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Abstract

Using nationally representative data, this study found that family trips have a positive impact on children's academic achievement in reading and math. Children who took at least one family trip at kindergarten or third-grade achieved on average 1% higher in third-grade reading and math tests. The benefits were greater with more family trips, but differed by trip type. Family trips to cultural attractions most benefited the reading achievement, whereas those to athletic events benefited the math the most. This study's findings contribute to the understanding of family trip's educational benefits in early childhood; they provide a rationale for the promotion of family trips for children's educational benefits and for the further examination of different types of trips and travel.

Keywords: educational benefits; travel benefits; family trip; family travel; children; early childhood

David Rockefeller, in an interview with *Forbes*, declared that "*I am a passionate traveler, and from the time I was a child, travel formed me as much as my formal education*" (de Albornoz, 2003). Echoing this quote, many people believe that travel is educational for children (Crompton, 1979; Fantuzzo, Tighe & Childs, 2000; Minnaert, 2012; Stone & Petrick, 2013; SYTA, 2016), and parents take their children on family trips with educational motivations (Jonathan M. Tisch Center, 2017). However, empirical evidence for the educational benefits of travel for children, and specifically family trips—defined as any forms of activities done with family members outside of a person's usual living environment—is limited (Bos, McCabe & Johnson, 2015; Minnaert, 2012; Stone & Petrick, 2013, 2017).

The current study argues that family trips can function as an educational activity in the realms of family leisure and travel, as it is an activity conducted outside the usual environment that can vary in time and location. Though limited in scope (Durko & Petrick, 2013; Hilbrecht et al., 2008), scholars in tourism research have found that family travel and leisure time are correlated with children's socialization (e.g., Bos et al., 2015; Fu, Lehto & Park, 2014; West & Merriam, 2009) as well as general learning and personality development (e.g. Bos et al., 2015). However, there is limited empirical research on the impact of family trips on children's educational outcomes and the mechanism through which the impact occurs (Durko & Petrick, 2013; Hilbrecht, Shaw, Delamere & Havitz, 2008; Petrick & Huether, 2013).

Family trips provide an excellent opportunity for informal learning where children can repeatedly learn skills and knowledge such as counting and domain-specific vocabulary that can benefit them academically. Some education studies have examined the relationship between summer vacation and children's academic achievement (e.g., Burkam, Ready, Lee & LoGerfo, 2004; Cooper, Nye, Charlton, Lindsay & Greathouse, 1996; Helf, Konrad & Algozzine, 2008;

Morrison, 1924), but in many cases family trips were not a focus of study and were not extensively explored. Hence, previous studies provide limited information about which types of family trips are most beneficial to educational attainment and when family trips should take place in order to maximize their educational benefits.

To address this research gap, the current study examines the impact of different types of family trips on children's academic achievement by measurable learning outcomes over time. Nationally representative data from the Early Childhood Longitudinal Study-Kindergarten Class of 1998–99 (ECLS-K) is used to draw an inference that can apply to the U.S. population. Moreover, we employ propensity score matching (PSM) and difference-in-differences (DID) methods to support the causal relationship between family trips and academic achievement in early childhood; to identify the types of family trip activities that benefit their academic achievement the most; and to examine the immediacy of family trips' impact on children's academic achievement.

By questioning the educational benefits of family trips, this study aims to identify an accessible means to advance children's academic achievement. The following section reviews the literature on the benefits of family trips and mechanisms through which children develop numeracy and literacy skills.

Literature Review

Family Trips, Leisure and Tourism

Family trips occurring outside one's usual living environment can take many shapes and forms, such as attending a sporting event, taking a hike in a state forest, visiting a local museum, or driving multiple days to a famous national park. These trips have been termed as leisure activities or tourism activities, depending on the distance traveled, days spent, and more

importantly, the context of the discussion. Tourism researchers adopted the term "travel" to emphasize the activities outside of and detached from a person's usual living environment; their research focus is on the impact on the traveler, as well as on a destination's environment, community, and economy. Leisure researchers emphasize "travel" as a type of activity outside of one's formal work or study, and undertaken with freedom of choice.

There has been constant effort to bridge leisure and tourism (Carr, 2002) because the two have been separated by an artificial demarcation: by distance traveled and/or time spent. This is due to two distinctive domains of research, in which two groups of researchers have different missions. Most of the time, tourism researchers need to estimate the economic impact of travel to a pre-defined area, and thus an artificial boundary is necessary. However, we argue that in terms of human experience, this boundary is a blurry and incremental one: a traveler will not have a distinctly different experience traveling 49 miles versus 51 miles; moreover, a day-trip could be equally exciting and life-changing compared to an overnight stay, depending on the activities engaged. Since the clarification of terms is essential due to the multi-disciplinary nature of this study, we argue that the term "trip" provides a link between everyday leisure and travel, as it falls under both leisure and tourism (Figure 1). Besides, a short-distance trip can be more accessible for groups in a lower socioeconomic status (SES) than a long-distance or long-term travel. Its positive impact, if we can validate it, can be more meaningful in constructing intervention policy and promoting educational achievements for students from low-income families.

[Figure 1 about here]

This study bases its definition of family trips on prior research by Schänzel, Yeoman, and Backer (2012). They define a family holiday as "a purposive time spent together as a family

group (which may include extended family) doing activities different from normal routines that are fun, but that may involve compromise and conflict at times (pp. 3)". Following this definition, we define family trips as out-of-school activities practiced by both family members and children away from the usual living environment, excluding school-organized trips as part of the curriculum and trips that children take without family members, such as summer camps. In other words, this study defines family trips as *purposive time children spend with at least one member of his or her family group (which may include extended family) doing activities outside of and detached from their school and usual living environment and regular routines*.

Family Trips and Educational Benefits

There has been a stream of literature that discusses the social and psychological benefits of family trips for young children, but scant literature has examined their educational benefits (Bos et al., 2015; Byrnes, 2001; Hilbrecht et al., 2008; Minnaert, 2012; Stone & Petrick, 2017). Byrnes (2001) asserts that going on trips can help children learn and practice the concepts and skills in their core curriculum. Children can also learn new skills, gain new information, and become motivated for more learning through family trips (Hilbrecht et al., 2008). Different types of family trips can have a different impact on children's academic achievement. Minnaert (2012) points out that the effect of a holiday on children's learning outcomes might be different based on the type of holiday, but the research evidence is limited. Family trips to cultural sites such as museums have been widely considered as educational experiences and believed to motivate and stimulate children's interest in learning (Briseño-Garzón, 2013; Dierking & Falk, 1994; DiMaggio, 1982; Jæger, 2011; Wu & Wall, 2017).

Bos et al. (2015) and Minnaert (2012) explain learning outside the classroom during family trips through the mechanism of experiential learning (Bos et al., 2015; Minnaert, 2012),

which is a form of informal learning based on experience (Marsick & Watkins, 2001). Family trips can be categorized as informal learning which has been repeatedly identified as a crucial mechanism through which children's early literacy and numeracy skills can increase (Skwarchuk, Sowinski, & LeFevre, 2014). In addition to formal learning such as teaching literacy skills and math fact skills in classroom settings, informal learning such as playing number games and storytelling with family members have been reported to affect children's numeracy and literacy by developing early numerical sense and phonetic and phonological awareness for mathematics and reading (Bull, Espy, & Wiebe, 2008; Gathercole, Pickering, Knight, & Stegman, 2004).

The idea of experiential learning started with Dewey (1938) and was further developed by Kolb (1984). According to Kolb, Boyatzis, and Mainemelis (2001), experiential learning occurs through the following process: based on a Concrete Experience (CE)—in our case, the family trips—a person can reflect on the experience (Reflective Observation, RO) and derive implications (Abstract Conceptualization, AC); the implications lead to Active Experimentation (AE), which is the step where the person tries out what he or she has learned from the CE and creates a new experience (Figure 2).

[Figure 2 about here]

For experiential learning to occur, the experience needs to be concrete and not abstract (Kolb, 1984). Family trips provide such concrete experiences when they hike in a national park or visit a modern art museum. After a family trip, most children reflect on or reminisce about their experience, voluntarily or as encouraged by parents (Minnaert, 2012). Through images, memories, and emotions, the experience is conceptualized into an abstract form. Children can subsequently engage in active experimentation based on what they have learned. For example,

they can reflect on their experience watching a baseball game while solving a math question that compares numbers or writing about the new vegetation they observed at a national park, which contributes to the vocabulary building. Such a learning cycle, especially when repeated, leads to new knowledge, skills, and attitude (Bos et al., 2015) that build children's numeracy and literacy (Bull et al., 2008; Gathercole et al., 2004; Geary, Hamson, & Hoard, 2000).

Previous literature has repeatedly confirmed the educational benefits of experiential learning (e.g., Alkan, 2016; Alvarez & Rogers, 2006; Davidson, Passmore & Anderson, 2010; Dierking & Falk, 1994; Earnest, Rosenbusch, Wallace-Williams, & Keim, 2016; Scholz & Tietje, 2002). Alkan (2016) provides evidence on experiential learning's impact on academic achievement in chemistry by comparing students who received traditional teaching versus those who received experiential-learning-focused education. Alvarez and Rogers (2006) found that experiential learning increases students' participation, understanding of problems, and problem-solving skills. Davidson et al. (2010) revealed how experiential learning outside the school environment can stimulate learning and increase the learning potentials of the children. Indirectly, experiential learning can also affect academic achievement through stimulating self-esteem and self-efficacy (Galeotti, 2015; Ng, Dyne & Ang, 2009).

Family trips differ from some experiential learning activities outside the school in that they involve family. Research has found that family interaction positively benefits children's educational outcome (Fruh, Fulkerson, Mulekar, Kendrick, & Clanton, 2011). Fruh et al. (2011) noted that having meals with family not only contributes to family closeness and connectedness, but also leads to intellectual development of children. A longitudinal study of 15 years that examined the benefits of family meal conversations found that the conversations led to children's vocabulary expansion that improved their reading skills (Snow & Beals, 2006). Other

verbal interactions between parents and children such as shared reading also have been linked to children's development of language skills (Pomerantz, Moorman, & Litwack, 2007; Storch & Whitehurst, 2001). However, as argued by Pomerantz et al. (2007), the impact of parental involvement on children's academic achievement can vary according to its approach and quality. Therefore, we can expect that educational impact of family trips may be different from those of other family-involved activities, because parent's approach and quality of their involvement may vary by the characteristics and purposes of the activities. We also expect that educational impact may be different even within family trips considering a wide variety of ways to plan them; certain types of family trip may contribute to children's learning more than other types.

Considering the learning opportunities that family trips offer, the current paper expects to find a strong connection, though different in degree, between family trips and children's academic achievement. A series of studies have assumed the educational benefits of family trips. However, no research has examined the impact of family trips on younger children's educational outcome empirically, especially over an extended period. This study seeks to fill the gap by analyzing the relationship between academic achievement in early childhood and family trips that occurred at different time points; one took place during the semester when children's academic achievements were measured and the others occurred a few years prior to the tests. The following section discusses the data and methodology employed for the analysis.

Methods

Data

The dataset is from the Early Childhood Longitudinal Study-Kindergarten Class of 1998–99 (ECLS-K) collected by the National Center for Educational Statistics (NCES). It fits the current study's purpose of analyzing the impact of family trips on children's academic

achievement, as it provides comprehensive information on sampled children including their test scores, family trip experiences—how often and how long they were—, and other family background information.

ECLS-K followed a nationally representative sample of U.S. children (N = 21,260). The data were collected using a multistage probability sample design. In the first stage, 100 primary sampling units (PSUs) consisting of counties or groups of counties were selected. In the second stage, public and private schools that offered kindergarten programs were selected from each PSU. Then, kindergarteners were randomly sampled per school. Private schoolchildren, Asian, and Pacific Islander children were oversampled and later weighted accordingly in order to gain enough sample for those specific smaller populations. The base-year of ECLS-K represented the fall and spring of the 1998-99 school year and five more waves of data were collected after the base year (Table 1).

[Table 1 about here]

The present study used waves 0, 1, 2, 4 and 5 of the ECLS-K, including data from parent interviews and children's reading and math test scores. Parent interviews provided information regarding family trips and home environments (e.g., parent SES, household income, and parents' education level), the child's race and gender, and parents' expected level of education for the child, and time spent with the child doing various activities. Questions about family trips were asked in three different time points: in waves 2, 3, and 5. Among them, the current study focused on wave 2 and 5. Wave 3 was excluded from the analysis because it was inconsistent with the other waves and had much smaller sample size compared to those of other waves; only 30% of the total sample was surveyed in wave 3.

To measure academic achievement, this study used mathematics and reading test scores at wave 1, 2, 4, and 5. Although ECLS-K data also provide scores for general knowledge and science, the former is only present from wave 1 through wave 4, and the latter is only present from waves 5 through 7. Hence, general knowledge and science scores are disregarded as they only allow examination of family trips' one-off impact rather than two.

For the final analysis, we excluded children who did not have complete test scores for reading and math in waves 1, 2, 4 and 5. This process decreased the sample size from 21,260 to 12,204. To make our results generalizable to the population, a specific weight (C245PW0) provided by the NCES was applied. As the sample excluded those without reading test scores from wave 1, 2, 4 and 5, the sample should be weighted to be representative of the total population and to reduce bias, by adjusting differential non-response. Weighting also compensated for the non-random selection process of ECLS-K and adjusted for different selection probabilities.

Measures

Dependent variables. We examined the outcome variable, academic achievement, using the reading and math test scores at wave 1, 2, 4 and 5. We compared the scores between those with different family trip patterns as well as within an individual across time. For both reading and math, scores were based on Item Response Theory (IRT) following the NCES suggestion; IRT-based score is recommended for analyzing trends in student outcomes or achievements across time (NCES, SRCD Biennial Pre-Conference Training: Data from the Early Childhood Longitudinal Study, Kindergarten Class of 2010-11, April 5th, 2017). The reading IRT score ranged from 0 to 212 whereas the math ranged from 0 to 174. Table 2 provides a central and

spread tendency of the reading and math IRT scores for each wave. The scores have gradually increased over time, which indicates that over time and within-group comparison is needed.

[Table 2 about here]

Independent variables. There were five family trip-related independent variables which were based on four questions: *1. In the past month, has anyone in your family gone to a play, concert, or other live show with the child? 2. In the past month, has anyone in your family visited an art gallery, museum, or historical site with the child? 3. In the past month, has anyone in your family visited a zoo, aquarium, or petting farm with the child? and 4. In the past month, has anyone in your family attended an athletic or sporting event with the child?* (Appendix I). The answers were in a binary form of "yes" or "no". We created four variables that corresponded to each question by giving a value of 1 or 0.

Then, we created a family trip variable that was a sum of the four variables. For example, if the child visited both art gallery and athletic event, the family trip variable was given the number two whereas if the child answered no to all four questions, it was given zero. The family trip variable ranged from 0 to 4 for each wave. We also examined the non-linear relationship between a family trip and children's academic achievement by adding the squared term of the family trip variables but it was excluded from the final analysis as it was found to be non-significant.

This study also included various covariates that could affect children's academic achievement. All covariate variables were retrieved from the wave 0, 1, or 2, whichever collected the most data. For demographic information, we included gender, race, ethnicity, and language. Gender (Barnett, 1995), race and ethnicity (Bali & Alvarez, 2004; Lee & Bowen, 2006), and

prior achievement (Gill & Reynolds, 2000) have found to be associated with academic achievement, so we controlled for these factors.

Gender was measured as a binary variable with male given the value 1 and female 0. For race and ethnicity, we categorized children into five groups: White, Black, Asian, Hispanic, and Other, with Other as the reference group. The 'Other' category included the following four different racial groups: native Hawaiian, other Pacific Islander, American Indian or Alaska native, and more than one race. In addition to race and ethnicity, whether children were in an English-speaking home environment was also included as it is a determinant of English language proficiency (Carhill, Suárez-Orozco, & Páez, 2008).

Moreover, included in the analyses were parents' SES, their expected level of education for the child, and their time spent with the child as they can influence their children's academic achievement (e.g., Datar, Sturm & Magnabosco, 2004; Lee & Bowen, 2006; Tavani & Losh, 2003). Different educational attainment and income level of parents can contribute to an academic gap among children (Eamon, 2002; Lee & Bowen, 2006; Schreiber, 2002). Parents' expectation for child's future education level (Englund, Luckner, Whaley & Egeland, 2004; Zhan, 2006) and parental involvement (Barnard, 2004; Lee & Bowen, 2006), such as parents' time spent with children, are also critical factors for determining children's educational outcomes.

SES was created as a composite variable that factored in parents' education level, an occupation prestige score, and income. Expected education level for child ranged from "less than a high school diploma" to "finish a Ph.D., M.D., or other advanced degree". Parent's occupation prestige score was based on their type of occupation and it ranged from 0 to 77.5. Parents' time spent with their children was a sum of frequencies they spent doing the following activities: how

often they read to the child, tell a story to the child, sing together, help the child create art, play games together, teach the child about nature, build things together, and play sports together. Each activity was given value from 1 to 4 corresponding to "Not at all" to "Every day". This variable was included to represent the time parents dedicated to their children, as it could affect their learning outcomes.

Last, we included children's approaches to learning rated by teachers as academic interest is a strong predictor of achievement (Schiefele, Krapp, & Winteler, 1992). The survey asked the teachers six items to measure children's approaches to learning, which were: attentiveness, task persistence, eagerness to learn, learning independence, flexibility, and organization. Each item was based on the scale ranging from one to four. NCES (2001) provides a detailed guideline and codebook of these variables.

Analysis Strategies

Imputations. We conducted multiple imputations using multivariate imputations by chained equations (MICE) to address missing values in our initial data. In the original dataset, there are 21,260 children. Of those children, only 6,322 had complete data. Hence, excluding children with missing data could have lost 70% of the original data, which can lead to critical bias and reduction in power (Azur, Stuart, Frangakis, & Leaf, 2011). Multiple imputations, under a missing-at-random assumption, use plausible values in place of missing values so unbiased parameter estimates can be achieved (Byun, Meece & Agger, 2017; Graham, Olchowski & Gilreath, 2007).

MICE, one of the widely-adopted multiple imputation methods, is suitable for a dataset that has many incomplete variables and of which an adequate joint distribution for its incomplete variables is difficult to determine (Buuren & Groothuis-Oudshoorn, 2011). The method can also

manage diverse types of variables such as continuous and categorical (see Azur et al., 2011). MICE was implemented using *mice* package in R (Buuren & Groothuis-Oudshoorn, 2011). The imputation process included all dependent and independent variables—incomplete or complete—and generated 25 sets of imputed values with 10 iterations; weight variable was not imputed. The 25 estimates were then pooled into one estimate. The percentage imputed for each variable is presented in Table 2.

Propensity score matching. With the imputed data, we conducted propensity score matching (PSM) prior to investigating the relationship between family trips and children's academic achievement. In social science research, it is difficult to capture causality, especially when the data are not from an experimental design. Even when the treatment is given to the human subjects in a laboratory setting, the results can be biased due to study design or selection bias (Dehejia & Wahba, 2002). We employ the ECLS-K dataset to compare groups in a non-experimental design, where treatment is taking family trips. To decrease bias from the factors besides family trip experience, we match the children who took family trips to those who did not with similar covariates characteristics.

[Figure 3 about here]

PSM calculates the probability, called propensity score, that a child is assigned treatment based on a set of covariates. In our case, the probability was based on eight covariates—gender, race, ethnicity, English-speaking environment, SES, expected education level, parents' time spent with the children, and children's approaches to learning. The children who took family trips are matched to those who did not with similar propensity score and then their academic achievement is compared. Figure 3 presents decreased bias after matching.

Difference-in-differences. Finally, we conducted the difference-in-differences (DID) analysis using the matched data. DID, a popular method to evaluate the influence of policy implementation, is often used to capture causality (Athey & Imbens, 2006). Simply put, DID approach compares a group that received treatment, in our case taking family trips, and that did not before and after the treatment to examine the impact of a treatment. Figure 4 graphically represents the mechanism of DID.

[Figure 4 about here]

The equation below is the linear model we regress for DID analysis:

$$score_{it} = \beta_0 + \beta_1 T_t + \beta_2 FT_i + \beta_3 (T_t * FT_i) + X_i \eta + \epsilon_i$$

where $score_{it}$ is the reading or math IRT score of a child *i* at wave *t*. Time dummy, T_t, marks when the child takes a family trip, and is zero before wave 2 and one since wave 2. To divide the groups that took family trips and those that did not, family trip dummy, FT_i, is introduced ($FT_i = 1$ if a child *i* took a family trip, $FT_i = 0$ if not). Covariate vector is represented as X_i. The true impact of a family trip is measured by β_3. In addition to DID, we cluster children within the same school or classroom for robust standard errors to avoid overstating estimate precision (Cameron & Miller, 2015; Rogers, 1994). We use *diff* Stata module for analysis (Villa, 2018). The models for wave 2, wave 5, and wave 2&5 were carried out separately. Figure 5 articulates the analysis plan from imputation to DID.

[Figure 5 about here]

Results

Effects of Family Trips

Table 3 presents the analysis results. We first examined the impact of taking any type of family trip. The first and third columns show that family trips taken in wave 2 and 5 were

positively correlated with both reading and math score. On average, children who took at least one family trip in wave 2 and/or 5 had 2.52 and 1.87 higher scores in reading and math respectively. More specifically, children who took at least one trip in wave 2 had respectively 2.63 and 1.74 higher reading and math scores than those who did not take any family trips. The difference was about 1% of the total score (averaged scores are 212 for reading and 174 for math) assuming that all other conditions were identical. Even though it may seem minimal, it is a considerable difference considering that none of the variables were able to influence the scores more than 3% of the total score except for the children's approach to learning evaluated by teachers.

The results were similar for family trips in wave 5. The significance of family trips in both waves indicates that the impact of family trips is both immediate and lasting. Also, children who took more than two trips in both waves had higher average scores both in reading and mathematics. Though the degree of incremental impact is smaller, this implies that children who took more trips outperform those who took less. The immediate and lasting impact of family trips and its cumulative impact mean that children who start going on family trips at younger age and take more trips benefit the most.

[Table 3 about here]

The impact on reading score was greater for a family trip taken in the kindergarten (wave 2) than in the third grade (wave 5). This, though the study is unable to verify it, could be due to accumulated knowledge and experience through experiential learning. For experience to become knowledge, children need to repeat the cycle of reflecting, conceptualizing, and experimenting. However, in the case of math score, it was the opposite. Family trips taken in the same semester

(wave 5), had greater influence than those in wave 2. Figure 6 provides a graphical representation of simplified results.

[Figure 6 about here]

Regarding the covariates, children who are White, Asian or of Hispanic origin had significantly higher average scores for both math and reading scores. Children who are Black showed a lower average for math scores. The race gap in achievement scores is evident in previous literature (e.g., Bail & Alvarez, 2004). Compared to female, male children had lower average scores in reading and higher average scores in math. Children's approach to learning had the highest positive correlation with their academic achievement. Higher SES, English-speaking home environment, and parent's educational expectation for their children were also positively associated with children's reading and math achievements. These results coincide with previous studies (e.g., Datar et al., 2004; Tavani & Losh, 2003). However, the parent's time spent with children was negatively correlated with their academic achievement.

Effects of Family Trips by Type

Given that family trips at wave 2 and 5 had a positive impact on academic achievement, we ran a follow-up analysis to see what types of family trips from each wave contributed most to the reading score at wave 5. To do so, binary variables for each type of family trip were included in the analysis. For example, if a child took a family trip to an art gallery, museum, or historical site, it would have a value of 1 (0 otherwise).

In the case of wave 2, among the different types of family trips, those to an art gallery, museum, historical site, a play, concert, or other live show had a positive relationship with the reading score. Specifically, trips to an art gallery, museum, or historical site showed more siginficant impact than other types of family trips did. These trips were all culture-related. This

finding is in line with the previous literature that confirms the educational value of such culture-related venues. Culture-related sites such as museums are not only educational, but also can motivate children to learn and develop an academic interest (Briseño-Garzón, 2013; Dierking & Falk, 1994; Hampden-Thompson, Guzman, & Lippman, 2008; Wu & Wall, 2017). Trips to museums are also known to benefit parents and enhance family bonding (Wu & Wall, 2017; Briseño-Garzón, 2013). Unlike any types of family trips, children benefited more if they took culture-related trips in both waves 2 and 5. This indicates that for specific types of trips, marginal benefit increases with additional trips.

For math, family trips to an athletic or sporting event had a significantly positive impact. Sporting data are often used in classroom settings to improve mathematical questioning and thinking (Boaler, 2015). As children attend an athletic or sporting event, they interact with sporting data such as game scores, which can benefit their mathematical inquiry. In a similar logic, research has shown that physical education classes are positively associated with academic achievement in mathematics (e.g., Carlson et al., 2008). Moreover, there is a high possibility that the children who attended an athletic or sporting events were physically active during the events. Physical activity is often considered to benefit mathematical skills (Becker, McClelland, Loprinzi, & Trost, 2014). Similar to reading achievement, more trips led to higher math scores compared to children who did not take any trips.

The results from examining general family trips and type-specific family trips demonstrate that taking children to different attractions and events can have varying results. Disregarding other benefits from family trips such as family bonding, we suggest taking children to cultural attractions and sporting events if the goal is to improve reading and math academic achievement.

Family Trips by SES, Race and Ethnicity

The above analyses found that reading and mathematics achievement varied by SES, race, and ethnicity. Hence, we segmented children's family trip patterns by SES, race, and ethnicity to explore the possibility of mitigating achievement gaps via family trips. First, the segmentation by SES showed that children from lower SES were less likely to go on family trips of any kind compared to those from a higher SES segment. For example, at wave 2, only 21% of the children from the lowest 25th percentile SES group went on a family trip to an art gallery, museum, or historical sites whereas 45% children from the highest 25th percentile did. Though the difference was smaller at wave 5, there was still a gradual increase in family trip frequency for all types of trips as SES improved (Table 4).

[Table 4 about here]

In the segmentation by race and ethnicity, we observed that children who identified as White took the most number of family trips on average at both waves. This persisted throughout waves and trip types except for wave 2 where the percentage of Asian children who visited an art gallery, museum, or historical site slightly exceeded the percentage of White children. Table 4 shows that athletic or sporting event is the most popular place for family trips except for Asian children. More than 40% of all children took a family trip to an athletic or sporting event in both waves. Art gallery, museum, or historical site were the least popular. Only one out of three children had visited such places either in kindergarten (wave 2) or third grade (wave 5).

Considering that culture-related sites had the greatest impact on children's academic achievement, less access to an art gallery, museum, or historical site and play, concert, or other live show from lower SES groups and racial/ethnic minority groups is concerning. This finding

calls for a solution to raise awareness of the importance of family trips to cultural attractions and to increase access to those venues for the lower SES groups and racial/ethnic minority groups.

Conclusions and Discussion

From a nationally representative sample, this research validates the benefits of family trips in the academic achievement of young children. Family trips—especially those to cultural attractions and sporting events—can help improve academic achievement for reading and math in early childhood. The findings indicate that though taking more family trips is beneficial, visiting culture- or sport-related sites and events can maximize the benefits. These results further validate the old belief that travel is educational and crucial to a child's intellectual growth.

Previous studies have confirmed the social and psychological benefits of family trips for younger children, yet have not extensively explored their educational benefits (Bos et al., 2015; Byrnes, 2001; Hilbrecht et al., 2008; Minnaert, 2012; Stone & Petrick, 2017). The current study contributes to the literature that investigates the benefits of traveling by focusing on younger children and short-term family trips that can be more accessible than long-term travels. Moreover, we fill the gap in the existing literature by examining the impact of family trips using a nationally representative sample with the tracking of a cohort of children from the kindergarten to the third grade. Existing studies on this topic mostly adopted a case study or qualitative method and focused on short-term and immediate effects (Bell, Gibson, Tarrant, Perry, & Stoner, 2016; Chieffo & Griffiths, 2004; Moore, 2010).

The results from the current study show that children who took at least one family trip in kindergarten and/or third-grade had 2.5 and 1.9 higher scores in reading and mathematics respectively even when all other conditions are similar (gender, race, ethnicity, home environment, SES, approach to learning). Family trips that occurred within one month and three

years prior both had significantly positive impact on reading and mathematics achievements. This implies the prolonged impact of family trips as well as their immediate benefits. The findings also indicate that more trips lead to greater benefits, which warrants more family trips at younger age.

Family trips to an art gallery, or historical site and those to an athletic or sporting event had the most significant impact on children's academic achievement in reading and math respectively. However, our demographic analysis showed that children from lower SES and racial/ethnic minority groups were less likely to visit culture-related sites or attend athletic events. Children from those groups also had lower reading and mathematics scores compared to their counterparts. This discrepancy provides insights into curriculum planning. Schools should encourage and provide field trips to culture-related sites and attend athletic events as a part of extracurricular activities to mitigate the impact from limited access for lower SES and racial/ethnic minority groups. Involving children's parents in these field trips would enhance the benefits.

The limitations of the present study lie in its use of a secondary dataset. First, though the national data can provide us with a large scale and representative sample, it lacks the details and validation of the mechanism through which the family trips impact the children's academic achievement. The information on family trips is restricted. It lacks detail on the activities during the family trip. The items on family trips only ask about the family trips taken within a month from the time when the survey was taken. Family trips which took place before one month from the survey were not captured. This limitation calls for more detailed data collection of family trips. Moreover, the dataset could not empirically test whether experiential learning is the real mechanism behind children learning from family trips.

Another shortcoming of the current study is the limited time frame. The study did not investigate the impact of family trips beyond the third grade. However, the impact of family trips could be even longer-lasting. The so-called mind-opening experience of trips can only be tested over a longer lifespan of a person, in terms of awareness of the global environment and the realization of oneself, as well as the choices people make during their lifetime. Those choices can impact one's achievement over an even longer term. This assumption remains to be tested.

Future research in this area calls for studies with more in-depth measurements on the experiential learning process. For example, insights could be gained from a life-long tracking of a cohort of children following their growth into adulthood, through active work, and ultimately to their retirement age. A random trial of a field experiment in elementary or middle schools could also yield insightful results. These studies could provide even more internal and external validity on the impact of trips and travel outside the home and school environment.

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Figures

Distance away from home		Immediate proximity	Far away		
Duration		Same day		1 to 3 nights	More than 3 nights
Name of activity		Leisure	Excursion	Tourism	
		Trip as defined in this study			
Name of the person			Excursionist	Tourist	
			Visitor		
Travel Party	Family	Family trip as defined in this study			

Figure 1. The categorization of tourism and leisure (adapted from Ceron and Dubois, 2005).

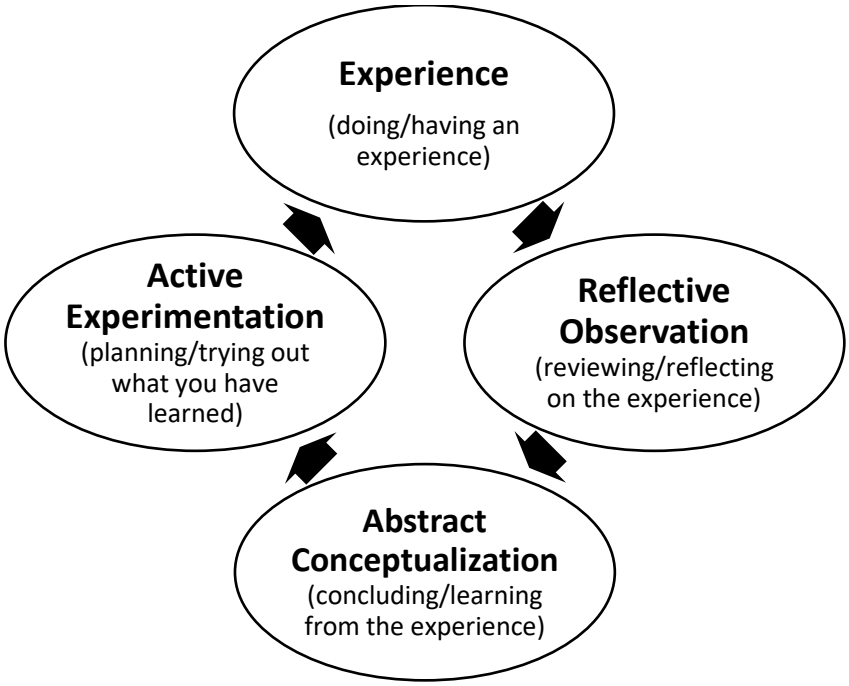
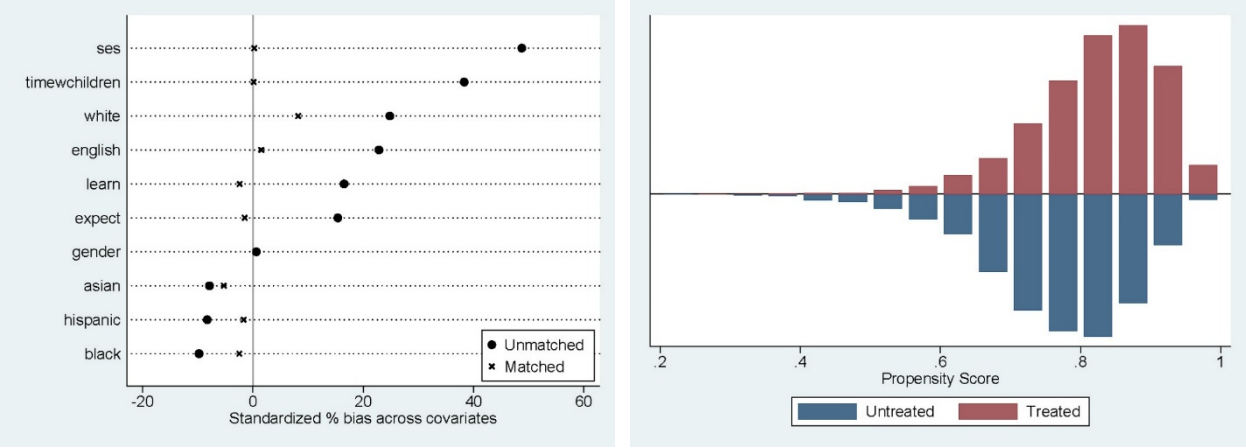


Figure 2. Experiential learning process (Davies & Lowe, n.d.)



(a) Standardized percentage bias (b) Propensity score

Figure 3. Propensity score matching. The figure (a) represents the standardized percent bias in the distribution of potential covariates of the association between academic achievement (reading and math test scores) and family trips (taking at least one type of a family trip). The graph shows the pre- and post-matching differences of each potential covariate between the children who took at least one family trip and those who did not as a percentage of their average standard deviations. The same procedure was conducted for each type of family trips and the results were similar. The figure (b) shows the pre- and post-matching estimated density of propensity score among children who took at least one family trip (treated) and those who did not (untreated).

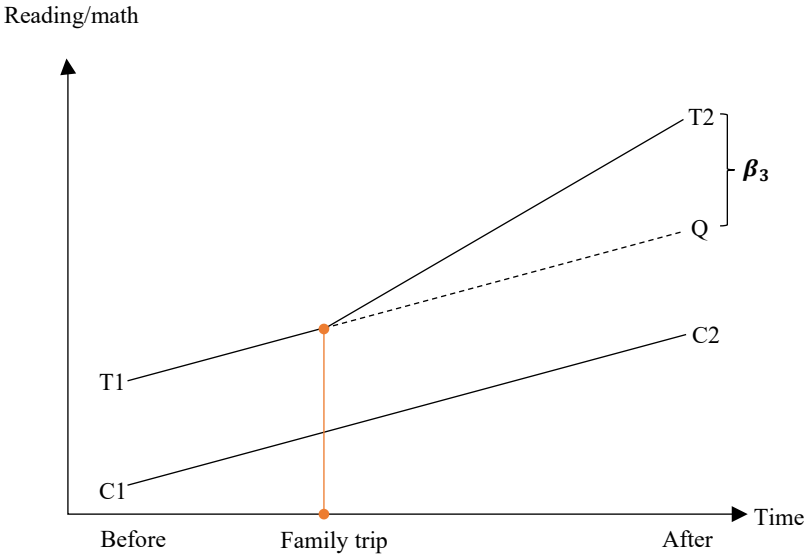


Figure 4. Difference-in-differences

Note. T represents children who took family trips at least once and C represents those who did not. Time before taking the family trips is noted as 1 and after as 2. The y-axis indicates the reading/math IRT score. For example, T1 is the reading/math IRT score before taking family trips for children who took at least one family trip at either wave 2 and/or 5. Whereas C2 is the reading/math IRT score at wave 5 of the children who did not take any family trips. Q is the counterfactual outcome with the assumption that they did not take any family trips and maintained the learning trend. β_3 is the difference-in-differences which indicates the impact from family trips.

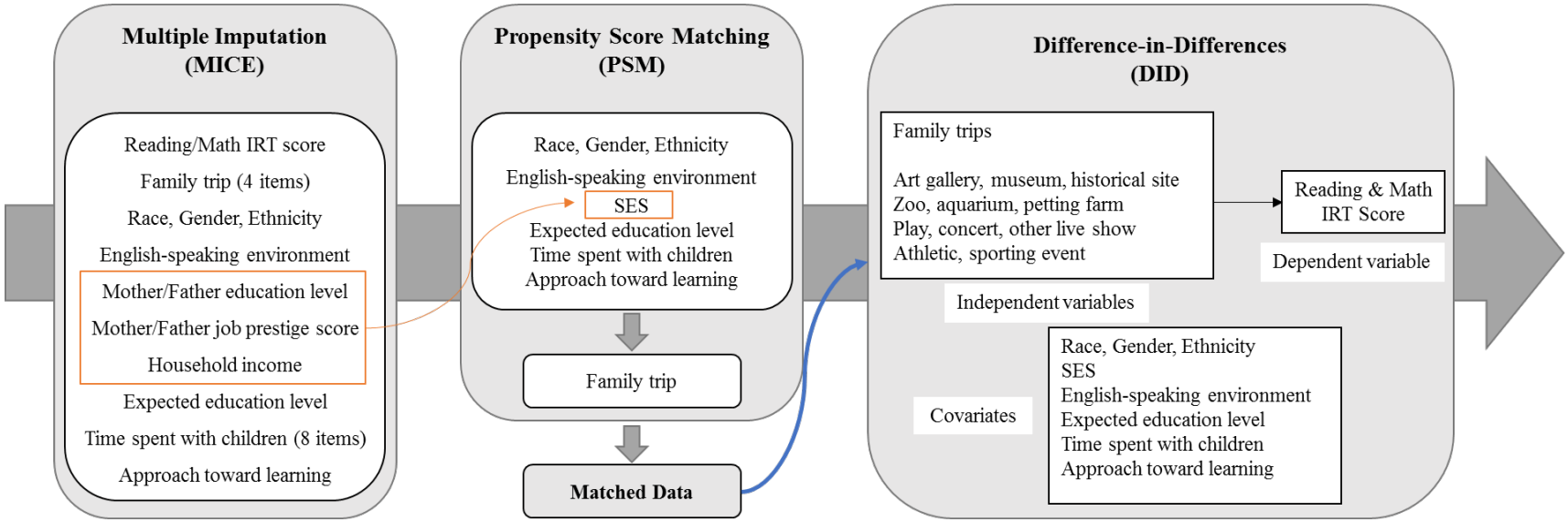


Figure 5. Analysis plan.

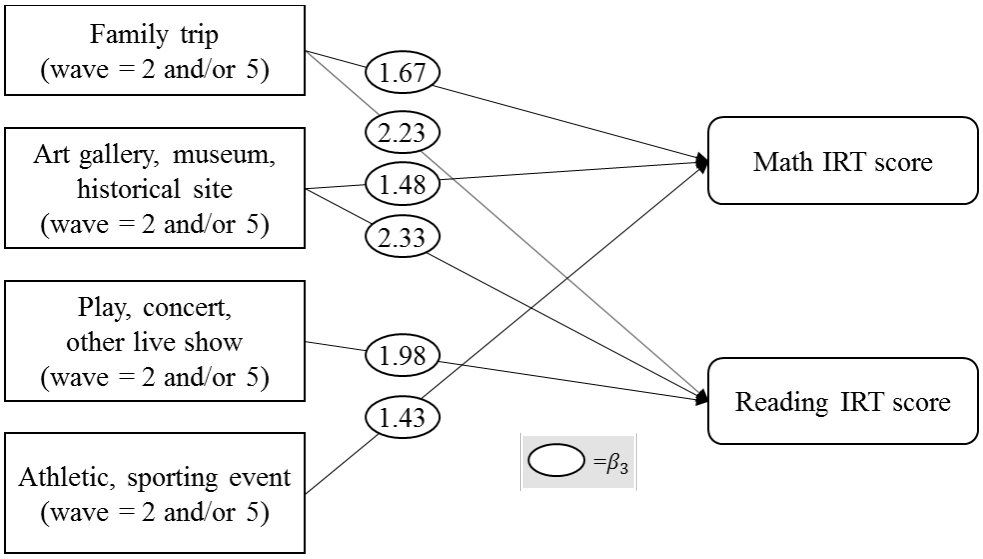


Figure 6. Analysis result

Note: The values in ovals indicate the coefficients of each independent variable in squares in regards to the dependent variable connected with arrow.

Appendix I. Questions used for family trip variables

Wave	Questionnaires
Wave 2 (Spring kindergarten)	HEQ130. In the past month, that is, since {MONTH} {DAY}, has anyone in your family done the following things with {CHILD}? Gone to a play, concert, or other live show? HEQ140. In the past month, that is, since {MONTH} {DAY}, has anyone in your family done the following things with {CHILD}? Visited an art gallery, museum, or historical site? HEQ150. In the past month, that is, since {MONTH} {DAY}, has anyone in your family done the following things with {CHILD}? Visited a zoo, aquarium, or petting farm? HEQ180. In the past month, that is, since {MONTH} {DAY}, has anyone in your family done the following things with {CHILD}? Attended an athletic or sporting event in which {CHILD} is not a player?
Wave 3 (Fall first grade)	HEQ 150. During the summer, did you or another family member take {CHILD} to any of the following places? a. Art, science, or discovery museums? b. Historical sites? c. Zoos or aquariums? d. Amusement parks? e. Beaches, lakes, or rivers? f. Plays or concerts? g. State or national parks? h. A large city (other than where {CHILD} lives)?
Wave 5 (Spring third grade)	HEQ 017 In the past month, that is, since {MONTH} {DAY}, has anyone in your family done the following things with {CHILD}? a. Gone to a play, concert, or other live show? b. Visited an art gallery, museum, or historical site? c. Visited a zoo, aquarium, or petting farm? d. Attended an athletic or sporting event in which {CHILD} was not a player?

Tables

Table 1

ECLS-K waves of data collection

Data collection	Date of collection	Sample
Fall–kindergarten (wave 1)	Fall 1998	Full sample
Spring–kindergarten (wave 2)	Spring 1999	Full sample
Fall–first grade (wave 3)	Fall 1999	30% subsample
Spring–first grade (wave 4)	Spring 2000	Full sample plus freshening*
Spring–third grade (wave 5)	Spring 2002	Full sample
Spring–fifth grade (wave 6)	Spring 2004	Full sample
Spring–eighth grade (wave 7)	Spring 2007	Full sample

Source: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K), spring 2007.
*Children who were not in kindergarten in the United States during the 1998–99 school year, and therefore did not have a chance to be selected to participate in the base year of the ECLS-K, were added to the spring–first grade sample.

Table 2

Descriptive statistics of variables used in the analysis (N = 12,206)

Variable	Mean	SD	Min	Max	Imputed ratio (0 to 1)
Student characteristics					
Gender (%)					
Female	0.49		0.00	1.00	0.00
Male	0.51		0.00	1.00	0.00
Race (%)					
White	0.55		0.00	1.00	0.00
Black	0.15		0.00	1.00	0.00
Asian	0.06		0.00	1.00	0.00
Hispanic	0.18		0.00	1.00	0.00
More than one race	0.03		0.00	1.00	0.00
Native Hawaiian, other Pacific Islander	0.01		0.00	1.00	0.00
American Indian, Alaska Native	0.02		0.00	1.00	0.00
Reading IRT score			0.00	212.00	
Wave 1	35.16	10.08	21.01	138.51	0.11
Wave 2	46.31	13.98	22.23	156.85	0.07
Wave 4	76.67	23.73	24.63	184.05	0.22
Wave 5	125.17	28.24	51.46	200.75	0.33
Mathematics IRT score			0.00	174.00	
Wave 1	25.85	9.03	10.51	115.65	0.11
Wave 2	36.09	11.96	11.57	113.80	0.07
Wave 4	60.68	18.07	12.61	132.49	0.22
Wave 5	97.29	24.80	34.56	166.25	0.33
Family trip (wave 2)					
Play, concert, other live show	0.38	0.48	0.00	1.00	0.11
Art gallery, museum, historical site	0.31	0.46	0.00	1.00	0.11
Zoo, aquarium, petting farm	0.40	0.49	0.00	1.00	0.11
Athletic, sporting event	0.43	0.49	0.00	1.00	0.11
Family trips (wave 5)					
Play, concert, other live show	0.39	0.49	0.00	1.00	0.37
Art gallery, museum, historical site	0.33	0.47	0.00	1.00	0.37
Zoo, aquarium, petting farm	0.31	0.46	0.00	1.00	0.37
Athletic, sporting event	0.49	0.50	0.00	1.00	0.37
Family characteristics (wave 1)*					
Mother's education	13.62	2.39	8.00	22.00	0.25
Father's education	13.94	2.84	8.00	22.00	0.25

Mother's occupation	31.60	21.77	0.00	77.50	0.25
Father's occupation	41.43	14.50	0.00	77.50	0.25
Household income (thousand USD)	12.67	6.20	0.03	32.50	0.25
English speaking environment	0.85	0.36	0.00	1.00	0.11
Expectations for education	15.11	5.45	3.00	22.00	0.15
Time spent with child					
Read books	3.23	0.79	1.00	4.00	0.15
Tell stories	2.74	0.93	1.00	4.00	0.15
Sing songs	3.10	0.95	1.00	4.00	0.15
Do arts and crafts	2.66	0.88	1.00	4.00	0.15
Play games or do puzzles	2.79	0.84	1.00	4.00	0.15
Talk about nature or do science projects	2.19	0.88	1.00	4.00	0.15
Build something or use construction toys	2.35	0.93	1.00	4.00	0.15
Play a sport or exercise together	2.65	0.92	1.00	4.00	0.15

* Averages and imputation ratios vary slightly by wave.

Table 3
Impact of family trips on reading and math IRT score (n=12,204)

	Reading		Mathematics	
Variable	*B*	*SE*	*B*	*SE*
Family trips (DID) [c]				
Wave 2	2.63**	0.82	1.74**	0.65
Wave 5	2.32**	0.84	1.96**	0.67
Wave 2 & 5	2.62***	0.70	1.90**	0.56
Wave 2 & 5 (>2 trips)	1.34*	0.65	1.09*	0.51
Wave 2				
Art gallery, museum, historical site	2.45**	0.71	1.48**	0.55
Play, concert, other live show	1.55*	0.66	0.93	0.52
Zoo, aquarium, petting farm	1.02	0.67	0.26	0.52
Athletic, sporting event [b]	0.71	0.65	1.08*	0.51
Wave 5				
Art gallery, museum, historical site	1.89**	0.68	0.88	0.54
Play, concert, other live show [b]	2.05**	0.66	0.72	0.52
Zoo, aquarium, petting farm	-1.00	0.70	-0.71	0.56
Athletic, sporting event	1.08	0.65	1.54**	0.51
Wave 2 & 5				
Art gallery, museum, historical site	2.65**	0.93	1.25	0.72
Play, concert, other live show [b]	2.35**	0.81	1.06	0.64
Zoo, aquarium, petting farm	-0.74	0.91	-0.90	0.70
Athletic, sporting event [b]	1.24	0.68	1.67**	0.54
Covariates [a]				
Gender (Male=1)	-0.69*	0.34	4.62***	0.26
White	3.17***	0.56	4.09***	0.45
Black	-0.84	0.79	-2.86***	0.62
Asian	6.15***	0.89	3.44***	0.75
Hispanic	2.15**	0.80	1.86**	0.63
Expected education level	0.28***	0.03	0.22***	0.03
Approach to learning	8.25***	0.27	8.10***	0.21
English speaking	4.12***	0.70	3.06***	0.56
Time with child	-1.08***	0.05	-0.94***	0.04
SES	5.07***	0.19	3.88***	0.15
R-square		0.63		

[a.] Coefficients for the covariates vary slightly by model, but their significance stays identical and unchanged.
[b.] P-value for gender greater than 0.05 for reading.
Inference: * p<0.1, ** p<0.05, *** p<0.001
[c.] These models were run separately.

Table 4
Family trips by SES, race, and ethnicity

Wave		Family trip		Art gallery, museum, or historical site		Play, concert, or other live show		Athletic or sporting event	
	SES	Mean	SD	Mean	SD	Mean	SD	Mean	SD
2	25th	1.30	1.09	0.21	0.41	0.42	0.49	0.42	0.49
	50th	1.53	1.12	0.28	0.45	0.48	0.50	0.48	0.50
	75th	1.67	1.06	0.33	0.47	0.51	0.50	0.51	0.50
	100th	**1.93**	1.09	**0.45**	0.50	**0.57**	0.50	**0.57**	0.50
5	25th	1.35	1.12	0.26	0.44	0.45	0.50	0.45	0.50
	50th	1.54	1.13	0.32	0.46	0.54	0.50	0.54	0.50
	75th	1.67	1.09	0.37	0.48	0.57	0.50	0.57	0.50
	100th	**1.90**	1.10	**0.46**	0.50	**0.63**	0.49	**0.63**	0.49
	Race	Mean	SD	Mean	SD	Mean	SD	Mean	SD
2	White	**1.63**	1.11	0.34	0.47	**0.41**	0.49	**0.50**	0.50
	Black	1.49	1.19	0.27	0.44	0.40	0.49	0.42	0.49
	Asian	1.45	1.18	**0.35**	0.48	0.38	0.48	0.27	0.45
	Hispanic	1.49	1.16	0.31	0.46	0.36	0.48	0.40	0.49
	Other	1.45	1.16	0.30	0.46	0.35	0.48	0.41	0.49
5	White	**1.60**	1.12	**0.36**	0.48	**0.41**	0.49	**0.55**	0.50
	Black	1.39	1.20	0.27	0.45	0.38	0.48	0.44	0.50
	Asian	1.40	1.20	0.32	0.47	0.40	0.49	0.33	0.47
	Hispanic	1.45	1.17	0.30	0.46	0.37	0.48	0.42	0.49
	Other	1.42	1.19	0.30	0.46	0.37	0.48	0.42	0.49

Note. Family trip ranged from 0 to 4 whereas the rest categories from 0 to 1. The highest number is bolded and the lowest is underlined.