



Museum Attendance in Youth: Who Attends and How Often?

Laura M. Crispin, Saint Joseph's University

Molly I. Beck, University of Arkansas

This project was supported by an award from the Research Labs program at the National Endowment for the Arts: Grant # 17-3800-7016. The NEA Research Lab is a project of the National Endowment for the Arts.

The opinions expressed in this material are those of the authors and do not represent the views of the NEA Office of Research & Analysis or the National Endowment for the Arts. The NEA does not guarantee the accuracy or completeness of the information included in this material and is not responsible for the consequences of its use.

Museum Attendance in Youth: Who Attends and How Often?

Laura M. Crispin, Saint Joseph's University¹

Molly I. Beck, University of Arkansas

Draft Updated on August 8, 2019

Visiting museums is a popular activity among adults in the United States, and its popularity is growing. For instance, visits to art museums increased by 2.7 percentage points from 2012 to 2018, a statistically significant increase (NEA, 2018). While there has been research to examine correlates of adult museum attendance (specifically art museums), there has not been, to date, any large scale study that has specifically focused on museum attendance for children, despite the fact that museum attendance has been shown to be positively associated with student outcomes. This paper is intended to fill this gap in the literature, providing the first large-scale descriptive analysis of museum-going behavior for children and young adults. In our paper, we provide a range of descriptive analyses to explore museum attendance of youth in the United States using data from five nationally representative datasets. Our analyses identify characteristics that are highly correlated with museum attendance overall, attendance at specific types of museums (art and science), and differences by location. Our findings show that museum attendance rates among youth typically range from 50-70% and that there are significant differences in museum attendance by socioeconomic status, race/ethnicity, gender, and location. These findings indicate significant discrepancies in attendance, suggesting that policies to improve access to museums for students, particularly low income students and students in rural areas via field trips, promotional events (e.g., “free Fridays”), or other related policies may be beneficial for promoting wider cultural, artistic, and hands-on STEM opportunities.

¹ Corresponding Author. Address: Department of Economics, Saint Joseph’s University, 5600 City Avenue, Philadelphia, PA 19131. Phone: 610-660-1594. Email: lcrispin@sju.edu.

Acknowledgements: The authors would like to thank Jay Greene and Julie Trivitt at the University of Arkansas for their feedback. We thank all participants at the Southern Economics Association Annual Conference (2018) and the Association of Education Finance and Policy Annual Conference (2019) for their helpful comments. All errors are our own.

1. Introduction

Though art museums in the United States see 132 million visitors per year (in 2012; NEA Research Report #58, 2015), and museums (in total) earn \$9.2 billion in revenue each year while employing nearly 87,000 workers (in 2012; U.S. Census Bureau, 2012 Economic Census), there has not been, to date, any research—specifically for youth—that addresses two basic questions: who attends museums? And how often? This paper is intended to fill this gap in the literature, providing the first large-scale descriptive analysis of museum-going behavior for children and young adults.

Using data from five nationally representative datasets, we provide a range of descriptive analyses to explore museum attendance in the United States. Our datasets--the Early Childhood Longitudinal Study of Kindergarteners (ECLS-K), the Panel Study of Income Dynamics Child Development Supplement (PSID-CDS), the Longitudinal Survey of American Youth (LSAY), the National Education Longitudinal Survey of 1988 (NELS:88), and the High School Longitudinal Study of 2009 (HSLs)--cover ages ranging from five through 18 years of age.² Our main analysis identifies characteristics that are highly correlated with museum attendance, with additional analysis to estimate characteristic associated with higher frequency of attendance and attendance at specific types of museums. Because of differences across regions and urban status (in regards to access as well as taste/preferences for museums), we also estimate results separately by location.

Our findings indicate that museum attendance rates among youth typically range from 50-70%, or conversely, 30-50% of youth are *not* typically attending museums. We find notable differences in museum attendance by socioeconomic status, race/ethnicity, gender, and location.

² In upcoming work, we will be studying early adulthood using the Current Population Survey and the American Time Use Survey.

These findings suggest that policies to improve access to museums for students, particularly low income students and students in rural areas via field trips, promotional events (e.g., “free Fridays”), or other related policies may be beneficial for promoting wider cultural, artistic, and hands-on STEM opportunities.

This paper proceeds as follows: In Section 2, we provide a literature review of the research on museum attendance for children, young adults, and adults. In Section 3, we describe our datasets and variables of interest. In Section 4, we provide our descriptive analysis and conclude in Section 5.

2. Literature Review

2.1 Museum Attendance

Previous descriptive analyses of museum attendance focus mainly on adult behavior and rely on data from the Survey of Public Participation in the Arts (SPPA), a survey administered periodically by the National Endowment for the Arts to gather data on arts participation in the adult population. Using data from the 1997 wave of the SPPA, Bradshaw and Mosier (1999) found that about 35% of adults went to an art museum at least once in 1997 and that the average number of visits to art museums was 3.3 visits per year – conditional on attending any art museums. Furthermore, art museum visits increased as income and education level increased. Using the 2012 wave of the SPPA, Shewfelt, Ivanchenko, Menzer, and Shingler (2015) found that 21% of adults visited an art museum at least once—a 13 percentage point (pp) decline from 1997. As in 1997, attendance at art museums increased with educational attainment – from 9.6% of high school graduates attending art museums at least once in 2012 to 52.2% of graduate school graduates attending art museums (Shewfelt et al., 2015).

In addition to providing overall trends of adult arts participation behaviors, prior research examined whether specific characteristics predict cultural activity take-up. Ateca-Amestoy (2008) and Borgnovi (2004) examine predictors of theater attendance while Gray (1998), Brida et al. (2016), and Houston and Ong (2012) examine predictors of museum attendance. Ateca-Amestoy (2008) uses data from the SPPA to examine which “social capital,” “cultural capital,” and demographic characteristics are predictive of going to see live theater. She finds that, for people who have a higher probability of participating, females are more likely to attend theater performance and probability of attendance increases with age. Borgnovi (2004) also uses data from the SPPA to examine predictors of attending theater performances as well as frequency of attendance. In addition to demographic characteristics, she uses price and availability variables as well as previous arts education and participation in other arts activities in the previous 12 months. She finds, overall, that women are more likely to attend arts performances, although men are more likely to attend frequently. Educational attainment is also positively associated with attendance, and arts education is a strong predictor of attendance. Furthermore, attendance to one version of performing arts is complementary to attendance in other forms of performing arts. Similarly, Gray (1998) uses the SPPA to examine whether taking arts lessons as a child increase the probability of museum attendance as an adult. He finds that taking arts lessons is positively, and in the case of young adults – strongly, associated with museum attendance as an adult.

Two studies have collected their own data to examine which characteristics influence museum attendance – Brida et al. (2016) examine museum attendance in Italy while Houston and Ong (2012) examine museum attendance in the San Gabriel Mountains. Brida et al. (2016), defining museum attendance differently by whether the visitor is there on vacation (light

consumption) or to research (hard consumption), find that motivation impacts the number of times a person will visit a museum. Light consumption motivation has a negative relationship with museum attendance. Unlike Ateca-Amestoy (2008) and Borgnovi (2004), they do not find significant differences by gender, but do find increasing probability of attendance as age increases. Finally, they find that increased cultural capital – measured by number of books at home – increases probability of attendance. Lastly, Houston and Ong (2012) examine the influence of geographic characteristics on museum attendance. Focusing on five museums/cultural institutions in the San Gabriel Mountains, they find that living closer to the museum/cultural institution is associated with higher attendance rates - this was especially true for school tours when allowing for non-linearities for distance. Areas with higher average educational attainment and income also had higher attendance rates.

One recent study, motivated by the benefits of cultural experiences, examined which types of “encouragement” move students to visit a local museum (Lattarulo, Mariani, & Razzolini, 2017, p. 261). Using a three-prong intervention, they randomly assigned students to one of three types of treatment, an informational flyer, the flyer with a presentation, and a flyer, presentation, and bonus points. They found that, in the short run, the bonus points induced students to visit the museum whereas the informational presentation induced students to visit at a later date.

2.2 Outcomes Associated with Museum Attendance

While few studies have examined overall museum attendance patterns of children, some studies have examined outcomes associated with museum attendance. Suter (2014) looks specifically at science museum attendance and performance in science classes. Using data from

the Longitudinal Survey of American Youth (LSAY) and the High School Longitudinal Survey (HSLS), Suter examines the effect of the number of times a student visited a science museum during the school year or over the summer has on a science exam. He finds that visiting science museums has a positive, statistically significant impact on science achievement test scores. Using data from the National Educational Longitudinal Study of 1988 (NELS: 88), George and Kaplan (1997) examined how visiting science museums affected a student's reported attitudes towards science. They found that activities involving science, including visiting science museums, had a strong effect on attitudes toward science (George & Kaplan, 1997, 105).

Researchers have also used place-specific museums and student populations to examine outcomes associated with museum visits. Using longitudinal data from New York City, Whitesell (2016) examined the impacts of museum field trips on science standardized test scores and found small gains for students. Results from a randomized study of visits to an art museum in Arkansas found that visiting a museum once increased a student's critical thinking skills and analyses of artwork (Bowen, Greene, & Kisida, 2014). In addition to academic outcomes, recent studies have found a positive relationship between visiting an art museum and a student's desire to gain more cultural knowledge (Kisida, Greene, & Bowen, 2014) and increase their "consumption" of works of art (Kisida, Bowen, & Greene, 2017). A recent randomized control study from Rice's Kinder Institute of Urban Research finds that 8th grade students who were given access to various arts experiences, which included visits to arts and cultural museums, improved writing scores on standardized tests, behavioral outcomes, and student's self-reports of compassion (Bowen & Kisida, 2019).

To date, there has not been any large scale study that has specifically focused on museum attendance for children, despite the fact that museum attendance has been shown to be positively

associated with student outcomes. Therefore, our paper is the first to provide a comprehensive analysis of the characteristics associated with museum attendance for children and young adults, additionally providing rich descriptive information by region, urban status, and type of museum.

3. Data

To provide the first comprehensive study of museum-attendance for children and young adults, we draw upon data from five nationally representative datasets. Each varies in the sample studied, with the earliest beginning when children are in Kindergarten and the latest beginning with adolescents. The data collection varies across time periods, ranging from 1987 to 2009. Though each has its strengths and limitations, when studied simultaneously, our paper will be the first to provide a complete descriptive study of the museum attendance of youth. Therefore, in this section, we provide basic information about each dataset, including our sample selection and key measures of museum attendance. Table 1 provides a basic summary of our datasets and key measures of museum attendance.

[Table 1 here]

3.1. Early Childhood Longitudinal Study of Kindergarten (ECLS-K)

The ECLS – K is a longitudinal dataset which was designed to follow students through their education experiences in the early and middle grades in school.³ Collecting data from a variety of sources (parents, school personnel, researchers, students) and in several forms (surveys, interviews, and administrative data), the ECLS-K provides a thorough look at “how

³ <https://nces.ed.gov/ecls/kindergarten.asp>

various child, home, classroom, school, and community factors at various points in children's lives relate to cognitive, social, emotional, and physical development" (NCES).

The kindergarten (98/99) cohort includes a nationally representative sample of kindergartners in the United States – over 21,000 students participated. Data were collected in the fall (1998) and spring (1999). Information was collected from student administrative records, parent interviews, survey responses from principals and teachers, and direct assessment of the student. In the fall of 1999, a subsample of the kindergarten cohort schools (30 %) were surveyed to measure summer melt. In spring 2000, the full kindergarten cohort was sampled as first graders. The full cohort was interviewed again in 2002 (3rd grade), 2004 (5th grade), and 2007 (8th grade).

Our sample includes only the kindergarten, 1st, and 3rd grade survey rounds, as these were the years in which parents were asked about children's museum attendance. In each survey round, we eliminate those who did not participate in the survey or had largely incomplete surveys, those who did not have parent interviews, and those who had missing information regarding museum attendance. Our final sample sizes are 18,300, 4,860, and 12,250, respectively.

Museum Attendance in the ECLS-K

The key variables of interest are the parents' report of their child's museum attendance. The ECLS-K parent survey asks questions about whether they have taken their child to "a gallery, museum, or other historical site" in the previous month (ECLS-K Questionnaire). Parents can respond either yes, no, don't know, or refuse to answer. In the fall 1st grade subsample, parents respond to questions whether they took their child to an art, science, or

discovery museum during the summer prior to 1st grade. Parents are asked again in spring of the student's 3rd grade year about museum attendance during the previous month.

3.2 Panel Study of Income Dynamics: Child Development Supplement (PSID-CDS)

The PSID-CDS surveys a random sample of up to two children of parents in the main PSID sample. Children, parents, school administrators, and teachers are surveyed as part of the comprehensive interview process. Initial interviews in 1997, with follow-ups in 2002, 2007, 2014, and 2017, provide longitudinal data about children's development, educational inputs, and environment.

We use 1997, 2002, and 2007 survey waves, as these were the years in which parents were asked about museum attendance of their children. To construct a sample of school-aged children, we eliminate anyone under the age of six. Then we eliminate anyone who did not have responses to museum attendance questions in a given survey year, anyone who lives outside of the United States, and anyone with incomplete survey responses. As the museum questions were asked separately about children 6 to 9 years old and 10 to 18 years old, we divide our sample into these two age groups, resulting in sample sizes of 1,470 and 4,143 students, respectively.

Museum Attendance in the PSID-CDS

In each of the three survey waves, the primary caregiver (typically a parent) is asked how often a family member has taken the child to any type of museum in the past year. Responses include "never", "once/twice", "several times", "about once a month", and "more than once a month." This question is asked separately about children 6 to 9 years old and 10 to 18 years old. Using the response to this question, we construct a binary variable equal to one if the parent responded that the child had one or more museum visits in the past year. We also construct a

categorical measure to analyze the frequency of museum attendance, though this measure is not used in regression analysis.

3.3 Longitudinal Study of American Youth (LSAY)

The LSAY originally planned to measure middle school and high school students' interest in mathematics and science (and pursuing careers in these fields) and the influence of peers, schools, parents, and media on these interests (Miller, 2014). The original LSAY consists of two cohorts of students. The first cohort ("Cohort 1") of students is a nationally representative sample of over 2,800 10th graders in public high schools in 1987. Cohort 1 is followed for 7 years, ending 4 years post high school. The second cohort ("Cohort 2") is a nationally representative sample of over 3,000 7th grade students in the feeder schools for the high schools where the 10th grade students attend. Cohort 2 students are also followed for 7 years, with data collection ending one year after high school. The LSAY consists of survey data collected from the student directly as well as parent interviews, teacher interviews, and principal interviews.

We use both cohorts to construct a 7th grade and a 10th grade sample. For each, we eliminate any non-respondents or those with data quality issues. Then we eliminate any missing key variables of interest. Our remaining sample size for the 10th grade sample is 1,616, and for the 7th grade sample is 1,848.

Museum Attendance Variables in the LSAY

The LSAY asks students in the fall of the first year they appear in the study whether they have ever attended a science or an art museum. In addition, in the fall survey every year while the student is in school, the survey asks whether the student visited a science museum or an art museum over the past summer. For our analysis, we use data from the initial survey year to

measure attendance prior to 7th grade and attendance prior to 10th grade for each of the samples, respectively. For each, we construct a binary measure equal to one if the student has attended either type of museum and equal to zero otherwise. Furthermore, we construct similar binary measures for attendance at an art museum and attendance at a science museum.

3.4 National Education Longitudinal Study of 1988 (NELS:88)

The NELS:88 is the third study in the NCES Secondary Longitudinal Studies Program. The NELS:88 began with a cohort of 8th graders in 1988 (“base year”), interviewed again in 1990 (“first follow-up”), 1992 (“second follow-up”), 1994 (“third follow-up”), and 2000 (“fourth follow-up”) to learn about their educational and labor market outcomes over time.

To construct the base year sample of students, an average of 24 8th grade students were selected from the 1,050 participating schools (public and private), resulting in a final sample of 24,600 students (Ingels et. al, 1998). Additionally, the students' parent and school administrator, and two teachers also completed questionnaires during this initial survey round, and students completed a battery of cognitive tests. Complete details can be found in the National Education Longitudinal Study of 1988 (NELS:88) Base Year through Fourth Follow-Up Data File User's Manual (Curtain et. al, 2012).

To construct our sample, we begin with all students who completed interviews in the base year (24,599 students), and whose parent(s) also completed interviews in the base year (22,651 students). We then eliminate any students whose parents did not respond to questions about museum attendance, leading to a final sample size of 20,960 students.

Museum Attendance Variables in the NELS:88

In the base year, parents were asked about whether their child attended art, science, and history museums.⁴ We have constructed several museum attendance variables from these responses. First, we have condensed to a binary variable with the value of one if the student ever attended any museum and zero if they never attended any museum. Second, we constructed a variable to count the types of museums that the student has attended, ranging from zero to three. Finally, we to explore each specific type of museum, we construct three binary variables that take on the value one if the student went to an art, science, or history museum, respectively, and zero otherwise.

3.5 High School Longitudinal Study of 2009 (HSLs)

The HSLs is the fifth study in the NCES Secondary Longitudinal Studies Program. The HSLs includes a sample of 9th grade students in their fall term in 2009 (“base year”), and were interviewed again in the spring term of 2013 (“first follow-up”). The students were interviewed again in fall 2016 (“second follow-up”), but this data has not yet been made available to researchers. Similar to the NELS:88, parents, teachers, and school administrators were also interviewed, and students completed a battery of cognitive tests.

To construct the base year sample of students, an average of 28 9th grade students were selected from the 944 participating schools (public and private),⁵ resulting in a final sample of 21,444 students (Ingels et. al, 2014).⁶ To construct our sample, we begin with the complete sample of students in 9th grade. We eliminate any students with low quality interviews (i.e.,

⁴ Specifically, parents were asked whether their child attends art museums, science museums, or history museums. There was no specific time period referenced in the questionnaire.

⁵ Schools were selected using a stratified, two-stage random sample design. See Ingels et. al (2014) for more details about the sample design.

⁶ Of the 26,305 students selected to participate, 1,099 were ineligible and 3,214 were non-respondents.

missing or non-response surveys), and any students who are missing key variables of interest (student/parent reported museum attendance) in the base year. This results in a final sample size of 21,160 students in the base year.

Museum Attendance Variables in the HSLs:09

Both students and their parent(s) were asked about attending science-related museums in 2008-2009, and only parents were asked about the student's museum attendance in the first follow-up.⁷ Student response options used a Likert-type scale, which we have condensed to a binary variable with the value of one if the student ever attended a museum and zero if they never attended a museum. Parental responses in both the base year and first follow-up were binary, which reflect that they did attend a museum with their child (coded as one) or did not attend a museum with their child (coded as zero). There were a substantial number of incomplete or missing parent responses, so we rely only on the student responses in the base year for our analysis.

3.6 Control Variables

In all of our analysis, we control for available demographic characteristics, school quality measures, and geographic information, though these controls vary across datasets. For all, measures of sex, race/ethnicity, and socioeconomic status are available. When possible, we also include measures for cognitive skills (typically test scores), and English as a second language. School quality measures vary across samples, covering aspects of school quality including school size, class size, student-teacher ratios, teacher salary, private/public school, grade span,

⁷ In the base year survey, students were asked "How often did you visit a science museum/planetarium since the start of the 2008-2009 year?" In both the base year and first follow-up, parents were asked "During the last 12 months, which of the following activities have you or another family member done with your student: Visited a zoo, planetarium, natural history museum, transportation museum, or a similar museum?"

and student demographics (minority share and free/reduced price lunch share). Regional controls are typically four Census regions: Northeast, South, Midwest, West, though these, too, vary across dataset. Urbanicity is typically measured as urban, suburban, or rural, though the HSLs also includes the category “town”. More details on the construction of these control variables within each dataset are available in the data appendix.

4 Analysis

4.1 Descriptive Statistics

In Table 2, we provide a frequency distribution of museum attendance for all of our samples. The results are surprisingly consistent across samples and years, when taking into account the time periods about which the questions were asked. Beginning with the ECLS-K sample, we see that approximately 30% of students attended a museum *in the month prior* to the survey question or in the summer prior to 1st grade. When asked about attendance *in the past year*, we see that these percentages increase to 70% for the younger PSID-CDS cohort, but only to 51% for the older PSID-CDS cohort. When asked if they have *ever attended* a museum, both cohorts in the LSAY show attendance rates higher than other samples of 73%. Finally, the NELS:88 sample shows somewhat lower attendance rates than the LSAY samples, with 65% of students attending museum.

With regard to frequency, we are only able to use data from the PSID-CDS, LSAY and NELS:88, which ask about frequency or multiple types of museums. As shown in Table 2, for those attending, students in the PSID-CDS sample are only attending occasionally. For the other samples, most students are attending frequently, with more than 40% of the LSAY samples visiting two museums and 50% of the NELS:88 sample attending two or three museums.

Science museum attendance is the most common, with 50% to 62% of the older samples attending these museums. Art museum attendance is slightly lower, with only 37% of the NELS:88 sample and 57% of the LSAY samples attending art museums, respectively. Finally, summer museum attendance is lower than other attendance measures, with rates ranging from 25% to 40%.

[Table 2 here]

Tables 3A through 3D show select student-level demographic and location differences between those attending museums and those not attending. Table 3A presents the difference in means tests for the three ECLS-K samples. It shows that those who attend museums are more likely to be from higher socioeconomic households (a difference of half of a standard deviation), white (non-Hispanic), and attending schools with peers who are predominantly white and from higher socioeconomic households. Museum attendees are also less likely to live in the South or in rural areas. In Table 3B, the results for both PSID-CDS cohorts show similar patterns. Those who attend museums are from higher socioeconomic backgrounds, are more likely to be white, and are more likely to live in urban or suburban areas. Table 3C presents the difference in means for the two cohorts of the LSAY. It shows patterns similar patterns to the ECLS-K and PSID-CDS samples. Again, students attending museums are from higher socioeconomic households, are more likely to be white (non-Hispanic), and less likely to live in the South or a rural area. Interestingly, those who did not attend museums tend to report higher average grades in the previous school year. Finally, Table 3D shows the difference in means for the 8th grade sample of the NELS:88 and the 9th grade sample of the HSLs. It shows further similarities to the previous samples. Higher achieving students from higher socioeconomic backgrounds are more

likely to attend museums, and those in rural areas or in the South are less likely to attend museums.

[Table 3A, 3B, 3C, 3D here]

4.2 Regression Analysis

To estimate the relationship between demographic characteristics and the likelihood of museum attendance, we estimate a series of probit models. Our analysis begins with predicting the probability of attending museums as a function of demographics, school quality, and location characteristics. The results for selected variables of interest are presented in Table 4 (with full results provided in the data appendix). Then, we predict the probability of attending a specific type of museum (art and science), when this measure is available, and provide the results in Table 5.⁸ These results are presented as marginal effects, and should be interpreted as the percentage point increase or decrease that the associated variable of interest has on the probability of museum attendance.

[Table 4 here]

Socioeconomic Status

Across all samples in our datasets, we find that consistently across all regressions, socioeconomic status is a highly correlated, significant predictor of museum attendance. In terms of magnitude, a one standard deviation increase in socioeconomic status increases the likelihood of museum attendance by 8.1pp to 17pp across our datasets.

⁸Given the substantial differences in museum attendance by location, we estimate the original probit model separately by region and by urban status (when sample sizes permit) to test for differences in museum attendance. These results are available in the data appendix.

More specifically, in the ECLS-K sample, a one standard deviation increase in socioeconomic status is associated with at least a 10 pp increase in the likelihood of visiting a museum. This relationship is more pronounced for the ECLS-K sample in 1st grade. Increasing socioeconomic status by one standard deviation increases the likelihood of visiting a museum during the summer by almost 17pp. The ECLS-K sample in 3rd grade is similar to the Kindergarten results, where a one standard deviation in socioeconomic status is associated with a 10.2pp increase in the likelihood of museum attendance.

For children in the PSID-CDS sample, we find that parents' education level (college degree or higher) increases the likelihood of attendance by 10 to 15pp, though conditional on parents' education, we do not find a statistically significant marginal effect of household income. In the LSAY sample, which purposefully did not ask for parental income, we find similar marginal effects for parents' education ranging from 8.7 to 15.7pp. We find that for 7th graders whose mother has at least college degree, the likelihood of museum attendance increases by 8.7pp. For 10th graders, father's college degree or greater is associated with a 15.7pp increase in the likelihood of visiting a museum.⁹ Eighth grade students in the NELS:88 sample follow a similar, if more pronounced, pattern. We find that a standard deviation increase in a student's socioeconomic status is associated with a 17pp increase in the likelihood of attending a museum. Finally, for 9th graders in the HSLS data, a one standard deviation increase in socioeconomic status increases the likelihood of museum attendance by 6.7pp.

Sex

⁹ Though mother's degree is not statistically significant in the 10th grade specification, in both specifications, parents' education level is jointly significant.

Interestingly, when compared to their male counterparts, our datasets indicate that, in general, females are less likely to visit museums, though findings are mixed. Overall, females are 1pp to 4pp less likely than males to visit museums, though for several samples we do not find any statistically significant difference.

While there is no difference between male and female first and third graders in the ECLS-K, female kindergarteners are 1.3pp less likely to visit museums. In the PSID-CDS samples, we find no statistically significant gender difference in attendance. In the LSAY sample, while there is no difference between 7th grade males and females, 10th grade females are 4.6pp less likely to visit museums than males. However, 9th grade females are 5pp more likely to visit science museums than males. We will return to this finding when we analyze attendance at specific types of museums in the following table.

Race/Ethnicity

There are also mixed findings by race/ethnicity, though in general, we find that white students are more likely to attend museums than non-white students, with differences ranging from 0 to 14pp.

In early childhood (ECLS-K), the point estimates are inconsistent zeros except for the kindergarten sample, where Hispanic students are 2.3pp less likely to visit museums than their white counterparts. Similarly, non-white students in the younger cohort of the PSID-CDS are 13.6pp less likely to attend museums than white students. This pattern is similar to the patterns in the older cohort of the PSID-CDS, NELS:88, and HSLs samples. Non-white students 10 to 18 years old in the PSID-CDS are 9.3pp less likely to attend museums than white students. In the NELS:88 sample, black students are 2.4 percentage points less likely to visit museums than

white students. The data from LSAY suggest much greater disparities. For example, in the 7th grade cohort, Hispanic students are 9.4 pp less likely to visit museums when compared to white students. In the 10th grade cohort, both Black and Hispanic students are less likely to attend museums, 11.2 percentage points and 14.4 percentage points respectively.

Urbanicity

Perhaps unsurprisingly, and similar to socioeconomic status results, rural students are considerably less likely to visit museums compared to their urban counterparts. Across all datasets, rural students are anywhere from 6.6pp to 12.6pp less likely to visit museums (when marginal effects are statistically significant). The patterns for suburban students compared to urban students are similar, though less consistent across the datasets. Of those with significant results, kindergarten and 1st grade suburban students are 2.4 to 8.5pp less likely to attend museums than urban students, respectively. Eighth grade students in the NELS:88 are 4.1pp less likely to visit museums.

Region

We compare students who attend schools in different regions to students who attend school in the North/Northeast. Overall, the results suggest that students not in the North/Northeast are less likely to visit museums, though results are most significant for the older samples (middle school and high school samples).

Young students in the ECLS-K demonstrate a different pattern – kindergarteners in the West are 2.6 pp more likely to visit museums and 1st graders in the South are 7.8 pp more likely

to visit museums in the summer.¹⁰ For middle school students, we find that 7th graders in the LSAY cohort are 7.2pp (North Central) to 12.6 pp (South) less likely to visit museums and 8th grade students in the NELS:88 are 9 pp (South) and 5 pp (West) less likely to attend museums, respectively.

The pattern for high school students is slightly more ambiguous. Students in the 10th grade LSAY cohort in North Central schools are 8.7 pp more likely to visit museums than their peers in the North. All 9th graders in the HSLs, on the other hand, report being less likely to visit museums than those in the Northeast. For example, 9th grade students in the West are 9.9 percentage points less likely to visit museums when compared to those in the Northeast.

Type of Museum

[Table 5 here]

We are able to examine attendance patterns for different types of museums for the LSAY, NELS:88, and HSLs samples. As with the overall attendance model, we estimate probit regressions to test which of our variables of interest are associated with an increased or decreased likelihood of attending science museums or art museums. The results, presented in Table 5, are similar to the overall attendance variables. For attending science museums, specifically, we use data from both cohorts of the LSAY, the 8th grade cohort of NELS: 88, and the 9th grade cohort of HSLs. In general, higher socioeconomic status is associated with a 6.7 pp to 18 pp increase in the likelihood of visiting a science museum. For females, an interesting dynamic appears to emerge over time. Mid- to late- adolescent females are 5pp to 8.8 pp less likely to visit science museums in the 1980s, the LSAY and NELS:88 datasets, but this changes

¹⁰ We find no statistically significant differences for the PSID-CDS students, though this may be due to relatively smaller sample sizes.

by 2009. Ninth grade females in the HSLs are 5 pp more likely to visit science museums than their male counterparts. Hispanic and Black students are similarly less likely to visit science museums as they were less likely to visit museums overall.

For attending art museums, we use data from both cohorts of the LSAY and the 8th grade cohort of NELS: 88. Socioeconomic status affects probability of attending an art museum in a similar way. A 10th grade student whose father has a college degree has a nearly 16pp increase in likelihood of visiting art museums, all else equal. Similarly, 8th grade students whose parents' socioeconomic status increases by one standard deviation are nearly 14pp more likely to visit art museums, all else equal. Female students are anywhere from 2.7 to 5.3pp more likely to visit art museums than males. Finally, we find no clear pattern in art museum attendance by race/ethnicity. Across the two datasets, black students are less likely to visit art museums than their white peers. Hispanic students in the 10th grade LSAY cohort are 13.4pp *less* likely to visit art museums, but Hispanic students in the NELS: 88 data are 3.5pp *more* likely to visit art museums than their white peers.

Estimates by Location

We examined whether there are heterogeneous effects of these demographics by location by estimating our probit models separately by region and urbanicity. The marginal effects from these probits (provided in the data appendix for brevity) indicate similar patterns for socioeconomic status and gender. The differences in likelihood of attendance by socioeconomic status and race/ethnicity are more pronounced in the South. Differences by gender, race/ethnicity, and socioeconomic status also seem to be exacerbated by rural status when compared to urban students. This suggests that within certain locations (specifically rural areas),

differences in museum attendance across socioeconomic and demographic groups are exacerbated.

5. Conclusions and Discussion

This paper is the first to conduct a large scale study of museum attendance for youth in the United States. Using data from five nationally representative datasets that span from Kindergarten to high school, and from 1987 to 2009, our paper is the first to provide comprehensive descriptive analysis of the characteristics associated with museum attendance to address two questions: who attends museums? and how often?

Summary statistics show clear discrepancies in museum attendance, with 30% to 70% of students attending museums (though survey questions across datasets have different reference periods (i.e., last month, last summer, last year)), and with approximately 50% of students attending a museum in the previous year. In other words, half of grade-school aged students are not attending museums with any frequency.

Our probit results are strikingly consistent across datasets, where students from higher socioeconomic backgrounds are more likely to attend museums by 5pp to 12pp, regardless of the survey year or the age group of the cohort. In most of our samples, we also find significant differences in museum attendance by race/ethnicity, gender, and location (specifically the South and rural areas). In most samples, black and Hispanic students were 2pp to 10pp less likely to attend museums than white students. Furthermore, the gender gap in museum attendance, and specifically science museum attendance, is significant in the earlier samples, but seems to have closed (and maybe even reversed) in the more recent samples, where females were 5 to 8pp *less* likely to attend science museums than males in the late 1980s, but by 2009, females were 5pp

more likely to attend science museums. Many of these disparities were particularly pronounced in the South and in rural areas, which suggests that access to museums may be costlier in these regions, such that only those with significant household resources or preferences toward cultural activities are visiting museums. Finally, there is no consistent evidence that school characteristics are associated with museum attendance, conditional on student, household, and location characteristics.

These findings suggest that programs to increase museum access, via school field trips or via programs such as “Free First Fridays” or “pay what you can” may be beneficial to students, especially in lower income households or rural areas. Many public libraries are also providing museum passes that can be checked out by library card holders, providing an increase in access for many families. Given that museum attendance has been positively associated with increased student achievement, programs such as these may be a way to improve achievement for students across the socioeconomic distribution and across locations.

It is important to note that this paper, though comprehensive in the descriptive analysis about museum attendance, does not address the relationship between museum attendance and student outcomes. To address this limitation, our future research will use these datasets to provide comprehensive study of the relationship between museum attendance and student achievement, non-cognitive skills, and educational attainment, providing further policy implications of the importance of museum attendance for children and young adults.

References

- Ateca-Amestoy, Victoria. "Determining heterogeneous behavior for theater attendance." *Journal of Cultural Economics* 32.2 (2008): 127.
- Brida, Juan Gabriel, Chiara Dalle Nogare, and Raffaele Scuderi. "Frequency of museum attendance: motivation matters." *Journal of Cultural Economics* 40.3 (2016): 261-283.
- Borgonovi, Francesca. "Performing arts attendance: An economic approach." *Applied Economics* 36.17 (2004): 1871-1885.
- Bowen, Daniel H., Jay P. Greene, and Brian Kisida. "Learning to think critically: A visual art experiment." *Educational Researcher* 43.1 (2014): 37-44.
- Bowen, D.H. & Kisida, B. (2019). "Investigating causal effects of arts education experiences: Experimental evidence from Houston's Arts Access Initiative." Kinder Institute for Urban Research Report, 7(4), 1 – 32. Retrieved from:
<https://kinder.rice.edu/research/investigating-causal-effects-arts-education-experiences-experimental-evidence-houstons-arts>
- Bradshaw, Tom, and Olive Mosier. "Public participation in the arts in the United States: Summary of the national endowment for the arts 1997 survey." *Cultural Trends* 9.33 (1999): 35-104.
- Curtin, T.R., Ingels, S.J., Wu, S., and Heuer, R. (2002). *National Education Longitudinal Study of 1988: Base-Year to Fourth Follow-up Data File User's Manual (NCES 2002-323)*. Washington, DC: U.S. Department of Education, National Center for Education Statistics.
- Gray, Charles M. "Hope for the future? Early exposure to the arts and adult visits to art museums." *Journal of Cultural Economics*, 22.2-3 (1998): 87-98.

- Houston, D. & Ong, P. (2013). "Arts accessibility to major museums and cultural/ethnic institutions in Los Angeles: can school tours overcome neighborhood disparities?" *Environment and Planning A* 45.3 (2013): 728-748.
- NEA. 2015. "A decade of arts engagement: findings from the survey of public participation in the arts, 2002–2012." *NEA Research Report #58*. Washington, D.C.: National Endowment for the Arts.
- Ingels, S.J., Pratt, D. J., Herget, D. R., Dever, J.A., Fritch, L.B., Ottem, R., Rogers, J. E., Kitmitto, S., and Leinwand, S. (NCES 2014-361). *High School Longitudinal Study of 2009 (HSL:09) Base Year to First Follow-Up Data File Documentation*. National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Washington, DC.
- Institute for Social Research. 2012. *Panel Study of Income Dynamics Child Development Supplement User Guide for CDS-III*. Institute for Social Research, University of Michigan. Ann Arbor, MI.
- Kisida, Brian, Daniel H. Bowen, and Jay P. Greene. "Cultivating interest in art: Causal effects of arts exposure during early childhood." *Early Childhood Research Quarterly* (2017).
- Lattarulo, P., Mariani, M., & Razzolini, L. (2017). "Nudging museums attendance: a field experiment with high school teens. *Journal of Cultural Economics*, (2017) 41, 259 – 277. DOI 10.1007/s10824-016-9285-6
- Miller, Jon. 2014. "Longitudinal Study of American Youth: Users Guide." ICPSR Report No. 30263, Inter-university Consortium for Political and Social Research, University of Michigan.

- Shewfelt, Steven, Roman Ivanchenko, Melissa Menzer, and Tamika Shingler. *How a Nation Engages with Art: Highlights from the 2012 Survey of Public Participation in the Arts*; Research Report #57. National Endowment for the Arts, Washington, DC, 2013.
- Suter, Larry E. "Visiting science museums during middle and high school: A longitudinal analysis of student performance in science." *Science Education* 98.5 (2014): 815-839.
- Tourangeau, K., Nord, C., Lê, T., Sorongon, A.G., & Najarian, M. (2009). *Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 (ECLS-K), Combined User's Manual for the ECLS-K Eighth-Grade and K-8 Full Sample Data Files and Electronic Codebooks (NCES 2009-004)*. National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education, Washington, D.C.
- Whitesell, Emilyn Ruble. "A day at the museum: The impact of field trips on middle school science achievement." *Journal of Research in Science Teaching* 53.7 (2016): 1036-1054.

Table 1: Museum Attendance Variables

Survey	Survey Year	Questionnaire	Museum Attendance Measures	Museum Attendance Survey Questions*	Sample Size
ECLS:K	1998	Parent	Attended (past month)?	Have you taken your child to a gallery, museum, or other historical site in the previous month?	18,300
	1999	Parent	Attended (past summer)?	Have you taken your child to a gallery, museum, or other historical site in the preceding summer?	4,860
	2002	Parent	Attended (past month)?	Have you taken your child to a gallery, museum, or other historical site in the previous month?	12,260
PSID-CDS	1997, 2002, 2007	Parent	Attended (past year)?	How often has a family member taken or arranged to take (CHILD) to any type of museum (children's, scientific, art, historical, etc.) within the past year?	1,470
	1997, 2002, 2007	Parent	Attended (past year)?	How often has a family member taken or arranged to take (CHILD) to any type of museum (children's, scientific, art, historical, etc.) within the past year?	4,143
LSAY	1987	Student	Attended (ever)? Attended Art Museum (ever)? Attended Science Museum (ever)?	Have you ever attended an art museum? Have you ever attended a science museum? Have you attended an art museum the previous summer? Have you attended a science museum the previous summer?	1,848
	1987	Student	Attended (ever)? Attended Art Museum (ever)? Attended Science Museum (ever)?	Have you ever attended an art museum? Have you ever attended a science museum? Have you attended an art museum the previous summer? Have you attended a science museum the previous summer?	1,616
NELS:88	1988	Parent	Attended (ever)? Attended Art Museum (ever)? Attended Science Museum (Ever)? Attended History (Ever)?	Does your eighth grader attend art museums? Does your eighth grader attend science museums? Does your eighth grader attend history museums?	20,960
	2009	Student; Parent	Attended Science Museum (past year)?	Since the beginning of the last school year (2008-2009), how often have you visited a science museum, planetarium or environmental center? During the last 12 months, [have you or another family member] done the following activities with your child: Visited a zoo, planetarium, natural history museum, transportation museum, or a similar museum?	21,160

Note: *Survey questionnaire wording may have been rephrased or paraphrased for clarity.

Table 2: Frequency Distribution of Museum Attendance (in %s)

	ECLS-K		PSID-CDS		LSAY		NELS:88	HLSL	
	K	1st	3rd	6-9y.o.	10-18y.o.	7th	10th	8th	9th
Attended a museum?	30.03	-	31.81	70.39	51.19	73.88	73.31	64.13	
<i>Count of museums</i>									
0				31.72	49.25	26.06	26.51	35.87	
1				39.05	33.80	29.97	26.76	13.84	
2				22.10	13.00	43.90	46.55	19.72	
3+				7.13	3.95	-	-	30.57	
<i>Visited ...</i>									
Science Museum						61.49	61.75	53.60	61.48
Art Museum						56.29	58.11	39.69	
History Museum						-	-	51.71	
Attended a museum last summer?			39.19			38.13	25.77		
<i>Count of museums last summer</i>									
0						61.81	74.05		
1						21.05	14.67		
2						17.07	11.1		
<i>Last Summer I ...</i>									
Visited a Science Museum						32.64	21.92		
Visited an Art Museum						22.56	14.95		
N =	18,300	4,860	12,260	1,470	4,143	1,848	1,616	20,960	21,160

Note: All statistics are calculated using sample weights. Definitions of museum attendance are provided in Table 1. Sample sizes using ECLS and HLSL are rounded to the nearest 10 for confidentiality. For the PSID-CDS sample, museum frequency is measured as "never", "once/twice", "several times", "about once per month", or "more than once per month". We combine the later two categories for brevity.

Table 3A: Difference in Means of Select Demographics by Museum Attendance, ECLSK

	Kindergarten			1st Grade			3rd Grade										
	Attended Museums		Did Not Attend	Attended Museums		Did Not Attend	Attended Museums		Did Not Attend								
	Mean	SD	Diff.	Mean	SD	Diff.	Mean	SD	Diff.								
SES	0.22	0.81	0.76	-0.13	0.76	0.35	0.24	0.82	-0.27	0.72	0.51	0.80	0.77	0.32	***		
Female	0.47	0.50	0.50	0.49	0.50	-0.01	0.47	0.50	0.50	0.50	-0.03	0.47	0.50	0.48	-0.01		
Black, Non-Hispanic	0.14	0.35	0.37	0.16	0.37	-0.02	0.13	0.33	0.17	0.38	-0.04	0.12	0.33	0.15	-0.03	***	
Hispanic	0.15	0.36	0.40	0.20	0.40	-0.05	0.14	0.35	0.21	0.41	-0.07	0.16	0.36	0.19	-0.03	***	
Other Race/Ethnicity	0.07	0.26	0.26	0.07	0.26	0.00	0.07	0.26	0.08	0.27	-0.01	0.07	0.25	0.07	-0.01		
Urban Status (Base: Urban area)																	
Suburban	0.52	0.50	0.50	0.50	0.50	0.02	0.50	0.50	0.49	0.50	0.01	0.54	0.50	0.50	0.03	***	
Rural	0.09	0.29	0.34	0.14	0.34	-0.04	0.11	0.32	0.15	0.35	-0.03	0.11	0.31	0.16	-0.05	***	
Region (Base: North)																	
South	0.34	0.48	0.49	0.39	0.49	-0.04	0.34	0.47	0.40	0.49	-0.06	0.34	0.47	0.36	0.48	-0.02	**
Midwest	0.25	0.43	0.42	0.23	0.42	0.02	0.27	0.44	0.20	0.40	0.06	0.24	0.43	0.23	0.42	0.01	
West	0.22	0.42	0.41	0.21	0.41	0.01	0.19	0.39	0.23	0.42	-0.04	0.23	0.42	0.23	0.42	0.00	
N=	5,500			12,810			1,900		2,950			3,900		8,360			

Note: ***p<0.01; **p<0.05; *p<0.10. All statistics are calculated using base year survey weights. Sample sizes using ECLSK are rounded to the nearest 10 for confidentiality and may not add up due to rounding.

Table 3B: Difference in Means of Select Demographics by Museum Attendance, PSID-CDS

	6-9 y.o.			10-18 y.o.									
	Attended Museums		Did Not Attend	Attended Museums		Did Not Attend Museums							
	Mean	SD	Mean	SD	Mean	SD							
Household Income	57698.75	49139.98	41369.12	44368.10	16329.63	16329.63	***	86796.91	96023.46	62535.05	73049.36	24261.86	***
Father: Years of Education	13.50	2.60	11.88	3.29	1.62	1.62	***	14.11	2.45	12.27	3.12	1.84	***
Mother: Years of Education	13.35	2.41	11.76	2.93	1.59	1.59	***	13.64	2.52	12.13	2.90	1.51	***
Female	0.50	0.50	0.48	0.50	0.02	0.02		0.50	0.50	0.50	0.50	0.01	
Race/Ethnicity: Non-White	0.22	0.42	0.36	0.48	-0.13	-0.13	***	0.20	0.40	0.34	0.47	-0.14	***
Urban Status (Base: Urban area)													
Suburban	0.43	0.50	0.46	0.50	-0.02	-0.02		0.40	0.49	0.36	0.48	0.04	***
Rural	0.03	0.17	0.07	0.25	-0.04	-0.04	***	0.06	0.24	0.08	0.27	-0.02	***
Region (Base: Northeast)													
Midwest	0.25	0.43	0.22	0.41	0.03	0.03		0.26	0.44	0.21	0.41	0.04	***
South	0.32	0.47	0.37	0.48	-0.05	-0.05	*	0.30	0.46	0.35	0.48	-0.05	***
West	0.23	0.42	0.27	0.45	-0.04	-0.04		0.25	0.43	0.27	0.44	-0.02	
N=	1,008		462					2,066		2,077			

Note: ***p<0.01; **p<0.05; *p<0.10. All statistics are calculated using child-level survey weights.

Table 3C: Difference in Means of Select Demographics by Museum Attendance, LSAY

	7th Grade				10th Grade					
	Attended Museums		Did Not Attend Museums		Attended Museums		Did Not Attend Museums			
	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
Mother College Grad +	0.20		0.10		0.20		0.08		0.12	***
Father College Grad +	0.31		0.18		0.29		0.13		0.16	***
Female	0.49		0.46		0.50		0.51		-0.01	
Black, Non-Hispanic	0.11		0.13		0.10		0.15		-0.06	***
Hispanic	0.09		0.11		0.08	**	0.12		-0.03	**
Other Race/Ethnicity	0.06		0.05		0.04		0.03		0.01	
Average Grades in Previous Year	2.77	1.59	3.31	1.82	3.33	1.62	4.00	1.67	-0.67	***
Urban Status (Base: Urban area)										
Suburban	0.48		0.33		0.46		0.34		0.12	***
Town										
Rural	0.26		0.44		0.31		0.46		-0.15	***
Region (Base: North)										
North Central	0.30		0.31		0.32		0.28		0.05	**
South	0.31		0.37		0.32		0.37		-0.05	**
Midwest										
West	0.18		0.15		0.16	**	0.15		0.01	
N=			2,302				2,074			

Note: ***p<0.01; **p<0.05; *p<0.10. All statistics are calculated using base year survey weights. Missing values were imputed.

Table 3D: Difference in Means of Select Demographics by Museum Attendance, NELS:88 and HSLs

	NELS:88				HSLs				
	8th Grade				9th Grade				
	Attended Museums		Did Not Attend		Attended Museums		Did Not Attend		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Diff.
SES	0.09	0.72	-0.41	0.71	0.50	0.77	-0.23	0.70	0.27 ***
Female	0.49		0.51		-0.02		0.47		0.05 ***
Black, Non-Hispanic	0.10		0.15		-0.05		0.15		-0.03 ***
Hispanic	0.08		0.11		-0.03		0.25		-0.05 ***
Other Race/Ethnicity	0.08		0.09		0.00		0.11		0.02 ***
Urban Status (Base: Urban area)									
Suburban	0.47		0.38		0.09		0.31		0.05 ***
Town							0.14		-0.04 ***
Rural	0.27		0.41		-0.13		0.24		-0.01 **
Region (Base: North)									
North Central	0.28		0.25		0.04				
South	0.32		0.42		-0.10		0.40		-0.04 ***
Midwest							0.22		0.01 *
West	0.19		0.18		0.01		0.25		-0.03 ***
N=	13,795		7,165			12,450	8,720		

Note: ***p<0.01; **p<0.05; *p<0.10. All statistics are calculated using base year survey weights. Sample sizes using HSLs are rounded to the nearest 10 for confidentiality. Missing values were imputed.

Table 4: Marginal Effects on Museum Attendance

	ECLS-K			PSID-CDS		LSAY		NELS:88	HSLs
	K	1st	3rd	6-9yo	10-18yo	7th	10th	8th	9th
SES	0.103*** (0.006)	0.169*** (0.015)	0.102*** (0.008)					0.171*** (0.006)	0.067*** (0.010)
Mother education				0.119*** (0.045)	0.101*** (0.032)	0.087* (0.051)	0.021 (0.052)		
Father education				0.044 (0.053)	0.150*** (0.030)	0.024 (0.047)	0.157*** (0.050)		
Household Income (in \$000s)				0.000 (0.001)	0.000 (0.000)				
Female	-0.013* (0.008)	-0.022 (0.018)	-0.012 (0.011)	0.017 (0.033)	-0.009 (0.021)	0.023 (0.022)	-0.046** (0.023)	-0.023*** (0.008)	0.050*** (0.011)
Race/ Ethnicity									
Black	0.015 -0.015	0.018 (0.032)	-0.026 (0.021)			0.002 (0.048)	-0.112*** (0.040)	-0.024* (0.015)	-0.020 (0.020)
Hispanic	-0.023* -0.013	-0.000 (0.031)	-0.011 (0.019)			-0.094** (0.039)	-0.144*** (0.038)	-0.001 (0.016)	-0.018 (0.021)
Non-white				-0.136*** (0.047)	-0.093*** (0.029)				
Urbanicity									
Suburban	-0.024*** (0.009)	-0.085*** (0.021)	-0.013 (0.013)	-0.049 (0.034)	0.008 (0.023)	-0.022 (0.035)	-0.046 (0.033)	-0.041*** (0.011)	0.013 (0.015)
Rural	-0.068*** (0.013)	-0.097*** (0.030)	-0.066*** (0.018)	-0.200** (0.093)	-0.047 (0.043)	-0.091*** (0.035)	-0.126*** (0.034)	-0.102*** (0.013)	0.001 (0.017)
Region									
Midwest	0.015 (0.012)	0.045 (0.033)	0.010 (0.017)	-0.013 (0.055)	0.042 (0.033)	-	-	-	-
North Central	-	-	-			-0.072** (0.036)	0.087** (0.034)	-0.007 (0.013)	-0.043** (0.020)
South	-0.007 (0.011)	0.078*** (0.030)	0.021 (0.017)	-0.059 (0.056)	-0.023 (0.033)	-0.126*** (0.040)	-0.013 (0.034)	-0.090*** (0.013)	-0.079*** (0.020)
West	0.026** (0.013)	0.015 (0.026)	0.019 (0.019)	-0.048 (0.060)	-0.005 (0.035)	-0.054 (0.047)	0.028 (0.041)	-0.050*** (0.016)	-0.099*** (0.024)
N=	18,300	4,860	12,260	1,470	4,143	1,848	1,616	20,959	21,160

Note: *** p<0.01, ** p<0.05, * p<0.1. Marginal effects shown in all columns. Robust standard errors in parentheses. Sample weights used in all analyses. Samples sizes for ECLS-K and HSLs rounded to nearest 10 for confidentiality. SES variables for PSID-CDS cohorts are indicator variables for mother and father having 16 or more years of education, and household income in thousands of dollars. SES variables for LSAY cohorts are indicator variables for mother having at least a college degree and father having at least a college degree. The comparison group is mother not having completed high school and father not having completed high school. All models control for school characteristics and student achievement, when available. Full results are provided in the data appendix.

Table 5: Marginal Effects by Type of Museum

	<i>Science Museums</i>				<i>Art Museums</i>		
	LSAY		NELS:88	HLSL	LSAY		NELS:88
	7th	10th	8th	9th	7th	10th	8th
SES			0.180*** (0.007)	0.067*** (0.010)			0.138*** (0.006)
Mother Education	0.043 (0.057)	0.028 (0.057)			0.069 (0.059)	0.021 (0.052)	
Father Education	0.098* (0.052)	0.130** (0.056)			0.029 (0.056)	0.157*** (0.050)	
Female	-0.017 (0.024)	-0.088*** (0.025)	-0.050*** (0.008)	0.050*** (0.011)	0.039 (0.026)	0.053** (0.026)	0.027*** (0.008)
Race/ Ethnicity							
Black	-0.021 (0.054)	-0.091** (0.046)	-0.042*** (0.016)	-0.02 (0.020)	0.045 (0.056)	-0.081 (0.050)	-0.042*** (0.016)
Hispanic	-0.123*** (0.045)	-0.171*** (0.043)	-0.017 (0.017)	-0.018 (0.021)	-0.045 (0.047)	-0.134*** (0.047)	0.035** (0.017)
N=	1,848	1,616	20,959	21,160	1,848	1,616	20,959

Note: *** p<0.01, ** p<0.05, * p<0.1. Marginal effects shown in all columns. Sample weights used in all analyses. Samples sizes for HLSL rounded to nearest 10 for confidentiality. Robust standard errors in parentheses. SES variables for LSAY cohorts are indicator variables for mother having at least a college degree and father having at least a college degree. The comparison group is mother not having completed high school and father not having completed high school. All models control for school characteristics and student achievement, when available. Full results provided in the data appendix.