

# Psychology of Aesthetics, Creativity, and the Arts

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# Selection Into, and Academic Benefits From, Middle School Dance Elective Courses Among Urban Youth

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Although research shows associations between adolescents general arts involvement and academic performance, little research documents links between enrollment in middle school dance elective courses and academic achievement, especially within low-income, urban populations. Further, differences between adolescents who do and do not have access to, or self-select into, middle school dance electives have yet to be identified. We prospectively followed a large ( $n = 31,332$ ), ethnically diverse sample of children from preschool through 8th grade in Miami, Florida. About 7% of adolescents enrolled in a dance elective course at some point in middle school (6th–8th grade), with the majority of those (68.8%) taking dance for only one year. Black students were more likely than White and Latinx students to attend middle schools that did not offer dance. When dance courses were available, males and Black students were less likely to select into a dance elective. Students who took dance in middle school showed greater initial social skills at age four and better prior academic achievement in elementary school compared with those who did not take dance. Importantly, controlling for all preexisting selection effects and prior academic achievement, dance engagement in middle school was associated with higher grade point averages and standardized test scores, better school attendance, and a lower likelihood of suspension during middle school, with stronger positive effects observed for taking dance electives for multiple years. Implications for future research and educational policy are discussed.

*Keywords:* academic achievement, adolescence, dance, educational policy, selection

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Engagement in the visual and performing arts has long been thought to provide numerous benefits, not only to individuals but also to society and human cultures (National Endowment for the Arts [NEA], 2012; Winner, Goldstein, & Vincent-Lancrin, 2013). However, in recent years there has been limited opportunities for students in the United States (U.S.) public schools to participate in different types of art forms, particularly dance (Parsad, Spiegel-

man, & Coopersmith, 2012). Access to the arts is particularly low among public secondary schools in low-income neighborhoods (Parsad et al., 2012), despite evidence that the arts may be particularly helpful for students of color in poverty (Catterall, 2009; Catterall, Dumais, & Hampden-Thompson, 2012).

The middle school period is an important time when children can begin (or continue) their engagement in the arts because students have the opportunity to enroll in full elective courses in subject areas like music, dance, visual art, or drama. Entrance into the arts during adolescence becomes more of a closed system in that a certain degree of skill is needed, (i.e., auditions; McNeal, 1998) compared with entrance into the arts earlier in life. Further, adolescence is a sensitive period of brain development when exposure to different external experiences, like the arts, can enhance students' long-term achievement, motivation, and/or emotional well-being (Dahl, 2004; Jensen, 2004).

The current study, with a large ( $n > 30,000$ ) and ethnically diverse sample of predominantly low-income students followed longitudinally from preschool through 8th grade, addresses three research goals. First, we descriptively report how many students in our sample enrolled in a dance elective during middle school, and for how many years. Second, we examine differential demographic, school readiness, and elementary academic achievement profiles for students who do and do not (a) have access to a middle

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school that offers dance and (b) self select into dance elective courses in middle school when they are available. Finally, we statistically control for all observed selection effects to determine if taking dance courses in middle school is associated with better academic performance later in middle school.

### Research on Benefits of the Arts

Researchers from different theoretical perspectives have explored how different forms of artistic experience (i.e., music, dance, drama, and visual art) influence child development (Gardner, 1990; Goldstein, Lerner, & Winner, 2017). Vygotsky and John Dewey held similar philosophies about learning and the arts (Conery, John-Steiner, & Marjanovic-Shane, 2010; Jackson, 2000). Dewey's philosophy described human engagement with the arts as learning by doing, or art as experience. Similarly, Vygotsky emphasized art activities as experiences in social context where children participate in joint artistic endeavors and internalize the cultural symbol systems involved in the art forms (i.e., language, music, dance) and use them as tools for thinking, behaving, and regulating the inner world of the child's mind (Winsler, Ducenne, & Koury, 2011).

Studies have shown associations between participation in the arts (music, dance, visual art, drama, multiarts) and positive child outcomes. Children's exposure to high-quality arts classes is related to decreased stress in the classroom measured via cortisol levels, and enhanced positive emotion (Brown, Garnett, Anderson, & Laurenceau, 2017; Brown & Sax, 2013). During early childhood, music activities and instruction are linked to higher numeracy skills, attention regulation, and prosocial behavior years later, even after controlling for parent-child home reading activities and other covariates (Williams, Barrett, Welch, Abad, & Broughton, 2015). Drama activities are also related to children's positive social development in ways not always observed for music activities. For example, Schellenberg (2004) tested for effects of music lessons on children's development and reported that the drama-lesson comparison group showed pre-to-post increases in prosocial behavior not observed among the music groups. Theater activities can also help build children's social and emotional competencies via enhanced theory of mind, emotional perspective taking, and adaptive emotion regulation strategies (Goldstein & Lerner, 2017; Goldstein, Tamir, & Winner, 2013; Goldstein & Winner, 2012). Associations between in- or-out-of-school artistic involvement and academic performance and student well-being have also been noted among adolescents, especially among those in poverty (Catterall et al., 2012; Elpus, 2013a).

### Methodological Challenges

Although there is no shortage of research showing positive effects of the arts on student academic and social outcomes, the literature suffers from numerous critical methodological challenges. First and most important, the research linking arts involvement and increased academic or developmental outcomes is largely correlational or quasi-experimental (somewhat better but still lacking sufficient control of selection variables), which only shows (often weak) associations between arts participation and positive developmental outcomes. There exist a few true experimental studies that have randomly assigned students to arts par-

ticipation and control groups (the design needed to infer causality) that have shown positive effects of arts engagement (Greenfader & Brouillette, 2017; Holochwost et al., 2017; Lobo & Winsler, 2006; Moreno et al., 2011; Rabinowitch & Meltzoff, 2017; Schellenberg, 2004). However, the majority of research in this area compare an arts-exposed group with a naturally occurring comparison group of children not exposed to the art form in question without sufficiently accounting for selection factors.

Naturally occurring comparison groups are problematic because they introduce selection bias, or omitted variable bias, into the sample. That is, many important family and child factors are related to both selection into the arts and positive academic or social outcomes (Elpus, 2013b). For example, it is well documented that children from families in poverty or with low parental education receive less exposure to arts-related activities *and* they do not perform as well in school compared with children with more financial and educational capital (Catterall, 2009; Catterall et al., 2012; Child Trends Database, 2015; Elpus & Abril, 2011; Foster & Jenkins, 2017; Hall, 2015; O'Hagan, 2014; Rabkin & Hedberg, 2011; Winner et al., 2013).

Children who enroll in art electives during secondary school typically have prior exposure to the arts, and/or are from middle to upper class families with the monetary resources and social capital to provide the attire, instruments, or art supplies necessary for engagement (Eccles, 2005; Fredricks et al., 2002; Lareau, 2002; McNeal, 1998). Further, children from more affluent families typically academically outperform their peers before they enter middle and high school, and therefore it is likely that other individual traits or family factors are responsible for both the arts engagement and the higher achievement, rather than there being a direct causal effect from arts involvement to enhanced outcomes. Indeed, differences in family background characteristics such as socioeconomic status or parent education level account for just as much if not more variance in student academic outcomes compared to the unique effect of the arts (Elpus, 2013b; Foster & Jenkins, 2017).

Underrepresentation of certain groups of students in the arts is reported by Elpus and Abril (2011), who used data from the Educational Longitudinal Study and created demographic profiles of music- and non-music-involved high school students. Males, English Language Learners (ELLs), Hispanics, children of parents with a high school diploma or less, and those in the lowest socioeconomic quartile were significantly underrepresented in music courses (Elpus & Abril, 2011). Further, most high school music students were from the highest socioeconomic backgrounds and had the highest academic performance. In a separate study, after controlling for demographics, prior academic achievement, school fixed effects, and other covariates, Elpus (2013b) found no significant difference in the Scholastic Aptitude Test (SAT) standardized math tests of high school music and non music students. The current paper extends this literature by first revealing demographic profiles of adolescents who select into dance during middle school. Then, controlling for all observed selection differences, we show whether dance exposure in middle school is associated with enhanced academic outcomes.

Another limitation of the arts education literature is that the link between the arts and academic performance is not replicated consistently, even with experimental or high-quality, quasi-experimental studies (Costa-Giomi, 2004; Elpus, 2013b; Mehr,

Schachner, Katz, & Spelke, 2013). The meta-analysis, the Reviewing Education and the Arts Project (REAP; Winner et al., 2013) revealed that although many studies showed positive effects, other empirical studies reported inconsistent, inverse, or no effects of student engagement in multiarts in-or-out-of-school activities on academic achievement (Winner et al., 2013). Other meta-analyses sometimes report no causal relations between arts engagement and academic performance (See & Kokotsaki, 2015; Winner & Cooper, 2000).

Although part of the replication inconsistency is likely due to the selection bias problem discussed above, difficulty in replication may also be due to studies using very different definitions of arts involvement (i.e., not differentiating between in- or out-of-school involvement), or studies reporting the effects of general (multi) arts engagement, without differentiating between artistic disciplines. Each art form (music, visual art, drama, dance) is likely linked with specific neurological, cognitive, social, and behavioral outcomes, which cannot be captured without examining each art form as its own entity (Winner et al., 2013). Student achievement related to arts involvement also likely varies in direction and magnitude depending on the age of the student and on the academic domain examined (i.e., math, science, reading; Smithrim & Uptis, 2005).

Given that it is impossible to randomly assign students to arts-elective courses in middle school, a strong methodological approach to examine outcomes associated with arts engagement in middle school is to use a large-scale, prospective longitudinal design that first identifies the many selection factors that differentiate those that do and do not take arts elective courses in middle school and then statistically control for these selection factors to examine whether exposure to arts is associated with enhanced later academic outcomes. We did that with a sample of more than 30,000 ethnically diverse, almost entirely low-income middle school students who were followed longitudinally since preschool in the context of the Miami School Readiness Project (MSRP; Winsler et al., 2008; Winsler, Gara, Alegrado, Castro, & Tavasoliev, 2019). We found large and important differences between students that did and did not enroll in arts-related elective courses (a combination of music, dance, visual art, and drama) in 6th, 7th, or 8th grade. Black students, males, students with disabilities, those previously retained in grade, and those not English proficient were less likely to take arts electives in middle school. Importantly, students exposed to arts electives in middle school already showed enhanced social and behavioral skills and stronger language, motor, and cognitive skills 7 years earlier in preschool at age 4 and stronger prior academic performance in fifth grade (Winsler et al., 2019).

After controlling for the strong selection differences, however, we found that students exposed to arts electives in middle school had significantly higher grade point average (GPA), standardized math and reading test scores, and decreased odds of school suspension later in middle school, compared with students not exposed to the arts during school. Unfortunately, only a multiarts composite variable was examined in that study (Winsler et al., 2019). As noted above, it is critical to examine specific types of arts exposure given likely differential outcomes associated with each art form (Winner et al., 2013). In the current study, we follow the same approach with this large and ethnically diverse sample, to examine and systematically control for selection factors to explore

the potential positive academic outcomes associated specifically with *dance* exposure in middle school.

### Research on Dance

Dance instruction is thought to foster an environment where children can engage in higher cognitive processes such as problem solving, creativity, and critical thinking when choreographing or interacting with peers (Gilbert, 2006; Hanna, 2008). A dance enriched environment incorporates multisensory curriculum through auditory (music) and physical stimuli (body movement). Such sensory and bodily experiences are believed to be essential to children's concept formation and repertoire of learned experiences (Eisner, 2002). Dance may also be an exceptional artistic discipline for children to engage in compared with drama, music, or the visual arts because of the integration of music and movement—which requires the activation of multiple senses at once (Brown, Martinez, & Parsons, 2006; Metcalfe, 2016; Walker, 2016).

Early childhood movement and music classes give children practice in controlling and regulating their motor behavior through music (i.e., fast-slow, high-low; start-stop), and such experience appears to enhance children's behavioral self-control (Winsler et al., 2011). Using a double-blind, randomized control design, Lobo and Winsler (2006) assigned 40 Head-Start preschoolers to a dance program or an attention control group. Preschoolers in the treatment group improved significantly in their social competence and decreased in internalizing and externalizing behavior problems as rated by both parents and teachers, compared with a randomly assigned, demographically similar control group.

Synchronized movement activities during early and middle childhood also appear to be advantageous to children's cooperation, helping behavior, and positive affect. In a randomized control experiment, Rabinowitch and Meltzoff (2017) found that joint synchronized movement between two people (i.e., dancing) via a swing-like apparatus increased cooperation among 4-year olds, compared with a control group that experienced asynchronous movement. Joint music activities also provide opportunities for synchronized movement (tapping, singing, and dancing) that is shown to increase cooperation and willingness to help others, among 4-year-olds, compared with children in nonmusical joint task conditions (Kirschner & Tomasello, 2010). Other well-controlled studies have noted movement as a medium for synchrony that leads to more helping behavior, smiling, eye contact among, and social bonding among older children and for seniors (61–108 years; Rossberg-Gempton, Dickinson, & Poole, 1999; Tunçgenç & Cohen, 2018, 2016). Rossberg-Gempton et al. showed that an innovative, highly structured intergenerational 12-week dance intervention for 30 min twice per week increased or maintained children's cooperation, direction following, leadership skills, communication, sense of belonging, and awareness of others (Rossberg-Gempton et al., 1999).

Children whose first language is not English may particularly use music, dance, and drama as a system of nonverbal symbolism to explore and exercise their creative and cognitive abilities (Conery et al., 2010; Hanna, 2008). When strategically coupled with a literacy curriculum, English learners in grades K–2 who participated in an in-school drama and dance intervention integrating movement, gesture, and expression into classroom-based early English literacy lessons reported greater gains in language acqui-

sition and science vocabulary, compared with a control group (Greenfader & Brouillette, 2017; Morgan & Stengel-Mohr, 2014). Another experimental study by McMahon, Rose, and Parks (2003) found that a dance and literacy intervention improved the reading skills of low-income, African American first graders in Chicago public schools, compared with a control group that received traditional reading instruction.

Other than the social, emotional, and literacy benefits related to dance engagement among younger and older individuals, much less empirical evidence exists about how exposure to in-school dance courses might enhance student's academic and learning outcomes during middle school. As mentioned earlier, this is largely because of the difficulty in assigning randomized groups to capture the isolated effects of dance engagement on other domains (See & Kokotsaki, 2015; Winner et al., 2013). The empirical evidence that dance engagement, in particular, positively affects student academic outcomes is weak (Lanfredi, 2013; See & Kokotsaki, 2015; Winner et al., 2013).

Yet, exposure to dance has been associated with greater creative thinking skills among adolescents (Minton, 2003). Two experimental studies reported that tailored dance instruction significantly increased middle and high school students' problem solving and critical thinking skills, compared with a control group (Kim, 2007; Park, 2007). However, generalizability to students in the U.S. is limited in that both Kim (2007) and Park (2007) sampled Korean students. Finally, small meta-analyses conducted by Keinänen, Hetland, and Winner (2000) examined eight experimental and quasi-experimental studies on dance engagement and reading and nonverbal reasoning skills, finding little support that dance instruction increased student's reading or nonverbal reasoning skills.

### Access to, and Selection Into, Dance Education

Compared with levels of music, visual art, and theater programs, dance education has been the least accessible form of arts programming in U.S. public secondary schools (Parsad et al., 2012). One factor that restricts access to dance electives in public secondary schools is limited funding for arts education programs. The National Endowment for the Arts' budget for arts education in the U.S. has decreased considerably over the years (Hall, 2015). This limits the resources school districts have to provide dance courses (i.e., studio room, music equipment) and hire certified dance instructors or teaching artists (Bonbright, 1999). Neighborhood variation in the amount of tax revenue collected by local school districts also limits students' access to dance electives. Schools located in lower-income areas receive less tax revenue which affects the schools' budget and the range of elective programs that can be offered.

Another prominent factor influencing the accessibility of dance programs in public secondary schools in the United States is that arts programs—particularly dance education—have not been included or rewarded within the evaluation and accountability system of public schools (Kisida, Morrison, & Tuttle, 2017; Peterson, 2007). In 2003, the United States' reauthorization of the Elementary and Secondary Education Act, The No Child Left Behind Act, required that funding of public schools be dependent upon students' demonstrated proficiency on standardized assessments of math and reading (Beveridge, 2009). Access to dance elective courses in secondary schools at this time was largely overrun by

other programs focused on helping low-performing students pass the annual proficiency exams. At some schools, this meant the removal of certain arts education electives, like theatre. At other schools with more resources, where dance and theater programs still existed, such arts electives were often not an option for the low-performing students who were forced to take remedial math and reading tutoring electives (Beveridge, 2009; Peterson, 2007). Thus, an important aim of the current study was to explore the extent to which students have *access* to dance education programs in middle school, and for those who attend a school that offers dance, what individual *selection* factors determine which students do and do not sign up for dance courses.

Adolescent participation in school-based dance courses is likely influenced by a variety of individual, peer, family, and school factors (Eccles, 2005; Fredricks et al., 2002; McCarthy, Ondaatje, Zakaras, & Brooks, 2004; NEA, 2012). Opportunities for socialization with selected peer groups, for example, is often an important reason why adolescents choose one elective over another, in addition to alignment with both family and religious values (Fredricks et al., 2002). Middle school is also an important developmental period when adolescents experiment with different social and personal identities (i.e., "I am a dancer"), which can influence their middle- and high-school trajectory and long-term career choice (Wigfield & Eccles, 2002). The middle school years are critical in determining adolescents' identity development and long-term trajectories in the arts because these are the first academic years (6th–8th) when students can enroll in full arts elective courses with limited skill.

When funding for arts programs is available, the public-school setting is an ideal environment where children from all social backgrounds can receive access to the arts (Beveridge, 2009; Chapman, 2004). According to a national survey administered by Child Trends Database (2015), among adolescents enrolled in schools with arts programs between 1991 and 2013, about half (48% to 55%) engaged in a performing arts program in any given year, and participation declined in the higher grades. According to a nationwide survey of adults, fewer than 5% of adults in the United States (18 or older) reported receiving dance instruction in a school setting (NEA, 2013) and the proportion of adults who received dance instruction as a child varied from 9.6% to 17% (Hall, 2015; Rabkin & Hedberg, 2011).

Despite the small proportion of adults who reported dancing during childhood (NEA, 2013), researchers (O'Neill, Pate, & Liese, 2011) have reported that dance is a common activity among adolescents according to self-report measures. O'Neill et al. (2011) sampled 3,598 adolescents, ages 12–19 years and found that approximately 21% of U.S. adolescents participated in out-of-school dance activities in the month prior to data collection. Self-selected dancing experiences were most prevalent among adolescents from Black and Hispanic backgrounds, compared with non-Hispanic Whites (O'Neill et al., 2011). Interestingly, O'Neill et al. (2011) also reported that adolescents from the lowest-income families reported engaging in more dance than adolescents from higher-income families.

The findings reported by O'Neill et al. (2011), using self-report measures of dance engagement largely outside of school, run counter to the literature stating children from higher-income families are more likely to engage in the arts compared with children from lower-income backgrounds (Elpus & Abril, 2011; Foster &

Jenkins, 2017; Hall, 2015). Perhaps when examining dance as a single subject (rather than an any-arts composite), and adolescents are given the autonomy to choose the type of activity they want to engage in, adolescents' selection into dance activities does not follow the notion that arts engagement is limited to children from higher-income families. Further, ethnic and income differences in dance participation during school may not be observed in ethnically diverse, lower-income, urban communities—given the diverse and culturally rich heritage of many forms of dance (other than ballet) prevalent within such communities (Hanna, 2015; NEA, 2013). The current study adds to this literature by reporting the frequency of, and selection factors involved in, adolescents' participation in middle school dance courses overall, and during 6th, 7th, and 8th grade, a period, according to O'Neill et al. (2011), in which adolescents are actively choosing to engage in dance activities.

Large gender differences favoring females are prevalent in dance participation during early childhood, adolescence, and adulthood (Bucknavage & Worrell, 2005; Dumais, 2006; Hall, 2015; O'Neill et al., 2011). Male participation in dance may be stigmatized by stereotypes that challenge male identity and masculinity, especially among males who partake in Western European dance (i.e., ballet). Noteworthy, however, is that gender stereotypes about dance may not carryover to Afro-Caribbean and Latinx students, where male and partner dance are normalized in social engagement and cultural sharing (NEA, 2013). In addition to gender and ethnicity, our study adds to the literature by examining other factors, including disability/special education status, English proficiency, ELL status, initial school readiness (cognitive, social, behavioral, and motor skills) at kindergarten entry (7 years before middle school), and prior academic performance as potential self-selection factors into dance during middle school.

### The Current Study

We assessed more than 30,000 ethnically diverse and largely low-income preschoolers for school readiness at age four, and then followed them longitudinally as they progressed through public middle school (Winsler et al., 2008, 2019). We had three goals. First, we descriptively report the number of students enrolling in dance electives during middle school (6th, 7th, and 8th grade). Second, we carefully examine numerous child and family factors (age-4 school readiness, academic performance in 5th grade, gender, ethnicity, special education, poverty, and ELL status associated with both *access* to dance electives (for all middle schools) and *selection* into dance electives when they were available (only in middle schools that offered dance). Our ultimate goal was to statistically control for all observed selection effects to test whether in-school dance courses are linked to a variety of authentic, school-based measures of student academic performance (GPA, retention, suspension, standardized math and reading test scores, and attendance) during 6th, 7th, and 8th grade.

We add to the existing literature in several ways. First, we examine multiple, novel selection factors associated with middle school dance (i.e., age-4 school readiness, academic performance in 5th grade, gender, ethnicity, special education, poverty, and ELL status). Second, we isolate potential effects of *in-school dance* engagement on student academic outcomes. (Rather than a combination of both in- and out-of-school participation, or dance

combined with sports or other forms or art). Third, we have a large ethnically diverse and low-income sample, including many Latinx students, an understudied group (Garcia & Jensen, 2009). Fourth, our indicator of dance engagement is from official school data as opposed to less reliable student or parent retrospective reports. Finally, our strong quasi-experimental, prospective longitudinal design carefully controls for observed selection factors and has the potential to provide some of the strongest scientific evidence to date (short of random assignment) for examining associations between dance and academic performance. We ask the following research questions:

1. What proportion of our sample enrolls in dance electives during middle school (6th, 7th and 8th grade), and what proportion of the middle schools attended by children offer dance electives?
2. What are the preexisting selection factors that predict enrollment in dance electives in middle school? That is, how do students who do and do not take dance electives in middle school differ in terms of demographic variables, school readiness skills at kindergarten entry, and prior elementary school academic performance? This question is examined from two perspectives:
  - A. Access – For the entire sample, who is accessing dance courses in middle school?
  - B. Selection/Choice – Limiting the sample to only students who attend a middle school that offers dance, which students are actively choosing to take dance electives when available?
3. Controlling for all preexisting selection factors, are dance classes associated with enhanced concurrent and later academic outcomes (i.e., GPA, retention, suspension, standardized math and reading scores, and attendance) for students in middle school?

## Method

### Participants

We used data from the Miami School Readiness Project (MSRP; Winsler et al., 2008, 2019), a large-scale, university-community partnership using a prospective, cohort-sequential, longitudinal design. Research for this project received institutional review board approval. Five cohorts of ethnically diverse, predominantly low-income, 4-year-old children were comprehensively and individually assessed for school readiness in prekindergarten between academic years 2002–2003 to 2006–2007. Children make up essentially the entire Miami-Dade County population (92%) of those who received subsidies to pay for childcare or attended public school pre-K programs at age four. Thus, the sample does *not* include (a) low-income children who were in Head Start programs only, (b) children of any income who received only parental care at age four, or (c) wealthier families who paid fully for their own childcare at age four. Our research team was responsible for administering the school readiness assessments to the children at

age 4 (training the assessors and teachers, and distributing and processing the parent and teacher surveys etc.; see Winsler et al., 2008, 2012). Once the children got to the public school system in kindergarten, we received secondary administrative, de-identified, data sets for the annual school outcomes and eventual elective course selections for students.

Students who later entered the local public school system were followed longitudinally every year as they progressed through school. With the help of the school system, children were carefully matched/linked according to their unique IDs and followed even if they moved to another school as long as they didn't leave the school district. The research team received de-identified, confidential administrative school record data for the children who were still in the school system each year. The sample was largely progressing through middle school (6th–8th grade) at the time of this study. Attrition (or failure to initially link/match) for this mobile, low-income sample from prekindergarten (pre-K) to kindergarten was about 20%, but after reaching the public school system, regular longitudinal attrition was only about 3% to 5% per year.

We had data on 31,332 total children who had completed either 6th, 7th, or 8th grade by the academic year 2013–2014. Because of cohort-based attrition (i.e., some of the children were not old enough to have reached 7th or 8th grade), our sample had 6th grade data for all five cohorts, 7th grade data for four cohorts, and 8th grade data for three cohorts. Thus, we had 16,392 students with 8th-grade data, 23,788 with 7th-grade data, and 30,413 with 6th-grade data.

The background characteristics, average school readiness, and elementary school performance of our sample is shown in Table 1. Children were 51.8% male, and the ethnic breakdown was 60.9% Latinx, 32.1% Black, 6.4% White, and .06% Asian/Other/Mixed. Slightly more than half were considered ELL by the district (defined by having reported speaking another language than English at home and testing below English for Speakers of Other Languages (ESOL) exit levels on an English proficiency test). By 5th grade, only 5% were still considered limited in their English proficiency. The sample was largely in poverty (81% received free/reduced lunch at school in 6th grade), and 16% received some kind of special education services in 6th grade.

## Measures

**Predictor variables/covariates.** Background information and the other predictor variables in the section below were collected via administrative school records with the exception of the school readiness assessments which were given directly by the researchers.

**ELL status in kindergarten.** ELL status was acquired from parent-reported home language at kindergarten entry. Those who reported predominantly speaking another language at home were considered ELLs during the kindergarten year by the school system.

**English proficient in 6th grade.** Students classified as ELL by the school district are assessed each year for English proficiency with the Comprehensive English Learner Assessment (CELLA; Educational Testing Service, 2005). The CELLA assesses aural/oral, writing, and reading skills in English. Raw scores place children in one of the five ordinal ESOL levels. The ESOL

Table 1  
*Demographic Information of the Sample (N = 31,322)*

Characteristic	N (%)
Grade	
Sixth grade	30,413
Seventh grade	23,788
Eighth grade	16,392
Gender	
Male	16,144 (51.8)
Female	15,021 (48.2)
Ethnicity	
White/Other	1,989 (6.40)
Hispanic	18,971 (60.90)
Black	10,000 (32.10)
Asian/Pacific Islander	185 (.60)
Poverty status in sixth grade	
Received free/reduced lunch	24,636 (81)
Did not receive free/reduced lunch	5,775 (19)
English language learner (ELL) in kindergarten	
ELL	17,978 (57.40)
Not ELL	13,348 (42.60)
English proficiency in sixth grade	
English proficient	28,300 (95)
Not English proficient	1,477 (5)
Disability status in sixth grade	
Disability	4,921 (16.20)
Nondisabled	25,502 (83.80)
Elementary school retention	
Retained at least once	4,206 (13.40)
Never retained	27,126 (86.60)
School readiness skills (nat. percentiles)	<i>M (SD)</i>
DECA	
Social skills (TPF)	59.40 (28.00)
Behavioral concerns	46.34 (29.51)
LAP-D	
Fine motor	56.62 (28.87)
Gross motor	68.15 (28.90)
Cognitive	52.31 (30.31)
Language	44.55 (30.69)
Fifth grade academic achievement	
GPA (5-pt scale)	4.09 (.57)
Math (100–500 scale)	284.95 (68.69)
Reading (100–500 scale)	268.45 (61.30)

levels are marked 1–5, with levels 1 and 2 indicating beginning English learners who still have much difficulty, levels 3 and 4 being advanced stages of English learning, and level 5 considered sufficiently proficient in English to exit the ESOL program. Students must also reach a minimum threshold of performance on the high stakes (English) reading Florida Comprehensive Achievement Test (FCAT; Human Resources Research Organization & Harcourt Assessment, 2007), in addition to reaching ESOL Level 5, to exit the ESOL program (Miami-Dade County Public Schools, 2008). We examined students' ESOL level in 6th grade, and those at level 5 (and those who were never considered ELLs) were considered English proficient ("1") and those with a value less than 5 received a "0."

**Poverty status in 6th grade.** Free/reduced lunch (FRL) receipt in 6th grade served as a proxy for poverty status. Children from low-income families are eligible for free or reduced-price lunch (130% of the Federal Poverty Line and 185% of the FPL, respectively) in the public-school system. Children who received free or reduced-price lunch received a "1" versus "0."

**Disability status in 6th grade.** Students were coded for whether they had a primary exceptionality in 6th grade. Codes included the following groups: intellectual disability, speech/language disorder, visually impaired, deaf or hard of hearing, specific learning disabled, dual-sensory impaired, autistic, severely emotionally disturbed, traumatic brain injured, or other health impaired. If any of these codes were present in 6th grade, children were coded a “1” = yes (vs. “0”). Gifted students were coded as a “0.”

**Retention in elementary school.** Four criteria had to be met for a child to be considered retained at some point during elementary school. First, the child had to enter kindergarten (or their first grade in the district) on time according to their birth date. Second, the child had to complete a grade, as demonstrated by having final grades for that grade level. Third, the child had to appear in the same grade for a second time the following academic year according to the school system. Last, the child had to have grades for the second, subsequent academic year in that repeated grade. Children who were ever retained during elementary school (kindergarten–5th grade) received a “1” (vs. 0).

**5th grade GPA.** We used students’ 5th grade GPA as an indicator of prior academic competence (before middle school). At the end of the academic year, students received grades from their teachers for all subject areas. Fifth grade subjects might include, for example, science, social studies, music, reading, language arts, English as a second language, math, and physical education. Subject enrollment varied by student. Grades were changed to a 5-point scale, where 5 = A, 4 = B, 3 = C, 2 = D, 1 = F. A continuous composite GPA score was created by averaging all grades received across subjects in the 5th grade, resulting in an overall GPA for 5th grade.

**5th grade math and reading scores.** In 5th grade, students were required to take the state-wide, high-stakes Florida Comprehensive Achievement Test (FCAT; Human Resources Research Organization & Harcourt Assessment, 2007). Questions are in both multiple-choice and short-answer formats. Total scale scores for math are included in the present study (range = 100–500; Cronbach’s alpha = .90). Just math scores were used for multivariate regression analyses because math and reading were highly correlated ( $r = .88$ ) to avoid multicollinearity.

**Cognitive, language, and motor skills at school entry.** Children’s cognitive, language, and fine and gross motor skills were measured at age four with the Learning Accomplishment Profile–Diagnostic (LAP-D; Nehring, Nehring, Bruni, & Randolph, 1992), a norm-referenced, standardized developmental assessment administered individually to children in their pre-K academic year. Children were typically assessed once in the beginning (September/October) of the 4-year-old year and once at the end (April/May). For certain years/cohorts, 3-year-olds were also assessed in the middle of the academic year. We used children’s latest available assessment for children who were assessed multiple times. For children in subsidized childcare, MA-level bilingual assessors administered the LAP-D assessment in either Spanish or English (whichever was the child’s strongest language), and for those in public school pre-K programs, the child’s teacher administered the assessment after receiving the same rigorous training from the publishers. Internal consistency reliability for the LAP-D within the sample ranged from .92 to .95 (Winsler et al.,

2008). National percentiles scores are used to increase interpretability.

**Social skills and behavior problems at school entry.** Children’s social skills and behavior problems were measured (same time periods as above) using the Devereux Early Childhood Assessment (DECA; LeBuffe & Naglieri, 1999). The DECA subscales, initiative, self-control, and attachment are combined and referred to as total socioemotional protective factors (TPF), for which larger numbers indicate greater social skills. The DECA behavior concerns scale, with higher numbers indicating more problems, was also used. Teachers and parents reported (identical forms) the frequency of children’s behaviors using a 5-point Likert scale to indicate how often within the past 4 weeks the child had exhibited a variety of behaviors (0 = *never*, 4 = *very frequently*). Parents/teachers chose whether they wanted to complete the form in English or Spanish. Sixteen percent of teachers and 34% of parents completed the Spanish form. National percentiles scores are used. Internal consistency reliability within this diverse sample was .91 (parent) and .94 (teacher) for TPF, and .72 (parent) and .81 (teacher) for behavior concerns. Reliability did not vary as a function of language of form (Spanish, English) or rater (Crane, Mincic, & Winsler, 2011).

## Dance Exposure in Middle School

**Child-level.** Included in the administrative data we received each academic year, for each student for all grades, were the course subjects taken (i.e., math, social studies, science, art) with an end-of-the-year teacher-assigned grade for each course. Using whether certain course names appeared on the student’s final report card each year, we created variables denoting whether, and when, students took a dance elective course in middle school. Dance course names included “Dance 1, 2, 3, or 4,” and “Dance Conditioning 1 or 2”. If any of these appeared in a given grade (6th, 7th, or 8th), the student was flagged as having enrolled in dance (i.e., 6th grade Dance, 1 = *yes* and 0 = *no*). This was done again for 7th and 8th grade. These grade-based variables were aggregated across all grades (6th, 7th, and 8th) to make another variable indicating *yes* (1) or *no* whether the child enrolled in dance at least once during middle school. A continuous variable indicating the total number of years a child enrolled in dance was also generated and ranged from 0 to 3 years of dance based on dance elective enrollment during the 6th, 7th, and 8th grades.

**School-level.** The variables described above that flag students’ exposure to dance in middle school were created at the child level, however, not all schools that children attended offered dance courses. To address this, middle schools ( $N = 202$ ) were each flagged for offering in-school dance electives (*yes* = 1/*no* = 0; during the years that students attended them) using the following three sources of information: (a) *The presence of a student who had taken a dance class based on the school IDs associated with each student.* For any student who took a dance course in 6th, 7th, or 8th grade, that child’s school was flagged as *yes* = 1 for offering dance. (b) *The school’s website often indicated course availability.* Schools were flagged as offering dance electives if a dance elective was listed on their 6th, 7th, or 8th grade online curriculum sheet, or the school listed a dance instructor on the staff page of the school’s website. (c) *Phone calls were made to administrators.* For schools with no publically available data about dance electives on



the website, we contacted by telephone the relevant person who was listed as head of curriculum or student advising and asked what, if any, dance elective courses were options for students to take during the academic years our students attended middle school. For some schools, current year (2015) course offerings had to be used to flag schools rather than retroactive information about what was offered in the academic years 2009–2014. Schools for which we could not find information on dance offerings were treated as missing data. Of the middle schools included in our study ( $N = 202$ ), we did not have information on availability of dance elective courses for 11.4% ( $n = 23$ ).

### Outcome Variables

Each outcome variable was recorded for both the *concurrent* year in which the dance exposure took place (i.e., 6th grade dance exposure and 6th grade GPA) and the following year after dance exposure took place (i.e., 6th grade dance exposure and 7th grade GPA).

**Retention in middle school.** Similar criteria mentioned earlier for elementary school retention were used to define retention in middle school. The student had to complete the middle school year (6th, 7th, or 8th) and have end-of-the-year grades for that academic year. Then, the student had to appear the following academic year for a second time in the same grade. Also, the child had to have remained long enough to have final grades at the end of the repeated academic year. For each grade (6th, 7th, or 8th), children who were retained received a “1” (vs. 0).

**GPA in middle school.** Middle school (6th, 7th, and 8th grade) academic subjects included English/language arts/ESOL, mathematics, social science, science, physical education, music/art/theater/arts/dance, foreign language, and career and technical education. As was done for elementary school GPA, we averaged the student’s grades across all courses to create a GPA score for each grade (6th, 7th, and 8th).

**Standardized math and reading.** Students in the state are required to take the high-stakes FCAT (Human Resources Research Organization & Harcourt Assessment, 2007) in both math and reading each academic year in middle school (6th, 7th, and 8th). Questions are in both multiple-choice and short-answer formats. Total scale scores are included in the present study (range = 100–500; Cronbach’s alpha = .90).

**Attendance.** Participants’ school attendance information was collected from school records each academic year. Teachers submitted attendance reports daily, and administrative records listed the total number of days absent. These totals represent a combination of both excused and unexcused absences. We created a continuous variable for analyses as the number of days absent.

**School suspension.** Administrative records also listed the total number of days a student was suspended for a behavioral offense each year in school. This is a combination of both in-school suspensions (e.g., removes students from regular class periods and places them in an alternative supervised room at the school during school hours) and out-of-school suspensions (e.g., students are not authorized to be on the school grounds for a period of time). We categorized this dichotomously for analyses—indicating yes/no whether the child was suspended at least once during that grade. For each grade (6th, 7th, or 8th), children who were every suspended received a “1” (vs. 0).

### Analysis Strategy

The first descriptive research question, having to do with proportions of students who took dance and schools that offered dance electives, was examined using descriptive statistics. For question 2, which addresses the differences between those who did and did not take dance in middle school, we first examined this in a bivariate fashion by running chi-square analyses for categorical predictors, and independent samples *t* tests for continuous predictors. Then, entering all of the significant predictors, we tested a series of developmentally informative, hierarchical, multivariate, logistic regression analyses to predict the types of students who enroll in dance courses during middle school. These models were run twice, first including all children regardless of whether they attended a school that offered dance (estimating *access* to dance), and then restricted to students who went to a school that actually offered dance (estimating *selection* into a dance elective when available). For our final research question on academic outcomes associated with dance engagement, we ran multiple multilevel regression models (logistic regression for categorical outcomes) predicting concurrent and future outcomes as a function of dance exposure among children who went to a middle school that offered dance, controlling for the selection factors associated with taking dance observed in our earlier selection model. The series of multilevel regression models, run in STATA/SE 14.2 using the “mixed” or “melogit” commands, allowed us to account for student nesting at the school level—the common variance within each middle school that also accounts for some proportion of each outcome—and adjusts standard errors accordingly.

### Results

**Research Question 1.** What proportion of our sample enroll in dance electives during middle school (6th, 7th and 8th grade), and what proportion of the middle schools attended by the children offer dance electives?

The number and proportion of our sample who ever took dance, broken down by 6th, 7th, and 8th grade, is shown in Table 2. Of the 31,332 adolescents with middle school data, 6.7% took dance at some point during middle school. Per grade we see that 3.4% of students enrolled in dance in 6th grade, 5% in 7th grade, and 4.7% in 8th grade. Of students who took dance at least once, the majority (68%) enrolled in dance for only one year, 22% took dance for two years, and only 10% of students took dance all three years (see Table 2).

Table 2  
*Proportion of Middle School Students Enrolled in a Dance Elective by Grade and Cumulative Number of Years*

Measure	Frequency	Total <i>N</i>	Percent
Grade			
6	1,031	30,413	3.4%
7	1,195	23,788	5%
8	769	16,392	4.7%
Ever	2,113	31,332	6.7%
Number of years			
1 year	1,436	2,113	68.0%
2 years	471	2,113	22.3%
3 years	206	2,113	9.7%

The 31,332 students in our sample attended 202 different schools serving 6th through 8th graders in the school district. Of the 179 middle schools that had dance-relevant data, 36.9% offered dance electives in 6th, 7th, or 8th grade. Only about half of our sample went to a school that offered dance. Of the students who went to a school that offered dance (and therefore had the option of taking dance), 13.3% took a dance elective.

**Research Question 2.** What are the preexisting selection factors that predict enrollment in dance courses in middle school? That is, how do students who do or do not take dance courses in middle school differ in terms of demographic variables, school readiness skills at kindergarten entry, and prior elementary school academic performance?

## Bivariate Analyses

**Demographics.** We addressed predictors of dance engagement one variable at a time via *t* tests (continuous predictors) and chi-square (categorical predictors). Table 3 shows how the categorical variables (gender, ethnicity, poverty, disability, and ELL, English proficiency, and retention status in elementary school) differed depending on whether the student later enrolled in dance in middle school. Latinx students had the highest enrollment rates (8.4%), followed by White (7.7%) and Asian (6.5%) students. Black students had the lowest enrollment rates compared with all other ethnic groups with only 3.5% taking a dance class,  $\chi^2(3) = 247.23$ ,  $p < .001$ . For males, an extremely small percentage (0.8%) took dance during middle school, compared to 13.2% of females,  $\chi^2(1) = 1,890.07$ ,  $p < .001$ .

Students without disabilities enrolled in dance more than double the rate of students who received special education services (7.8%

vs. 2.2%),  $\chi^2(1) = 199.98$ ,  $p < .001$ . ELL's showed higher enrollment in dance (7.8%) compared to native English speakers (5.3%),  $\chi^2(1) = 78.39$ ,  $p < .001$ . Children who were proficient in English (including native speakers) in 6th grade were more than twice as likely to take dance (7.2%), compared with students who had not reached full English proficiency (2.6%),  $\chi^2(1) = 44.61$ ,  $p < .001$ . Those who were retained at least once in elementary school were much less likely to take dance in middle school (2.9%), compared to those who were never retained (7.3%),  $\chi^2(1) = 112.69$ ,  $p < .001$ . There was no difference in dance enrollment between students who did or did not receive free/reduced lunch in 6th grade.

**School readiness.** Table 4 shows how students who took dance in middle school were different from those who did not on continuous predictor variables (social skills, behavior problems, cognitive, language, motor skills at school entry, GPA and math/reading scores in 5th grade) years before they arrived to middle school. At age four, children who enrolled in dance seven years later during middle school had higher social skills compared to students who never took dance,  $t(2,290.72) = -18.15$ ,  $p < .001$ ,  $d = .41$ . Children who enrolled in dance during middle school also had fewer behavioral concerns at age four compared to children who did not,  $t(2,231.72) = 14.67$ ,  $p < .001$ ,  $d = .34$ . Similarly, at age four, children who later enrolled in a dance elective had stronger fine motor,  $t(1,795.32) = -15.27$ ,  $p < .001$ ,  $d = .39$  cognitive,  $t(1,753.64) = -10.03$ ,  $p < .001$ ,  $d = .26$ , and language skills,  $t(19,705) = -8.09$ ,  $p < .001$ ,  $d = .22$ . Gross motor skills at school entry did not differ between groups. Importantly, students who took dance in 6th, 7th, or 8th grade were already performing better academically in 5th grade compared with those who did not take dance. Students who later went on to take dance in middle school had higher 5th grade GPAs,  $t(2,579.26) = -27.68$ ,  $p < .001$ ,  $d = .57$ , 5th grade math,  $t(2,406.89) = -12.92$ ,  $p < .001$ ,  $d = .29$ , and 5th grade reading test scores,  $t(2,408.70) = -16.51$ ,  $p < .001$ ,  $d = .37$ , compared with those who did not go on to enroll in dance.

Table 3

*Proportion of Students Who Enroll in Dance Electives in Middle School by Demographic Variables – Bivariate Analyses*

Variable	Enrolled	
	<i>n</i>	%
Gender**		
Male	128	.80%
Female	1,977	13.2%
Ethnicity**		
White/Asian/Other	154	7.7%
Hispanic	1,587	8.4%
Black	352	3.5%
Asian/Pacific Islander	12	6.5%
Poverty in sixth grade		
No free or reduced lunch	428	7.4%
Free or reduced lunch	1,656	6.7%
Disability in sixth grade**		
Nondisabled	1,979	7.8%
Has a disability	108	2.2%
ELL in kindergarten**		
Non-ELL	706	5.3%
ELL	1,407	7.8%
English proficiency in sixth grade**		
Not English proficient	39	2.6%
English proficient	2,030	7.2%
Prior retention		
Not retained	1,990	7.3%
Retained	123	2.9%

\*\*  $p < .001$ .

## Multivariate Analyses

The above analyses were conducted in a bivariate fashion, one variable at a time to see the individual correlates of taking dance to compare with other studies that did not have as many covariates. Here we report the results of hierarchical, multivariate, logistic regression analyses that predict dance enrollment during middle school (yes/no ever) from the combination of all of our preexisting selection variables. Importantly, these models control for intercorrelations between the predictor variables and tell us their unique and combined effects on dance exposure. The first block of the regression model examined the contributions of demographic variables (ethnicity, gender, poverty, disability status, ELL status, English proficiency) and child school readiness at age four as they come together to predict later dance enrollment. Next, the elementary school academic performance indicators (5th grade GPA and math scores, retention status) were entered into Block 2. Model 2 informs us not only as to whether 5th grade achievement is related to middle school dance enrollment, controlling for earlier child competence and demographic variables, but also whether the demographic variables in Step 1 remain associated with dance enrollment after elementary school achievement is entered. That is, if

Table 4  
*Independent Samples t Test of Enrollment in a Dance Elective in Middle School*

Variable	Enrolled			Not enrolled			Cohen's <i>d</i>
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	
School readiness							
Social skills*	1,888	69.39	24.56	24,098	58.61	28.06	.41
Behavioral concerns*	1,888	37.24	27.88	24,098	47.06	29.52	.34
Gross motor skills	1,313	66.77	28.11	16,121	68.26	28.95	.05
Fine motor skills*	1,479	66.53	25.69	18,332	55.83	28.97	.39
Cognitive skills*	1,474	59.51	28.49	18,321	51.74	30.38	.26
Language*	1,463	50.78	30.14	18,244	44.05	30.68	.22
Elementary academic performance							
Fifth grade GPA*	2,039	4.36	.44	26,915	4.07	.57	.57
Fifth grade math*	2,047	303.03	65.52	26,526	283.55	68.73	.29
Fifth grade reading*	2,047	289.02	58.30	26,568	266.87	61.24	.37

\*  $p < .001$ .

the coefficient for a demographic variable is no longer significant after children's academic performance were included in the model, it suggests that the variable was only indirectly related to middle-school dance enrollment and its effect is better explained by academic skill. As explained earlier, we examined these models from two perspectives: (a) *access* –the entire sample, who is accessing dance in middle school (including all students regardless of whether they attend a school that offers dance)?, and (b) *selection/choice* – limited to students who attend a school that offered dance which gets at which students choose to take dance electives when they are available.

**Access – Step 1.** Results of the logistic regression models for access to dance in middle school are shown in Table 5. When the

Table 5  
*Multiple Regression Predicting Access to Dance Courses in Middle School*

Variable	Step 1		Step 2	
	Odds ratio	<i>SE</i> ( <i>B</i> )	Odds ratio	<i>SE</i> ( <i>B</i> )
Demographics				
Hispanic/White	1.19	.15	1.25	.15
Black/White	.44***	.16	.51***	.16
Asian/White	.99	.44	.95	.44
Black/Hispanic	.37***	.10	.41***	.11
Asian/Hispanic	.83	.42	.76	.42
Male	.05***	.14	.05***	.14
Poverty	1.04	.09	1.19	.09
Disability	.73*	.16	1.03	.17
ELL	1.03	.09	.99	.09
English proficient	1.85*	.25	1.43	.25
School readiness at age 4				
Total S-E protective factors	1.006***	.002	1.19	.09
Behavioral concerns	1.001	.001	1.005**	.002
Gross motor skills	1.00	.001	1.00	.001
Fine motor skills	1.003	.002	1.002	.002
Cognitive skills	1.001	.002	.99	.002
Language skills	1.002	.001	1.001	.001
Elementary academic performance				
Retention in elementary school			.64**	.152
GPA in fifth grade			1.50***	.083
Math score in fifth Grade			1.002***	.001

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

demographic and school readiness variables were entered to predict middle school dance enrollment, ethnicity, gender, disability, English proficiency, and social skills at age four were significant predictors of who took dance in middle school. Odds ratios (*OR*) are provided which indicate the extent to which the odds of taking dance anytime in middle school increase (a number being greater than 1) or decrease (less than 1) as a function of being one level of the variable (i.e., male) compared to the other (female). For continuous predictors, the *OR* indicates how much the odds of dance enrollment change with a 1-point increase in the predictor (i.e., moving from the 39th to the 40th percentile in cognitive skills).

Black students were much less likely (about half) to take a dance elective compared with White and Latinx students. Females had nearly twice the odds of enrolling in dance compared with males. Students with a disability had 27% decreased odds of taking dance compared with those without a disability. Last, students who were proficient in English by 6th grade had almost double the odds of enrolling in dance compared with those who were not yet English proficient. ELL and poverty status were not significant unique predictors of taking dance in middle school. It is important to point out that these are adjusted effects after controlling for other variables in the model. Thus, for example, even controlling for poverty, disability status, and school readiness, Black students still had significantly less access to dance.

Children's teacher-rated social skills also uniquely predicted the odds of taking dance seven years later in middle school. For each 1-point increase in social skills at age four, the odds of taking dance increased by .006. So, for example, a child at the 75th percentile in school entry social skills compared to a child at the 25th percentile (a 50-point difference) has a 30% increased odds ( $50 \times .006$ ) of taking dance seven years later. Children's behavioral concerns, fine and gross motor skills, and cognitive and language skills at age four were not significant unique predictors of enrolling in dance seven years later when other demographic variables were included.

**Access – Step 2.** In Step 2, when children's 5th grade academic performance was entered, controlling for other covariates, we see that each of the prior performance measures was associated with taking dance during middle school. Students who were retained at least once in elementary school had 36% decreased odds of taking dance in middle school compared with those never

retained. A 1-point increase in 5th grade GPA (i.e., moving from a 'B' to an 'A') was associated with a 50% increased odds of taking dance. A 1-point increase in 5th grade math scores was associated with .002% increased odds of later exposure to dance (i.e., a 100-point increase on the 500-point FCAT scale would mean a 20% increased odds of taking dance).

Ethnicity and gender remained significant unique predictors of taking dance during middle school, after adding 5th grade academic performance. Disability status, English proficiency, and social skills at age four (significant effects in Step 1) were no longer significantly related to dance enrollment after factoring in 5th grade academic performance in Step 2. Finally, behavioral concerns at age four emerged as a significant unique predictor of taking dance in middle school after including 5th grade academic performance. Interestingly, each 1-point *increase* in behavior problems at age 4 was associated with a .005% *increased* odds of taking dance in middle school.

**Selection/Choice.** The above analyses inform us about who is taking dance classes in middle school, and thus tell us about which types of students have *access* to dance in their school, but these models do not account for whether or not the student attended a school that offers dance. Only 37% of middle schools attended by our sample offered dance electives. To account for the availability of dance courses among middle schools, we estimated the same regression analyses as above, except we limited the sample to students who attended a middle school where dance was actually offered. These analyses are more representative of which students actively *choose* or *select* dance classes when they are available at their school.

**Selection – Step 1.** Results of the logistic regression model predicting selection/choice into dance in middle school are shown in Table 6. Selection into middle school dance significantly varied as a function of ethnicity, gender, disability, and social skills at age four. Similar to the access model reported above, Black students were still less likely to take dance, 40% decreased odds compared with White and Hispanic students, controlling for other covariates. This indicates that underrepresentation of Black students in dance is not simply explained by them being more likely to attend schools that do not offer dance (true, but not the whole story). Even when available, Black students are not choosing to take dance classes as much as other groups. The gender difference remained stable, with females being twice as likely to take dance compared to males, and students with a disability had half the odds of enrolling in dance, than those without a disability. Among the school readiness predictors, only social skills were associated with selecting dance in middle school. The odds of taking dance increased by .007% for every one-percentile-point increase in social skills at age four.

**Selection – Step 2.** Each of the 5th grade performance measures was associated with choosing to take a dance class in middle school. Students who were retained during elementary school had 35% decreased odds of taking dance in middle school. Each one-point increase in 5th grade GPA yielded a 44% increased odds of taking dance, and a one-point increase on the 5th grade math was associated with a .002% increase in the odds of taking dance. Ethnicity remained a predictor of dance enrollment, such that Black students had less than half the odds of taking dance than Hispanic students. Interestingly, Black students were no longer less likely to take dance compared to White students, once prior

Table 6  
*Multiple Regression Predicting Selection to Dance Courses in Middle School*

Variable	Step 1		Step 2	
	Odds ratio	SE (B)	Odds ratio	SE (B)
<b>Demographics</b>				
Hispanic/White	1.03	.16	1.09	.16
Black/White	.61**	.17	.73	.17
Asian/White	.93	.47	.91	.47
Black/Hispanic	.59***	.12	.67**	.12
Asian/Hispanic	.90	.45	.83	.45
Male	.05***	.14	.05***	.14
Poverty	1.12	.10	1.26*	.10
Disability	.62**	.16	.87	.17
ELL	1.103	.10	1.07	.10
English proficient	1.49	.26	1.12	.27
<b>School readiness at age 4</b>				
Social skills	1.007***	.002	1.006**	.002
Behavioral concerns	1.00	.001	1.00	.001
Gross Motor skills	1.00	.001	1.00	.001
Fine Motor skills	1.00	.002	1.00	.002
Cognitive skills	1.00	.002	.99	.002
Language skills	1.00	.002	1.00	.002
<b>Elementary academic performance</b>				
Retention in elementary school			.65*	.16
GPA in fifth grade			1.56***	.09
Math score in fifth grade			1.002*	.001

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

academic performance was included. This suggests that a large part of the reason why Black students enroll less in dance is attributable to ethnic differences in academic performance—a certain level of academic performance might be needed to take dance.

Similarly, the effect of disability on selection into dance disappeared after entering 5th grade academic performance. This means that having a disability is correlated with academic performance, and it is performance in 5th grade that is more important for predicting dance participation. Males were still significantly underrepresented in taking dance, with 95% decreased odds compared with females. Social skills at age four remained a significant unique predictor of taking dance. Each one-percentile-point increase in social skills was associated with a .006% increased odds of taking dance seven years later. Last, poverty emerged as a unique predictor of taking dance when 5th grade performance was included. The relation between poverty and selection into dance was positive—among students with similar academic performance, those in poverty were slightly *more* likely to choose dance when it was available, compared to those not in poverty.

**Research Question 3.** Controlling for all preexisting selection factors, are dance classes linked to enhanced concurrent and later academic outcomes (i.e., GPA, retention, suspension, standardized math and reading test scores, and attendance) for students in middle school?

Now that we know that significant preexisting differences exist between those that do and do not select into middle school dance courses, our next goal was to control for these variables to examine whether student's enrollment in dance classes was associated with better concurrent and later academic outcomes in middle school. We ran multilevel multiple regression analyses including, each

time, the relevant selection factors that were associated with taking dance (from Step 2 of the selection regressions reported above) with exposure to dance as the main predictor of interest (1 = took dance, 0 = did not), among students who went to a school that offered dance electives. Retention in elementary school was not included as a covariate—despite its significance in Table 6 as a predictor of selection into dance—because of lack of variance (no one who took dance had been retained in elementary school). Our findings were similar with and without including this variable in the model. We ran models both for *concurrent* outcomes during the same year that the dance class was taken, and for the *subsequent* year, the year *after* the dance class was taken. The unstandardized beta coefficients and adjusted standard errors (accounting for nesting at the school level) for concurrent and subsequent year outcomes associated with having taken dance classes in 6th grade, 7th grade, and 8th grade are shown in Table 7.

**6th grade.** Controlling for prior academic achievement and other selection factors distinguishing those who did and did not take dance, those who took dance in 6th grade had significantly better grades in 6th grade compared to those who did not (see Table 7). There were no other significant differences on the other outcomes in 6th or 7th grade between those that did and did not take dance in 6th grade.

Table 7  
*Concurrent and Subsequent-Year Outcomes From Taking Dance in Middle School*

Enrolled in dance 6th grade	6th grade outcomes		7th grade outcomes	
	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
GPA	.058*	.018	.041	.023
Math	1.650	1.555	.255	1.615
Reading	-.315	1.629	-1.941	1.757
Days absent	-.301	.284	-.381	.368
Retained <sup>a</sup>	2.337	1.237	2.461	1.423
Suspended <sup>a</sup>	.761	.117	.942	.139
Enrolled in dance 7th grade	7th grade outcomes		8th grade outcomes	
	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
GPA	.042	.019	.067*	.022
Math	3.763*	1.353	1.546	.649
Reading	1.996	1.453	.724	.618
Days absent	-.594	.305	-1.029*	.385
Retained <sup>a</sup>	1	n/a	.786	.634
Suspension <sup>a</sup>	.582**	.080	.863	.140
Enrolled in dance 8th grade	8th grade outcomes			
	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
GPA	.088**	.022		
Math	.997	.655		
Reading	.457	.607		
Days absent	-1.289**	.379		
Retained <sup>a</sup>	.995	.792		
Suspension <sup>a</sup>	.700	.118		

*Note.* Unstandardized beta coefficients are shown. Estimates displayed are the concurrent and subsequent outcomes of taking a dance elective in sixth, seventh, or eighth grade. Each variable in the left-most column represents a unique outcome estimated by our models. Race, gender, FRL, behavioral concerns at age four, fifth grade GPA, and fifth grade math scores are controlled for in each model.

<sup>a</sup> Odds ratios.

\*  $p < .01$ . \*\*  $p < .001$ .

**7th grade.** Students who took dance in 7th grade had significantly higher math scores and were less likely to be suspended in 7th grade, compared with those who did not enroll in dance, controlling for covariates (see Table 7). Those who took dance in 7th grade also had significantly higher GPAs and missed significantly fewer days of school in 8th grade, compared with nondance students.

**8th grade.** Students who took dance in 8th grade went on to earn significantly higher GPAs in 8th grade than those who did not take dance, controlling for covariates (see Table 7). Those who took dance in 8th grade also missed significantly fewer days of school in 8th grade than nondance students. There were no differences on standardized test scores nor on retention or suspension in 8th grade.

**Supplemental dosage analyses.** The above outcome analyses only examined whether dichotomous dance exposure (yes/no in X grade) was related to later outcomes. We also, however, had some information (albeit limited because not all of our students had a chance to get to 8th grade yet) on the number of years that the students took dance. At the helpful suggestion of an anonymous reviewer, we also ran preliminary, supplemental analyses to see whether dosage, or the number of years a student took dance, mattered for academic achievement. This question was analyzed with a similar regression approach controlling for the same covariates, as above, however without accounting for nesting, and only including students who went to a school that offered dance and who had reached eighth grade and, thus, had an opportunity to take dance for all 3 years ( $n = 8,427$ ). Also, to have time to see a cumulative effect of multiple years of dance, we restricted the analyses to estimate only 8th grade academic outcomes.

We first estimated multiple regression models (logit for dichotomous outcomes) with our continuous independent variable of years of dance engagement in middle school (range 0–3 years) in place of the prior Y/N dichotomous predictor used for the results included in Table 7. Using the continuous measure of years of dance taken, we replicated the effects observed in Table 7 on 8th grade GPA and attendance, but here showing that more years of dance was even better. In addition, a new positive effect on 8th grade math scores was now observed using the continuous predictor of years of dance exposure. These results can be seen in Table S1 in the online supplementary materials.

Next, we estimated identical regression models but instead we used dummy-coded indicators of the years taken (using one year as the reference group) to examine, for example, whether two or three years of dance enrollment was more advantageous to students' academic achievement than enrolling in just one year of dance. For this model, we limited the analysis to only those who took dance at least once to see whether more than one year of dance exposure mattered. These results can be seen in Table S2 in the online supplementary materials.

Interestingly, even more positive associations appeared when students took multiple years of dance electives in middle school. Students' 8th grade GPAs were significantly higher for students who had enrolled in two or three years of dance, versus one year of dance during middle school. Eighth grade math scores also were significantly higher for those students who had taken two years of dance electives (vs. one year). Students who enrolled in two or years three of dance electives missed significantly less days of school in 8th grade than students with only one year of dance.

Two new outcomes emerged when examining multiple years of taking dance, compared with our nondosage models. Those who took dance for two years instead of one had significantly higher standardized reading test scores in 8th grade. Finally, the small number of students who took dance electives for all three years in middle school had significantly lower rates of suspension in 8th grade, compared with students with only one year of dance. These dosage models support our original models reported in Table 7 and extend these findings to show that taking multiple years of dance electives during middle school appears to be advantageous to academic achievement.

### Discussion

Although many studies have shown associations between participation in the arts in general and enhanced child cognitive, social, and academic outcomes (Brown et al., 2017; Brown & Sax, 2013; Catterall, 2009; Catterall et al., 2012; Elpus, 2013a) and some have explored positive benefits for dance engagement in particular (Gilbert, 2006; Greenfader & Brouillette, 2017; Kim, 2007; Lobo & Winsler, 2006; Minton, 2003; Morgan & Stengel-Mohr, 2014; Park, 2007; Rossberg-Gempton et al., 1999; Seham, 1997), much of the research is correlational and does not adequately control for preexisting selection effects—the many ways that students who do and do not get arts experiences are initially different. Further, studies often examine rather global arts experiences (Catterall, 2009; Catterall et al., 2012; Winsler et al., 2019) when outcomes associated with arts participation are likely to vary by the particular art form in question (Winner et al., 2013).

Dance is an art form that has been relatively understudied in the literature, and opportunities for dance are becoming fewer in today's public school systems (Parsad et al., 2012). With a large ( $n = 31,332$ ) and ethnically diverse sample followed longitudinally from pre-K through 8th grade, we carefully identified (a) the frequency with which adolescents enroll in dance electives during middle school and (b) the differences across students who do and do not (a) have access to and (b) select into dance electives in middle school when available. We further used this information to then statistically control for all observed selection factors to examine whether taking middle school dance classes was linked to better academic outcomes for students later in middle school.

### Access and Selection Into Dance

Overall, only 6.7% of our students took dance in middle school, with the majority taking a dance class for only a single year. This relatively small figure for dance enrollment is similar, although slightly less than the 10% to 17% of adults who report taking dance in or out of school as a child (Hall, 2015), yet higher than the 3.6% of a large sample of high school students who enrolled in dance coursework as indicated by high school transcripts (Elpus, 2013a). Our low rate of dance participation is not surprising given that dance is the least accessible form of arts programming (compared to music, visual art, and drama) offered in middle schools in the nation, at 12% (Parsad et al., 2012). Dance participation was low in our sample largely because many schools did not appear to offer it as an elective course. At the school level, only 37% of middle schools in the area offered dance in 6th through 8th grade. After limiting the sample to only students who went to a middle

school that offered dance, we found that 13% of students enrolled in dance electives. Our 13% figure is very similar to that reported for the state average for in-school dance enrollment (14%); however, these percentages are slightly lower than the Southeastern regional average for uptake (20%) when dance was available (Bell, 2014).

Access to dance classes in middle school, however, is far from equal. Black students were significantly underrepresented in middle school dance courses compared with both White and Latinx students. This was partly attributable to access—Black students were more likely to attend a middle school that did *not* offer dance courses. Inequities in school funding, especially in schools located in low-income neighborhoods, is a strong explanation for why Black students, who are more likely to reside in low-income neighborhoods, attend schools without dance programming (Dumais, 2002; NEA, 2012). Low-income neighborhoods are typically highly segregated, as is the case in this community, where one in three Black students are enrolled in “isolated” schools—“compris[ing] 85% of one racial group” (Moore, 2004; Smiley, 2014). Schools without funding for arts such as dance will not have adequate resources for dance infrastructure such as credentialed dance teachers or classrooms designed for dance and movement (Chapman, 2004).

Access to a school that offers dance is not the whole story, however. Even when attending a school that offers dance electives, Black students were still less likely to enroll in dance compared with Latinx students. It is important to note that academic skills and poverty status were controlled for in our analyses, so this ethnic difference cannot be explained by those factors. This ethnic discrepancy may be related to the ethnic make-up of the community, which is 66.8% Hispanic/Latinx descent (U.S. Census Bureau, 2015). As a part of Hispanic culture, social dancing is a widely accepted cultural norm (NEA, 2013), and Hispanic youth may be exposed to dance outside of school, which encourages their decision to enroll in dance electives. Intrinsic disinterest, stigma, or peer/social motivators (i.e., not feeling welcome in dance classes or clashes with ‘Black’ identity) may also influence Black students’ decision to not enroll in dance electives when they are available (Eccles, 2005; Fredricks et al., 2002).

Interestingly, the difference between Black and White students selecting into dance when it was available was no longer significant after including academic performance in the model. (Black students continued to be underrepresented in dance relative to Latinx students, however). This suggests that a certain level of academic performance may be needed before certain groups of students either feel free to, or are allowed to, sign up for dance classes. As discussed in the introduction, schools with a heavy emphasis on standardized tests often require students who are low performing in math and reading to use their elective options in the form of remediation courses to help increase their chance of passing the high stakes, standardized tests (Beveridge, 2009). Numerous scholars are concerned that high-stakes standardized tests disproportionately disadvantage students of color (Greene & Winters, 2009; Horn, 2003; Penfield, 2010; Tavassolie & Winsler, in press). Perhaps another, yet unexplored, side effect of high stakes tests is that required or encouraged remedial courses designed to help struggling students pass such tests are taking away valuable elective opportunities for certain groups of students to experience the arts.

Females students were nearly twice as likely to enroll in dance classes compared with males. Male participation in Western European dance (i.e., ballet) is often stigmatized by social norms or gender stereotypes favoring female engagement (Gard, 2008; Risner, 2007). Dance engagement in Western societies is primarily female dominant, which might challenge male identity or masculinity (Risner, 2007). Challenges to male identity often result in decreased likelihood of males engaging in dance, especially during adolescence when youth are exploring a sense of self and securing friend groups. However, among Afro-Caribbean and Latin cultures, male dancing is a normalized form of social engagement and cultural sharing (NEA, 2013). Within the Miami area where the current study took place, Caribbean and Latin American dances such as Salsa, Tango, Cha Cha, and Mambo are popular, so one might have thought that male dancing would be more normalized in the present study, but we still saw a large gender difference. It is possible that traditional ballet or modern dance rather than Latin dance are what is offered in schools, but we did not have information on the exact type of dance found in the curriculum.

Most arts education research has found that arts participation is more likely among individuals of middle to high socioeconomic status (Catterall et al., 2012; Elpus & Abril, 2011; Foster & Jenkins, 2017). Yet, within our predominantly low-income and urban sample, we found that when dance courses were offered and other factors such as prior academic competence were controlled, students whose family income reached the threshold for receiving free/reduced-price lunch were actually 26% more likely to enroll in dance than students not in poverty. This suggests that students in poverty in this urban community may find dance electives as an attractive outlet for expression, identity, and/or learning in middle school, supporting findings reported by O'Neill et al. (2011) that, when given the autonomy, adolescents from low-income families will select into dance at higher rates than adolescents from higher-income families.

According to the current study, students with disabilities were less likely to take dance electives than those without, but interestingly, this association was not significant after controlling for students' prior academic performance. This suggests that the reason why children with disabilities are less likely to enroll in dance is because of their increased likelihood of struggling in school, perhaps combined with the need to allocate more time to academics rather than the arts. If this is the case, it is unfortunate given the positive socioemotional and cognitive benefits dance engagement has shown for students with disabilities and other underperforming youth (Albin, 2016; Duggan, Stratton-Gonzalez, & Gallant, 2009; Skoning, 2008; Seham, 1997).

We also examined whether ELL status and English proficiency were related to dance enrollment in middle school. Although prior work has proposed that students who do not speak English as a first language may actively utilize dance as a form of self-expression through nonverbal symbolism (Connery et al., 2010), we found both ELL status and English proficiency in 6th grade were not associated with taking dance electives in middle school when all other variables were included in the model. There was, however, relatively little variance in English proficiency for this particular sample of older students since they had been in the school system since pre-K.

A strong contribution of the present longitudinal study was that we were able to examine whether different domains of children's

school readiness skills at age four were associated with students' selection into dance elective courses seven years later in middle school. The bivariate analyses revealed that children who took dance electives in middle school began kindergarten with stronger social, language, fine motor, cognitive, and behavioral skills compared with students who did not choose dance electives. However, after demographic variables and later elementary school achievement were added to the models, the only school readiness domain that remained uniquely and positively associated with selection into dance was social skills. This finding has critical implications for researchers attempting to show that dance education and joint movement activities promote social skills, collaboration, and cooperation among children (Gilbert, 2006; Kirschner & Tomasello, 2010; Lobo & Winsler, 2006; Rabinowitch & Meltzoff, 2017; Rossberg-Gempton et al., 1999; Tunçgenç & Cohen, 2018, 2016) because we show that children *already* had stronger social skills way before the middle school dance exposure took place. Clearly, dance education researchers must deal with the possibility of bidirectional relations—dance might improve children's social skills, but it also appears to be the case from our results that social skills might influence children's selection into dance. Researchers must understand and appropriately control for such selection and bidirectional effects when attempting to show positive links between dance education and children's outcomes.

The strongest and most robust selection factor identified in the present study, however, was prior academic achievement. Before even getting to middle school, students who went on to enroll in dance in 6th through 8th grade already had better grades, scored higher on standardized math and reading tests in 5th grade, and were less likely to have been retained in elementary school compared to students who did not enroll in dance in middle school. These findings are consistent with prior research showing that high school students who elect into music coursework are also more academically competent than nonmusic students (Elpus & Abril, 2011). The finding that students naturally exposed to dance are already higher functioning academically than those who are not, even before the measured dance exposure begins, is critical for researchers to consider when trying to make causal claims about the effects of dance (or other arts for that matter) on cognition and academic performance.

Indeed, research has documented that children who engage in the arts typically have parents with higher cognitive skills, more years of education, greater family assets, and spend more time with their children than children not exposed to the arts (Elpus & Abril, 2011; Foster & Jenkins, 2017). Such increased family social capital leads to enhanced academic development through increased parent-child scaffolding, learning activities, and educational investment, and also leads to enhanced exposure to the arts. Foster and Jenkins (2017) report that these preexisting family background characteristics explain more of the variance in children's academic achievement than direct causation between arts exposure and later outcomes. We did include initial school readiness skills and prior academic achievement in our models—factors that are presumably the consequence of family capital—as covariates to capture such early family influences, but we were limited in our availability of rich family covariates to examine this further. Another possibility to explain our findings is that many years of bidirectional causal influences have occurred—where enhanced family capital lead to early dance/arts exposure, and over time that exposure to dance

also stimulated cognitive and academic development among the students. It could be that the students who enrolled in middle school dance in our sample came from families where dance had been encouraged early on (i.e., ballet lessons since age 5?) and that such early exposure to dance may have already had a positive influence on children's elementary school achievement by 5th grade.

### Outcomes From Dance Participation

Our final goal was to control for the selection factors identified in the current study to see whether taking dance as an elective course in 6th, 7th, or 8th grade was *still* associated with enhanced academic performance concurrently and later in middle school. It is important to note that our quasi-experimental research design does not allow us to make causal claims between dance participation and student academic performance. However, in the absence of a randomized control trial, our large-scale, prospective, longitudinal design with multilevel analyses, using strong statistical controls for multiple, known, preexisting selection factors that make participation groups initially different is among the next best methodological options available (Shadish, Cook, & Campbell, 2002).

Controlling for selection factors, engagement in middle school dance electives was associated with enhanced academic outcomes for students either in their concurrent academic year or in the following year in middle school. Students who took dance in either 6th, 7th, or 8th grade attained higher GPAs and/or higher standardized math scores in either the concurrent or the following academic year. These findings, that dance students scored higher in math, are in contrast to prior research that failed to find a relation between dance engagement and math (Lanfredi, 2013). However, Lanfredi (2013) examined a small sample of females who engaged in dance training outside of school and they used a visual-spatial thinking measure of math ability; our study estimated the association between in-school dance and a school-administrated comprehensive math assessment. Prior research has noted that learning the kinesthetic of dance outside of the academic classroom (i.e., symmetrical movement and rhythm) can complement the learning of math concepts, and vice versa (Belcastro & Schaffer, 2011).

Children who took dance in 7th or 8th grade also had better school attendance (fewer days absent) in the concurrent year, and taking dance in 7th grade was also linked to lower rates of suspension from school that year. Elpus (2013a) also reported high school dance students having lower rates of suspension (6.8%) compared with nondancers (8%), but for them the contrast was not statistically significant. Lower rates of suspension and attending school more often among dancers, compared with nondancers, may be attributable to motivational factors in which students may be more engaged in the school environment as a result of their interest in the dance activity setting (Eccles, 2005).

In our primary analyses examining dichotomous (yes/no) dance enrollment, dance was not associated with reading achievement in middle school, despite other research supporting early childhood dance involvement and literacy skills (Greenfader, Brouillette, Farkas, 2015; Morgan & Stengel-Mohr, 2014). It is possible that dance only enhances literacy when the dance curriculum is coupled with a targeted intervention, as opposed to general dance

education electives as was examined here. It is notable, however, that in our supplemental analyses examining dosage, cumulative positive 'effects' of dance were observed for standardized reading scores in 8th grade for those who had taken two years of dance. Indeed, we found that several positive associations between taking dance electives and academic outcomes in 8th grade were either stronger or only emerged for students after multiple years of dance enrollment during middle school. Students' eighth grade reading and math scores, for example, were higher for those who enrolled in two years of dance, compared with 1-year takers. Also, reduced likelihood of being suspended from school in 8th grade was found, but only when students took three years of dance. These findings related to dosage effects of dance support other work showing that intense, sustained, and/or multiyear participation with the performing arts is more beneficial than brief exposure (Elpus, 2013a; Holochwost et al., 2017; Jaschke, Honing, & Scherder, 2018).

The positive findings here, with our prospective longitudinal design with statistical control for numerous selection effects, are some of the strongest empirical data available to date showing positive academic outcomes from dance engagement in middle school. This adds to the growing literature showing positive effects and increased academic performance associated with arts engagement (Catterall, 2009; Catterall et al., 2012; Elpus, 2013a; Hardiman, Magsamen, McKhann, & Eilber, 2009; Holochwost et al., 2017; Holochwost, Wolf, Fisher, & O'Grady, 2016; McCarthy et al., 2004; Posner & Patoine, 2009). Our study contributes in particular by examining a large, low-income and ethnically diverse sample including many Latinx students who have been underrepresented in the literature, by following longitudinally the sample for 10 years, by identifying and statistically controlling for numerous selection factors, by focusing specifically on dance, and on in-school dance courses, and by examining a wide array of authentic school outcomes.

### Limitations and Future Research

Our data, although strong in many ways, were limited. For instance, a student's decision to enroll in dance courses may have been stunted due to the style of dance offered in middle school (i.e., ballet vs. salsa). Some adolescents may have wanted to enroll in dance, but their interest in dance may not have matched the particular course(s) at their school, or that fit into their course schedule. Unfortunately, we did not have data on the type of dance offered in the curriculum. Also, for some schools, we could not find information on whether dance was offered. We also did not have data about the amount of out-of-school dance experiences adolescents received while enrolled in middle-school or at an earlier age. This particular concern—exposure to dance outside of school—may or may not have affected our reported outcomes associated with in-school dance engagement. Such gaps are clearly of interest for future research. Further, future longitudinal research should address the potential of bidirectional effects of exposure to dance and cognitive development, overtime. In addition, although we were able to account for nesting within schools, we did not have the necessary data to account for nesting at the classroom level. Last, although a strength of this study is our large and diverse Miami community sample that describes a particular community (Jager, Putnick, & Bornstein, 2017), it also limits the



external validity for generalizing our findings to students of medium- to high-income families, and those in other communities.

### Conclusion/Implications

The present study showed that in Miami, a moderate proportion of middle schools offered dance, and a relatively small proportion of children enrolled in dance electives. Future research should examine the barriers to dance enrollment and potential reasons why adolescents do not enroll and/or persist in dance electives during middle school, particularly among Black students, those who are disabled, and those who are low performing in terms of academics. In addition, school administrators and art educators may wish to enhance their efforts at increasing access for dance electives for students in 6th, 7th, and 8th grade in this community, and likely other communities as well.

There are also serious selection differences between students who do or do not choose to take dance, favoring White and Hispanic students, females, and students who were more socially and academically competent before entering middle school. It is imperative that future research on the effects of dance understand and control for selection effects before documenting associations between dance and enhanced development, if not using a true experimental design. Finally, we showed, with a rigorous quasi-experimental design, that taking dance in middle school is linked with enhanced academic performance among low-income, ethnically diverse students. These findings suggest that increasing opportunities for students to engage in dance in middle school would not only be good for art's sake, but also useful for other academic goals as well.

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