabilities both nationally (α = .76–.92; Nehring et al., 1992) and within the larger MSRP sample (α = .93–.95; Winsler et al., 2008). The LAP-D is a standardized direct assessment and we used three subscales: cognitive (matching and counting), language (comprehension and naming), and fine motor (writing and manipulation). The LAP-D is intended for children between 30 and 72 months of age and was administered by children's pre-K teacher at the beginning (Time 1 [T1]—September/October) and end (Time 2 [T2]—April/May) of the children's 4-year-old academic year. Although teachers administered the LAP-D, it was not teacher report of children's academic skills; rather, it was direct child assessments. Spanish and English versions of the LAP-D were available, both of which have demonstrated strong test–retest reliability (.93–.97; Hardin, Peisner-Feinberg, & Weeks, 2005). Children's teachers determined the language of assessment according to children's strongest language, and in this sample, 12% of children completed the LAP-D in Spanish at T1, whereas roughly 8% completed Spanish assessments at T2. Note, that for results reported in this study (both LAP-D and DECA), we use national percentile scores to increase interpretability of our findings and to compare children relative to where they rank nationally to other children of the same age.

As a precaution, we conducted analyses to determine whether assessment language mattered for children's performance, whether assessment language varied by curriculum, and whether the curriculum differences were a result of assessment language. Assessment language did not vary as a function of curriculum, $\chi^2(1, N = 6{,}734) = 3.94$, $p = .114$. When adding assessment language as an independent variable in a series of analyses of variance (ANOVAs), we found that children scored similarly regardless of language of assessment on the cognitive subscale, $F(1, 3625) = 2.22$, $p = .136$; language subscale, $F(1, 3563) = 1.24$, $p = .266$; and fine motor subscale, $F(1, 3733) = 2.24$, $p = .136$. Further, language of assessment did not interact with curriculum for the cognitive subscale, $F(1, 3625) = 0.40$, $p = .526$; language subscale, $F(1, 3563) = 0.01$, $p = .945$; or fine motor subscale, $F(1, 3733) = 0.23$, $p = .631$. Thus, we left language of assessment out of further analyses.

Socio-emotional and behavioral problems. At the same time points as the LAP-D, parents and teachers reported on children's socio-emotional and behavioral strengths with the Devereux Early Childhood Assessment (DECA; Lebuffe & Naglieri, 1999), which consists of four subscales: initiative, self-control, attachment, and behavior concerns. The DECA was available in both English and Spanish, with parents and teachers choosing the language in which they were most comfortable. Across both time points, approximately 69% of parents and 99% of teachers completed the DECA in English. Both parents and teachers were asked to rate children's social skills and behaviors from the prior 4 weeks on a 5-point scale (0 = *never*, 1 = *rarely*, 2 = *occasionally*, 3 = *frequently*, and 4 = *very frequently*). The first three subscales (initiative, self-control, and attachment) combine to make a total protective factors score (TPF), in which bigger numbers signal greater socio-emotional strengths. The behavior problems subscale stands alone and bigger numbers are indicative of greater behavior problems. Sample questions from the initiative subscale include "starts or organizes play with other children," whereas an example item for self-control includes "listens to/respects others." For the attachment subscale, an example includes "responds positively to adult comfort when upset," and an example of the behavior scale items includes "fights with other children." It should be noted that the internal consistency within this community sample is strong—teacher TPF = .94, teacher behavior concerns = .80; parent TPF = .91, parent behavior concerns = .71 (Crane, Mincic, & Winsler, 2011). Further, there are no differences in the reliability of these scales as a function of the language in which the DECA was completed or between Latino and Black children (Crane et al., 2011); thus, the DECA has strong reliability for ethnically and linguistically diverse children, those sampled within this study.

Results

Analytic Plan

Intraclass correlations (ICCs) for our variables of interest, indicating the percentage of variance in outcomes that varied as a function of the school the child attended, were for the most part below .10; however, as can be expected, for teacher-rated outcomes (DECA social skills and behavioral concerns) it was higher

(ICCs = .13–.18).[3] Accordingly, we ran all analyses in Mplus 7.1 (Muthén & Muthén, 2013) using a school-level clustering variable to properly estimate standard errors for nested data (TYPE = COMPLEX). Within each cohort, most centers had only one or two classrooms sampled, and due to a greater degree of missing data at the teacher/classroom level, we only conducted a two-level (children nested within schools) model. Also, although teachers administered the LAP-D, we see very little variation across teachers. If assessment integrity and validity of the data obtained were a concern, we would expect larger ICCs (Guo, 2005).

Structural equation modeling was conducted for each child outcome. A total of three models were tested (LAP-D, DECA–Teacher, DECA–Parent), controlling for children's fall scores to examine children's gains from the beginning to the end of year with ethnicity, curricula, and an interaction between the two as predictors of T1 and T2 child outcomes. Further, children's fall scores (e.g., T1: language, fine motor, cognitive) were correlated as were children's spring scores. All models addressed missing data for child outcomes using full information maximum likelihood estimation (FIML), the preferred method over listwise and pairwise deletion; however, we did not impute binary variables due to concerns in the literature with binary imputation (Schafer, 1997; Schafer & Olsen, 1998). As part of the imputation, we also required that children have at least one pre- or post-test assessment, and therefore, children who were missing data at both time points were not included in these analyses (excluded children: LAP-D, $n = 4{,}965$; teacher-rated DECA, $n = 990$; parent-rated DECA, $n = 1{,}709$). As a further precaution, we ran models both with and without FIML (listwise deletion), and the substantive findings were the same across both sets of analyses (non-imputed estimates are available upon request). Finally, all of our models fit the data well compared to recommendations by Hu and Bentler (1998).

Preliminary Analyses

Attrition analyses. We first examined whether children who were missing T2 data for the LAP-D ($n = 2{,}555$–$2{,}645$, approximately 38%—depending on subscale) and DECA (parent: $n = 3{,}678$, 18%; teacher: $n = 3{,}348$, 25%) were different in terms of T1 scores compared to children with outcome data at both time points. Results suggest that children who had complete LAP-D assessments were less likely to be Latino, $\chi^2(1, N = 13{,}745) = 213.75$, $p = .000$. We also found that children were more likely to be missing LAP-D data, $\chi^2(1, N = 13{,}745) = 21.19$, $p = .000$; teacher-rated DECA data, $\chi^2(1, N = 13{,}745) = 45.85$, $p = .000$; and parent-rated DECA data, $\chi^2(1, N = 13{,}745) = 75.73$, $p = .000$, when enrolled in Montessori programs compared to children attending more conventional pre-K programs. To make sure attrition/systematic non-response was not biasing our results, we also conducted a series of ANOVAs at both T1 and T2 using all possible children with data at each time point and found the same pattern in each case as the nested models below. Further, children's school readiness scores were comparable for children with T1 data only versus children who had assessments at both time points.

Fall scores. To determine whether the mean differences between the two groups (Montessori and Conventional) were significantly different at the beginning of the year, we conducted analyses modeling program effects on fall scores. Table 2 shows children's T1 and T2 mean percentile scores separately by curriculum and ethnicity (for those with complete data), whereas Tables 3 and 4 show the unstandardized nested/imputed model coefficients; thus, there are some minor differences across these estimates, but again, all substantive findings are the same. Note, because these were nationally normed percentile scores, all parameter estimates represent where children scored compared to their same-aged peers nationally (i.e., scoring at the 50th percentile is the national average). For the most part, no differences emerged for children's cognitive or language skills; however, during the fall, children in Montessori scored lower on assessments of fine motor skills ($B = -5.99$, $p = .036$). Teachers also reported that children in Montessori exhibited greater behavior problems compared to children in conventional programs ($B = 5.40$, $p = .032$), whereas parents reported that children in these programs exhibited lower social skills ($B = -2.85$, $p = .004$) than their conventional program peers.

Cognitive skills. We next examined children's gains in cognitive skills for Montessori and conventional programs. Note, for all child outcomes, we controlled for children's incoming skills at the beginning of the year (see Table 3 for coefficients); therefore, results are examining changes in children's school readiness skills throughout the pre-kindergarten year. Although there was no main effect for ethnicity ($B = 0.05$, $p = .970$) or curricula ($B = -1.65$, $p = .626$), there was a Curriculum × Ethnicity interaction ($B = -11.81$, $p = .000$). As can be seen in Figure 1, all children demonstrated cognitive gains; however, Latinos in Montessori programs began the year with the lowest cognitive skills but exhibited the greatest gains, and by the end of the year, they scored similarly to their peers in more conventional programs. In contrast, Black children in Montessori programs demonstrated the least gains over time, and by the end of the year, they scored 5–10 percentile points lower than their peers. To provide an easily interpretable effect size metric for these interaction effects, we conducted Cohen's *d* estimates with the univariate gain scores that compare the differences in gains across the four groups. Results suggest that for Latinos, these are non-trivial gains (interaction *d*s around 0.43–0.52, depending on contrast). For Black children, however, the benefits of being in conventional programs was small (interaction $d = 0.14$).

Language skills. For children's language skills, we did not find a significant main effect for curriculum ($B = -2.88$, $p = .432$), but there was a main effect for ethnicity ($B = 4.18$, $p = .005$); however, note the following Curriculum × Ethnicity interaction ($B = -9.03$, $p = .013$). Specifically, Latinos attending Montessori programs began the year scoring well below national averages (25th percentile) but demonstrated the greatest language gains (regardless of assessment language–English or Spanish) compared to all groups, and by the end of the year, they exhibited language skills at the 50th percentile, which was comparable to their Latino peers in more conventional programs who had begun the year with a greater language skill-set (see Figure 2). Further,

[3] Intraclass correlations were as follows: Cognition, .08; Language, .09; Fine Motor, .07; Parent-Rated Social Skills, .01; Parent-Rated Behavior Concerns, .01; Teacher-Rated Social Skills, .13; and Teacher-Rated Behavior Concerns, .18.

Table 2
LAP-D and DECA Mean Percentile Scores (and Standard Deviations) in the Fall and Spring for Black and Latino Children in Montessori and Conventional Programs

	Montessori (M)		Conventional (C)	
	T1	T2	T1	T2
Measure	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
LAP-D				
Cognitive skills				
Overall (n_M = 161, n_C = 3,512)	37.70 (27.98)	58.06 (27.91)	43.51 (29.43)	62.82 (28.53)
Latino (n_M = 54, n_C = 1,774)	35.09 (26.61)	65.13 (28.24)	42.33 (29.84)	61.06 (29.10)
Black (n_M = 107, n_C = 1,738)	39.02 (28.67)	54.50 (27.18)	44.72 (29.84)	64.62 (27.83)
Language skills				
Overall	28.54 (24.30)	49.63 (27.46)	32.94 (28.00)	54.22 (30.46)
Latino	22.52 (19.64)	51.43 (28.84)	30.26 (26.80)	49.69 (29.92)
Black	31.28 (25.78)	48.81 (26.92)	35.70 (28.95)	58.90 (30.31)
Fine motor skills				
Overall	36.44 (27.70)	54.30 (27.77)	47.63 (30.36)	62.72 (27.73)
Latino	39.24 (24.99)	65.18 (25.70)	49.56 (30.05)	64.52 (26.23)
Black	35.19 (28.85)	49.46 (27.40)	45.65 (30.55)	60.87 (28.08)
DECA–Teacher				
Social skills				
Overall (n_M = 432, n_C = 8,811)	49.47 (26.36)	59.35 (25.40)	50.49 (27.64)	61.11 (27.60)
Latino (n_M = 136, n_C = 4,806)	47.32 (23.19)	62.97 (23.36)	51.16 (27.41)	62.81 (26.70)
Black (n_M = 296, n_C = 4,005)	50.47 (27.67)	57.68 (26.15)	49.69 (27.92)	59.07 (28.51)
Behavior concerns				
Overall	50.15 (26.33)	49.94 (26.50)	43.51 (28.09)	42.66 (29.10)
Latino	49.53 (23.85)	42.40 (25.66)	41.28 (27.47)	38.31 (28.06)
Black	50.44 (27.43)	53.40 (26.20)	46.18 (28.58)	47.89 (29.47)
DECA–Parent				
Social skills				
Overall (n_M = 323, n_C = 7,519)	44.78 (31.09)	48.99 (30.72)	47.27 (31.00)	51.89 (30.98)
Latino (n_M = 128, n_C = 4,315)	44.64 (30.69)	50.85 (30.93)	47.16 (30.43)	52.99 (30.41)
Black (n_M = 195, n_C = 3,204)	44.87 (31.42)	47.77 (30.60)	47.41 (31.75)	50.40 (31.67)
Behavior concerns				
Overall	67.15 (30.59)	65.45 (28.55)	66.71 (29.30)	65.11 (29.69)
Latino	63.17 (31.74)	64.96 (30.31)	65.88 (29.03)	63.94 (29.68)
Black	69.75 (29.61)	65.77 (27.41)	67.82 (29.63)	66.69 (29.63)

Note. Means are without addressing missing data and only include children who had both Time 1 (T1) and Time 2 (T2) data. LAP-D = Learning Accomplishment Profile–Diagnostic; DECA = Devereux Early Childhood Assessment.

Black children in Montessori and Latino children in conventional programs appear to make the least language gains. Again, we find that the benefits of Montessori for Latinos are modest (interaction *d*s around 0.22–0.45), but for Black children, the benefit of being in conventional programs than in Montessori yielded much smaller benefits (interaction $d = 0.19$).

Fine motor skills. For fine motor skills, there was no main effect for curriculum ($B = -0.96$, $p = .763$), but there was a significant main effect for ethnicity ($B = -3.23$, $p = .003$) and a Curriculum × Ethnicity interaction ($B = -11.57$, $p = .010$). Similar to other pre-academic domains, Latino children in Montessori programs demonstrated the greatest motor gains and exhibited similar abilities at T2 as their peers in more conventional programs, who started the year with the highest motor skills (see Figure 3). In contrast, by the end of the year, Black children in Montessori were behind as much as 15 percentile points compared to Latino children in either program. The benefits of Montessori for Latinos were modest (interaction *d*s around 0.47–0.52), whereas the differences between conventional and Montessori were negligible for Black children (interaction $d = 0.02$).

Teacher-rated social skills. For the DECA total-protective factors scored by teachers, we found a main effect for ethnicity ($B = -2.99$, $p = .016$), suggesting that Latino children, according to teachers, demonstrated greater gains in social skills compared to their Black peers (see Table 4 for coefficients). However, there was no evidence for either a main effect for curricula ($B = -0.60$, $p = .802$) or a Curriculum × Ethnicity interaction ($B = -3.91$, $p = .414$; see Figure 4).

Teacher-rated behavioral concerns. Although there was no main effect for curriculum ($B = 2.17$, $p = .173$), there was a main effect for ethnicity ($B = 6.69$, $p = .000$) and a Curriculum × Ethnicity interaction ($B = 3.98$, $p = .044$). Results indicate that Black children, regardless of curriculum, showed a slight increase in problem behaviors, whereas Latino children in conventional High/Scope programs exhibited reduced problem behaviors across time (see Figure 5). Although Latino children in Montessori classrooms began the year with the greatest behavioral concerns, they exhibited the greatest improvement. Effect size estimates suggest that Latinos demonstrated small-to-moderate improvements in Montessori (interaction *d*s around 0.19–0.43), whereas the differ-

Table 3
Unstandardized Coefficients for Children's LAP-D Outcomes

LAP-D	Cognitive T1	Cognitive T2	Language T1	Language T2	Fine motor T1	Fine motor T2
Main effects model (Step 1)						
Fall assessment score		0.49 (0.02)***		0.57 (0.02)***		0.49 (0.01)***
Curricula[a]	−5.02 (3.20)	−1.65 (3.39)	−2.68 (3.23)	−2.88 (3.66)	−5.99 (2.85)*	−0.96 (3.18)
Race/ethnicity[b]	0.81 (1.29)	0.05 (1.30)	4.88 (1.54)***	4.18 (1.49)**	−5.30 (1.37)***	−3.23 (1.12)**
Interaction model (Step 2)						
Fall assessment score		0.49 (0.02)***		0.57 (0.02)***		0.49 (0.01)***
Curricula	−4.65 (4.26)	6.48 (2.83)*	−3.65 (1.92)†	4.83 (2.79)†	−4.36 (3.22)	7.11 (3.96)†
Race/ethnicity	0.82 (1.32)	0.50 (1.33)	4.82 (1.60)***	4.51 (1.53)**	−5.21 (1.41)***	−2.90 (1.11)**
Curricula × Ethnicity	−0.31 (5.23)	−11.81 (2.48)***	1.56 (4.01)	−9.03 (3.64)*	−2.12 (4.91)	−11.57 (4.49)**
R^2	.01	.29	.01	.32	.01	.34
Fit statistics	CFI = .958, RMSEA = .072, SRMR = .062, $\chi^2(6) = 331.89$, $p < .001$					

Note. Standard errors are in parenthesis. Learning Accomplishment Profile–Diagnostic (LAP-D), n = 8,780. T1 = Time 1; T2 = Time 2; CFI = comparative fit index; RMSEA = root-mean-square error of approximation; SRMR = standardized root-mean-square residual.
[a] Latino as the referent. [b] Conventional as the referent.
† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

ences for Blacks across programs was negligible (interaction d = 0.05).

Parent-rated social skills. According to parents, all children show some gains in the area of social skills. Similar to teacher reports, we also found a main effect for ethnicity ($B = -2.95$, p = .000), whereby Latino children demonstrated larger gains in social skills compared to Black children. There was no evidence for a main effect for curriculum ($B = -0.78$, p = .404), and as can be seen in Figure 6, there was no evidence for an interaction ($B = -1.15$, p = .265).

Parent-rated behavioral concerns. For parent-reported behavior problems, there was no main effect for curriculum (B = 0.10, p = .931), but there was a main effect for ethnicity (B = 1.85, p = .002) and a Curriculum × Ethnicity interaction ($B = -4.09$, p = .016). As can be seen in Figure 7, children generally show stable and/or a slight decrease in be-

Table 4
Unstandardized Coefficients for Children's DECA Outcomes

DECA	Social skills T1	Social skills T2	Behavior T1	Behavior T2
		DECA–Teacher		
Main effects model (Step 1)				
Fall assessment score		0.59 (0.02)***		0.60 (0.01)***
Curricula[a]	−1.33 (4.18)	−0.60 (2.37)	5.40 (2.31)*	2.17 (1.53)
Race/ethnicity[b]	−0.75 (1.81)	−2.99 (1.26)*	4.77 (1.25)***	6.69 (1.05)***
Interaction model (Step 2)				
Fall assessment score		0.59 (0.02)***		0.60 (0.01)***
Curricula	−4.71 (5.91)	2.04 (4.79)	8.18 (2.63)**	−0.50 (1.23)
Race/ethnicity	−0.95 (1.86)	−2.83 (1.29)*	4.94 (1.30)***	6.53 (1.09)***
Curricula × Ethnicity	4.92 (7.26)	−3.91 (4.69)	−4.03 (3.37)	3.98 (1.74)*
R^2	.00	.37	.01	.39
Fit statistics	CFI = .990, RMSEA = .037, SRMR = .027, $\chi^2(2) = 36.46$, $p < .001$			
		DECA–Parent		
Main effects model (Step 1)				
Fall assessment score		0.61 (0.01)***		0.53 (0.01)***
Curricula	−2.85 (0.99)**	−0.78 (0.93)	1.92 (1.43)	0.10 (1.19)
Race/ethnicity	−0.45 (0.88)	−2.95 (0.62)***	3.13 (0.74)***	1.85 (0.60)***
Interaction model (Step 2)				
Fall assessment score		0.61 (0.01)***		0.53 (0.01)***
Curricula	−3.14 (2.16)	−0.10 (0.84)	−0.53 (0.85)	2.55 (0.95)**
Race/ethnicity	−0.47 (0.91)	−2.89 (0.64)***	2.97 (0.77)***	2.02 (0.62)***
Curricula × Ethnicity	0.45 (2.66)	−1.15 (1.03)	3.78 (1.91)*	−4.09 (1.69)*
R^2	.00	.38	.01	.28
Fit statistics	CFI = .989, RMSEA = .061, SRMR = .021, $\chi^2(2) = 92.98$, $p < .001$			

Note. Standard errors are in parenthesis. Devereux Early Childhood Assessment (DECA)–Teacher, n = 12,755; DECA–Parent, n = 12,036. T1 = Time 1; T2 = Time 2; CFI = comparative fit index; RMSEA = root-mean-square error of approximation; SRMR = standardized root-mean-square residual.
[a] Latino as the referent. [b] Conventional as the referent.
* $p < .05$. ** $p < .01$. *** $p < .001$.

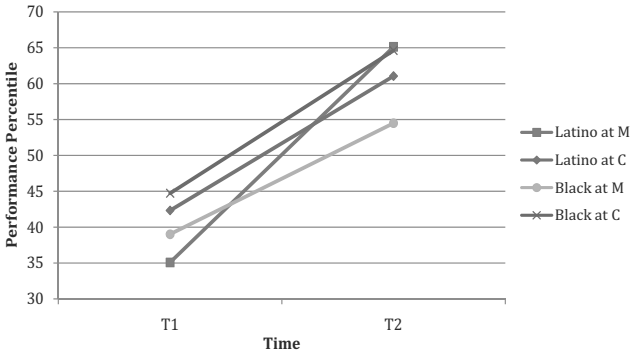


Figure 1. Cognitive score at Time 1 (T1) and Time 2 (T2) for Latinos and Blacks at Montessori (M) and Conventional (C) programs. See the online article for the color version of this figure.

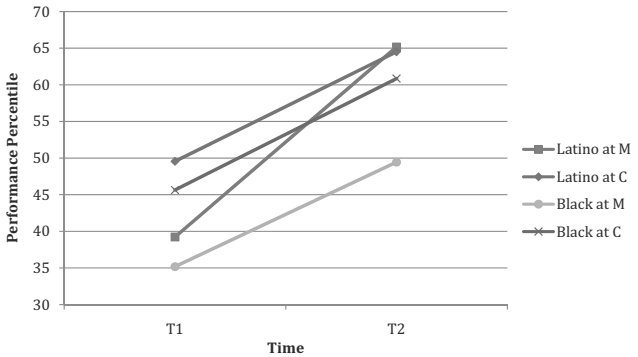


Figure 3. Fine motor score at Time 1 (T1) and Time 2 (T2) for Latinos and Blacks at Montessori (M) and Conventional (C) programs. See the online article for the color version of this figure.

havioral concerns; however, according to parents, Latino children in Montessori programs show some gains. Effect size estimates were small for both Blacks and Latinos (interaction *d*s around 0.09–0.20).

Discussion

In this article, we sought to understand differences in low-income, minority children's early school experiences and how these might relate to children's gains in areas of pre-academic, socio-emotional, and behavioral skills. With increasing numbers of early education models and curricula (Lillard, 2008), continued effort is necessary for a better understanding of how children should be taught these early skills and whether certain curricula are more effective than others for certain groups of children (Brooks-Gunn et al., 2013; Duncan & Magnuson, 2013; Garcia & Jensen, 2009). Specifically, Montessori curricula, which has existed for over 100 years and, today, is used in over 4,000 classrooms, has not received much empirical attention within minority and low-income communities (Cossentino, 2005; Lillard, 2012; Walsh & Petty, 2007). Accordingly, we extend the literature on early care and education curricula by examining the school readiness gains of low-income, Black and Latino children enrolled in Montessori programs compared to more conventional pre-K programs using a High/Scope framework with a literacy supplement.

Several notable and consistent findings emerged with regard to curriculum and child outcomes. Primarily, it is encouraging that all children made gains in areas of cognitive, language, and motor skills when attending public school pre-K programs, regardless of curriculum. Specifically, at the beginning of the school year, children were scoring well below national averages on pre-academic assessments, but after 1 year of pre-K, children generally scored at or above the 50th percentile. The potential gains across pre-academic skills when children are enrolled in preschool programs are promising and consistent with prior studies both within this community (Ansari & Winsler, 2013; Winsler et al., 2008) and more generally (Gormley et al., 2005; Magnuson et al., 2007).

Contrary to some of the prior literature (Lillard, 2012; Lillard & Else-Quest, 2006) and our hypotheses, however, children who attended Montessori programs did not (in terms of main effects for curriculum) exhibit greater gains across pre-academic, social, or behavioral skills compared to children enrolled in more conventional programs. The discrepancy in our findings and the prior literature might be due to the fact that children in this sample

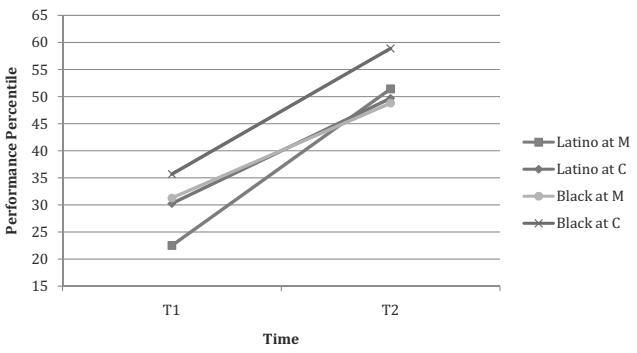


Figure 2. Language score at Time 1 (T1) and Time 2 (T2) for Latinos and Blacks at Montessori (M) and Conventional (C) programs. See the online article for the color version of this figure.

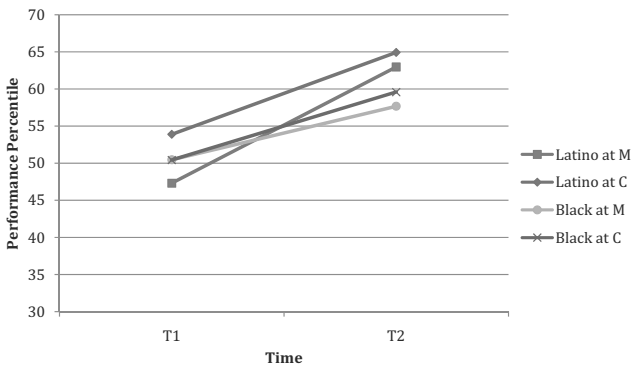


Figure 4. Teacher-rated total protective factor score (social skills) at Time 1 (T1) and Time 2 (T2) for Latinos and Blacks at Montessori (M) and Conventional (C) programs. See the online article for the color version of this figure.

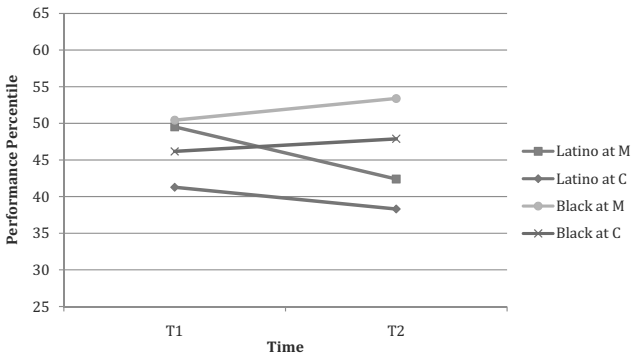


Figure 5. Teacher-rated behavior concerns at Time 1 (T1) and Time 2 (T2) for Latinos and Blacks at Montessori (M) and Conventional (C) programs. See the online article for the color version of this figure.

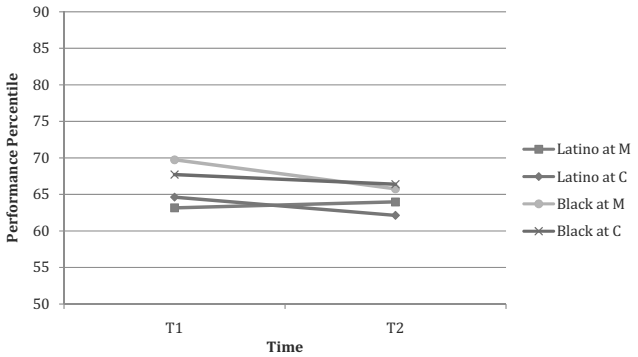


Figure 7. Parent-rated behavior concerns at Time 1 (T1) and Time 2 (T2) for Latinos and Blacks at Montessori (M) and Conventional (C) programs. See the online article for the color version of this figure.

attended Title-1 programs and came from low-income, minority neighborhoods (75% eligible for FRL, income range: $21,000-$30,000; U.S. Census Bureau, 2010). Note that the prior literature has generally not examined minority children's early learning when enrolled in Montessori classrooms (Lillard, 2012), and in the few cases that have included inner-city children, they did not examine sub-group differences (Dohrmann et al., 2007; Lillard & Else-Quest, 2006; Lopata et al., 2005). Further, some of the studies (e.g., Lillard & Else-Quest, 2006) that found positive impacts of Montessori education within urban cities examined children between the ages of 3 to 12; thus, it is possible that Montessori effects are stronger among older children, a group not tested in the current investigation, which was limited to children in their pre-kindergarten year. Even so, the literature on Montessori curricula, both with preschool- and school-age children, has been mixed, with some evaluations yielding no differences (Cox & Rowlands, 2000) and, in some instances, fewer gains compared to conventional programs (Lopata et al., 2005).

Our findings, however, highlight some important Ethnic Group × Curriculum interactions. Specifically, we found that Latino children excelled in Montessori programs across pre-academic and behavioral skills. Latino children began the year at high-risk of school failure and scored well below national averages (25th–35th percentile) on assessments of pre-academic skills (cognitive, language, and fine motor skills), but they demonstrated the greatest gains over time. Further, by the end of only 1 year of Montessori curriculum, they scored above national averages (>50th percentile). Because Latino children in Montessori began the pre-K year with particularly low skills, regression toward the mean is a possibility where children were likely to score closer to the true population mean by the end of the year. However, this is unlikely to be the only explanation because both Black and Latino children in Montessori began the year scoring well below national averages; thus, if regression toward the mean or the fact that these Latino children had more room to grow was the only explanation, we would also expect that Black children in Montessori would make greater gains, which in this study, was not the case. Considering that Latino children in Montessori programs make greater strides across cognitive, language, and motor skills, initiatives that raise Latino parents' awareness for Montessori curriculum and increase the enrollment of Latino children in such programs might be useful. If Latino children's enrollment in Montessori pre-school programs is raised, this might help reduce the racial and ethnic gaps in achievement that exists between Latino and White children.

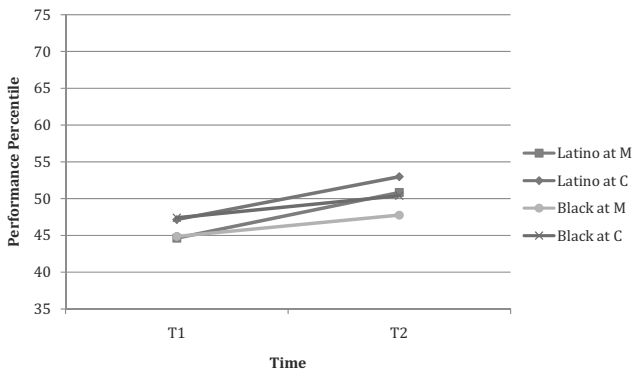


Figure 6. Parent-rated social skills at Time 1 (T1) and Time 2 (T2) for Latinos and Blacks at Montessori (M) and Conventional (C) programs. See the online article for the color version of this figure.

Contrary to some of the existing literature (Miller & Bizzell, 1984), Black children did not benefit from Montessori curriculum as much as conventional programs. It is important to note, however, that the differences in child outcomes between programs were often negligible or, at best, very small. Therefore, although Black children exhibit slightly greater gains over time in more conventional programs using High/Scope curricula with a literacy supplement, they still demonstrated gains when attending Montessori programs. It is important to also acknowledge the challenges in detecting interactions in non-experimental work and the fact that our sample sizes are much smaller when doing so, thereby further reducing the probability of identifying interactions (McClelland & Judd, 1993). Yet, the fact that we have multiple significant interactions, which all suggest the same pattern, indicates that not all children respond to curricula in the same way, and, thus, the Montessori philosophy might not benefit all low-income children equally.

We provide several plausible explanations for these differences across ethnic groups in Montessori programs. First, these differences might be due to the fact that Montessori curriculum is much more phonetic than traditional programs, and this emphasis on

sounds and visuals fosters children's pre-academic skills (Bodrova, 2008; Denton, Hasbrouck, Weaver, & Riccio, 2000). Compared to the English language, Spanish is more consistently phonetic, and there is evidence that at-risk Latino children in elementary school, who receive phonetic instruction (emphasis on the phonics/sounds of writing and reading), exhibit positive language and literacy gains (Cheung & Slavin, 2012). Another possibility is that because the Latino children in Montessori programs were more likely to come from Spanish-speaking homes, they might also have been more likely to be first- or second-generation immigrants. This is important to note because children of immigrants exhibit stronger socio-emotional and academic skills during the preschool years (De Feyter & Winsler, 2009) and have been found to benefit more from early education programs than their native-born peers (Gormley, 2008; Magnuson, Lahaie, & Waldfogel, 2006). Unfortunately, however, we cannot test this possibility because we do not have enough information on the immigrant status for children in the Montessori programs. Thus, examining the early school experiences of immigrant children in Montessori programs would be an important contribution to the growing Montessori literature. Finally, if it were the case that Latino families had less access to Montessori programs given the location of most the Montessori schools, then another explanation for differential growth for Latino children in such programs could be that the Latino families who were successful in getting into the Montessori programs were different on an unmeasured selection factor (i.e., Montessori Latino parents being more educated, motivated, or savvy than other Latino parents who could have provided more school readiness support at home).

These differential effects might also be rooted in two of the cornerstones of the Montessori method. First, Montessori curricula emphasizes individualized instruction and independent learning for each child (Morrison, 2007); therefore, for Latino children who may still be learning the English language, Montessori affords them the opportunity to learn at their own pace and master the skills necessary for future academic development. Second, the founder of Montessori argued that children's culture needed to be incorporated in the school environment in order for children to thrive, both academically and socially (Montessori, 1994), which would be particularly relevant for children from Latino and non-English-speaking families (Garcia & Jensen, 2007, 2009). This is because children's early learning is the dynamic interaction of the contexts in which children live their lives, including the home and school (Huston & Bentley, 2010). For culturally and linguistically diverse Latino children, these contexts can be noticeably different (Garcia & Jensen, 2007), and if schools are not culturally oriented, children might struggle during this transition. As discussed by Garcia and Jensen (2007), instead of building on Latino children's incoming skills, programs often try to transition Latinos into mainstream education, which forces children to adapt or make changes that are not always in the best interest of culturally diverse children. Thus, another possibility is that Montessori programs are better able to integrate Latino children's socio-cultural backgrounds within the classroom, which, in turn, allows Latino children to transition more smoothly into the educational system.

Clearly, these are speculative explanations, and a better understanding of why these differences emerged between Latino children and their Black peers is necessary. We suggest that future work focus on instructional fidelity and more specific classroom processes to help tease apart the reasons why the Montessori method might be more conducive for Latino children's early learning. Examining how the classroom environment and activities specific to Montessori contribute to children's school readiness could help uncover the mediating mechanisms for the differential responses to curriculum across different groups that were found in the current investigation. Further, understanding under what conditions Montessori curriculum might be more beneficial is necessary and moderators can be key in answering these questions. Some moderators that require attention include the following: (1) demographic factors (e.g., income, gender, ethnicity/race), (2) preschool attendance/absences (Justice, Mashburn, Pence, & Wiggins, 2008), (3) implementation fidelity (Lillard, 2012), and (4) whether children with greater incoming skills benefit more (skill-begets-skill) or whether children with lower initial skills demonstrate greater gains (compensatory hypothesis; Cunha, Heckman, Lochner, & Masterov, 2006).

Unfortunately, since the time of these children's pre-K experiences, the state involved faced over $1.1 billion in budget cuts for pre-K–12 education (National Education Association, 2011). These included the state's school readiness program, which provided low-income families access to high-quality early education. As a result, over 15,000 children who received these pre-kindergarten services during the time of this study are no longer receiving these services (National Education Association, 2011). In particular, Miami-Dade County Public schools' budget has been cut by roughly $300 million, which has resulted in reduced salaries, the elimination of positions, increased class-sizes, and the elimination of many of the Montessori programs and other early childhood programs within the district, including some of those programs involved in this present study (National Education Association, 2011). Montessori programs have been targeted because they are more expensive to operate than traditional programs due to greater teacher education and certification processes as well as the cost of purchasing educational materials that are needed to equip classrooms to fit the Montessori guidelines. However, as our study results have shown, there are many positive impacts of one year of Montessori, particularly for Latinos, who are the largest and fastest growing minority population in the United States and who make up 65% of this county and 23% of the state's population (U.S. Census Bureau, 2011). Accordingly, even considering the shrinking resources within the state, one policy implication of our findings is that it might be beneficial for Montessori programs to be made available to a larger number of children from low-income families, especially those from Latino backgrounds.

The findings of this study, of course, need to be interpreted in light of its limitations. Primarily, Montessori classrooms were staffed by more educated teachers, which might have implications regarding classroom quality and could explain some of our findings. Thus, we did not control for teacher education; however, this limitation is true for any study examining Montessori programs, even the most rigorous (e.g., Lillard, 2012), because part of the Montessori requirements are that teachers be Montessori certified/trained (ranging from 6-week to 1-year courses). The effect of teacher education, however, might be minimal given literature suggesting that teacher education and qualifications are not particularly predictive of classroom quality or child outcomes (Early et al., 2006, 2007; Pianta et al., 2005). Even if teacher education were driving these effects, one would expect that Black children would also make greater gains in Montessori, which in this study was not true.

Although teachers in Montessori classrooms had received the appropriate Montessori training/certification and Montessori materials and activities were in place, we lacked information on how well the curriculum was actually implemented, which also has important implications for children's early school success (Lillard, 2012). In particular, Lillard (2012), who examined the fidelity of Montessori implementation in preschool programs, found that children in classic Montessori programs (i.e., those closely following Montessori philosophies and activities) demonstrated greater literacy, math, and problem-solving skills compared to children in supplemented Montessori classrooms (i.e., classrooms that do not follow all guidelines and principles but use some Montessori materials) and conventional programs. Although the lack of information regarding fidelity and implementation is a limitation, the same holds true for many other studies that examine early education curricula (Dohrmann et al., 2007; Kayili & Ari, 2011; Lillard & Else-Quest, 2006; Miller & Bizzell, 1984). Further, high fidelity Montessori programs generally begin when children are 3 years of age (Lillard, 2012); unfortunately, we do not have systematic information on children's prior school history. We do know, however, that because these programs were housed in public schools, there were not any 3-year-olds in these programs. Even so, the focus of the current article is on children's school readiness gains across their pre-kindergarten year of Montessori, and, thus, prior school history may be less relevant.

Even if our programs do not fit the guidelines for classic Montessori curricula, it remains encouraging that Latino children nevertheless exhibited strong gains in pre-academic skills across 1 year of Montessori education (25–30 percentile points), much greater than our comparison sample of Latino children enrolled in more conventional High/Scope preschool programs (15–20 percentile points). Although Latino children both generally (Gormley et al., 2005; Loeb et al., 2007) and within this community (Ansari & Winsler, 2012, 2013) make gains in school readiness when enrolled in early education programs, they do not typically display gains as large as those observed here. Thus, it is not just that Latino children, and in particular, English-language learners, demonstrate larger gains; rather, it appears that at least in this community, Montessori education fosters greater pre-academic and behavioral gains for Latinos than for Black children. Whether these gains found here are sustained during later school years is an important question for future research to address.

Although one of the strengths of this study was that our sample of children enrolled in Montessori programs was ethnically diverse and low-income, similar to their peers in more conventional preschool programs, we had no information on low-income White children. Further, we only had limited family demographic data, so we were unable to control for a full set of covariates and could not completely address selection bias. Finally, if Latino children assessed in English were in fact dual language learners, their gains across pre-academic skills may in fact reflect linguistic gains, which would have implications for the interpretation of our findings and might explain some of the differential gains observed between programs.

Despite these limitations, our study moves beyond the prior literature in some important ways. Primarily, we provided much needed and up-to date analyses of Montessori curricula within a low-income and ethnically diverse community. As noted earlier, estimating the effects of Montessori programs on disadvantaged children's early learning is rare because Montessori programs often attract more-advantaged families, and when data are collected on urban city children, they rarely differentiate between ethnic subgroups. To address these limitations in the literature, we took advantage of a low-income and ethnically diverse sample of children and examined whether Montessori curriculum during the pre-kindergarten year was associated with young children's school readiness compared to more conventional preschool programs following the High/Scope framework. We also examined whether the benefits of Montessori varied as a function of children's race, which has been lacking in the existing literature.

The research presented here suggests that low-income Latino children who experienced 1 year of Montessori education made dramatic improvements in early achievement and behavior even though they began the year at great risk for school failure. In contrast, although Black children made gains across areas of school readiness when enrolled in Montessori classrooms, they exhibited slightly greater gains in more conventional pre-K programs. As discussed above, further understanding of how and why effects vary across ethnic and racial lines would be beneficial and is a direction for future research. At least in this community of ethnically diverse children from low-income backgrounds, it would appear that Montessori curriculum might be more appropriate for promoting the school readiness of Latino children.

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Received June 6, 2013
Revision received March 25, 2014
Accepted April 3, 2014 ■