MLDS Research Series Presentation
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Exploring Links Between Arts Education and Academic Outcomes in the International Baccalaureate

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ACKNOWLEDGEMENTS

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The opinions expressed here are those of the authors and do not represent the view of the Institute or the U.S. Department of Education.

IES Institute of Education Sciences

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MLDS Center
Maryland Longitudinal Data System
Better Data • Informed Choices • Improved Results

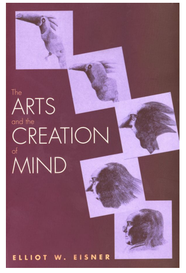
Arts Education in Maryland

COMAR 13a.04.16.01 requires that each local school system in Maryland

- Provide arts education in dance, media arts, music, theatre, and visual art for all students in PreK through 8th grade
    - PreK through 5th graders must have experiences in all arts forms
    - Students in 6th through 8th may specialize in one or more arts disciplines
- Provide an instructional program allowing all 9th through 12th grade students to meet graduation requirements by choosing from among courses in dance, media arts, music, theatre, and visual art

Aims of Arts Education

"The tasks the arts put forward—such as **noticing subtleties among qualitative relationships**, conceiving of **imaginative possibilities**, interpreting the **metaphorical meanings** the work displays, exploiting **unanticipated opportunities** in the course of one's work—require **complex cognitive** modes of thought."



(Eisner, 2002)

What Policy and Advocacy Arguments Are Made in Favor of the Arts?

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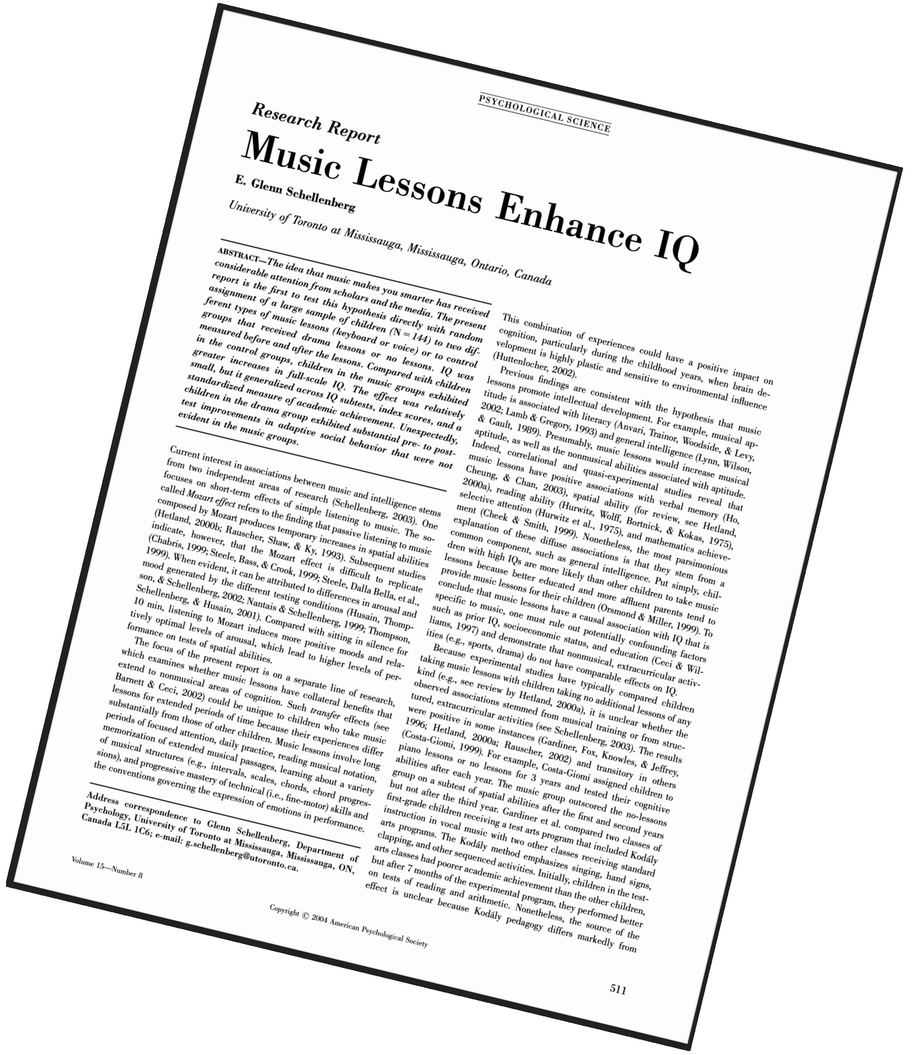

PSYCHOLOGICAL SCIENCE

Research Report

Music Lessons Enhance IQ

E. Glenn Schellenberg

University of Toronto at Mississauga, Mississauga, Ontario, Canada

ABSTRACT—*The idea that music makes you smarter has received considerable attention from scholars and the media. The present report is the first to test this hypothesis directly with random assignment of a large sample of children (N = 144) to two different types of music lessons (keyboard or voice) or to control groups that received drama lessons or no lessons. IQ was measured before and after the lessons. Compared with children in the control groups, children in the music groups exhibited greater increases in full-scale IQ. The effect was relatively small, but it generalized across IQ subtests, index scores, and a standardized measure of academic achievement. Unexpectedly, children in the drama group exhibited substantial pre- to post-test improvements in adaptive social behavior that were not evident in the music groups.*

Current interest in associations between music and intelligence stems from two independent areas of research (Schellenberg, 2003). One focuses on short-term effects of simple listening to music. The so-called *Mozart effect* refers to the finding that passive listening to music composed by Mozart produces temporary increases in spatial abilities (Hetland, 2000b; Rauscher, Shaw, & Ky, 1993). Subsequent studies indicate, however, that the Mozart effect is difficult to replicate (Chahnis, 1999; Steele, Bass, & Crook, 1999; Steele, Dalla Bella, et al., 1999). When evident, it can be attributed to differences in arousal and mood generated by the different testing conditions (Husain, Thompson, & Schellenberg, 2002; Nantais & Schellenberg, 1999; Thompson, Schellenberg, & Husain, 2001). Compared with sitting in silence for 10 min, listening to Mozart induces more positive moods and relatively optimal levels of arousal, which lead to higher levels of performance on tests of spatial abilities.

The focus of the present report is on a separate line of research, which examines whether music lessons have collateral benefits that extend to nonmusical areas of cognition. Such *transfer* effects (see Barnett & Ceci, 2002) could be unique to children who take music lessons for extended periods of time because their experiences differ substantially from those of other children. Music lessons involve long periods of focused attention, daily practice, reading musical notation, memorization of extended musical passages, learning about a variety of musical structures (e.g., intervals, scales, chords, chord progressions), and progressive mastery of technical (i.e., fine-motor) skills and the conventions governing the expression of emotions in performance. This combination of experiences could have a positive impact on cognition, particularly during the childhood years, when brain development is highly plastic and sensitive to environmental influence (Huttenlocher, 2002).

Previous findings are consistent with the hypothesis that music lessons promote intellectual development. For example, musical aptitude is associated with literacy (Anvari, Trainor, Woodside, & Levy, 2002; Lamb & Gregory, 1993) and general intelligence (Lynn, Wilson, & Gault, 1989). Presumably, music lessons would increase musical aptitude, as well as the nonmusical abilities associated with aptitude. Indeed, correlational and quasi-experimental studies reveal that music lessons have positive associations with verbal memory (Ho, Cheung, & Chan, 2003), spatial ability (for review, see Hetland, 2000a), reading ability (Hurwitz, Wolff, Bortnick, & Kokas, 1975), selective attention (Hurwitz et al., 1975), and mathematics achievement (Cheek & Smith, 1999). Nonetheless, the most parsimonious explanation of these diffuse associations is that they stem from a common component, such as general intelligence. Put simply, children with high IQs are more likely than other children to take music lessons because better educated and more affluent parents tend to provide music lessons for their children (Ormond & Miller, 1999). To conclude that music lessons have a causal association with IQ that is specific to music, one must rule out potentially confounding factors such as prior IQ, socioeconomic status, and education (Ceci & Williams, 1997) and demonstrate that nonmusical, extracurricular activities (e.g., sports, drama) do not have comparable effects on IQ.

Because experimental studies have typically compared children taking music lessons with children taking no additional lessons of any kind (e.g., see review by Hetland, 2000a), it is unclear whether the observed associations stemmed from musical training or from structured, extracurricular activities (see Schellenberg, 2003). The results were positive in some instances (Gardiner, Fox, Knowles, & Jeffrey, 1996; Hetland, 2000a; Rauscher, 2002) and transitory in others (Costa-Giomi, 1999). For example, Costa-Giomi assigned children to piano lessons or no lessons for 3 years and tested their cognitive abilities after each year. The music group outscored the no-lessons group on a subtest of spatial abilities after the first and second years but not after the third year. Gardiner et al. compared two classes of first-grade children receiving a test arts program that included Kodály instruction in vocal music with two other classes receiving standard arts programs. The Kodály method emphasizes singing, hand signs, clapping, and other sequenced activities. Initially, children in the test-arts classes had poorer academic achievement than the other children, but after 7 months of the experimental program, they performed better on tests of reading and arithmetic. Nonetheless, the source of the effect is unclear because Kodály pedagogy differs markedly from

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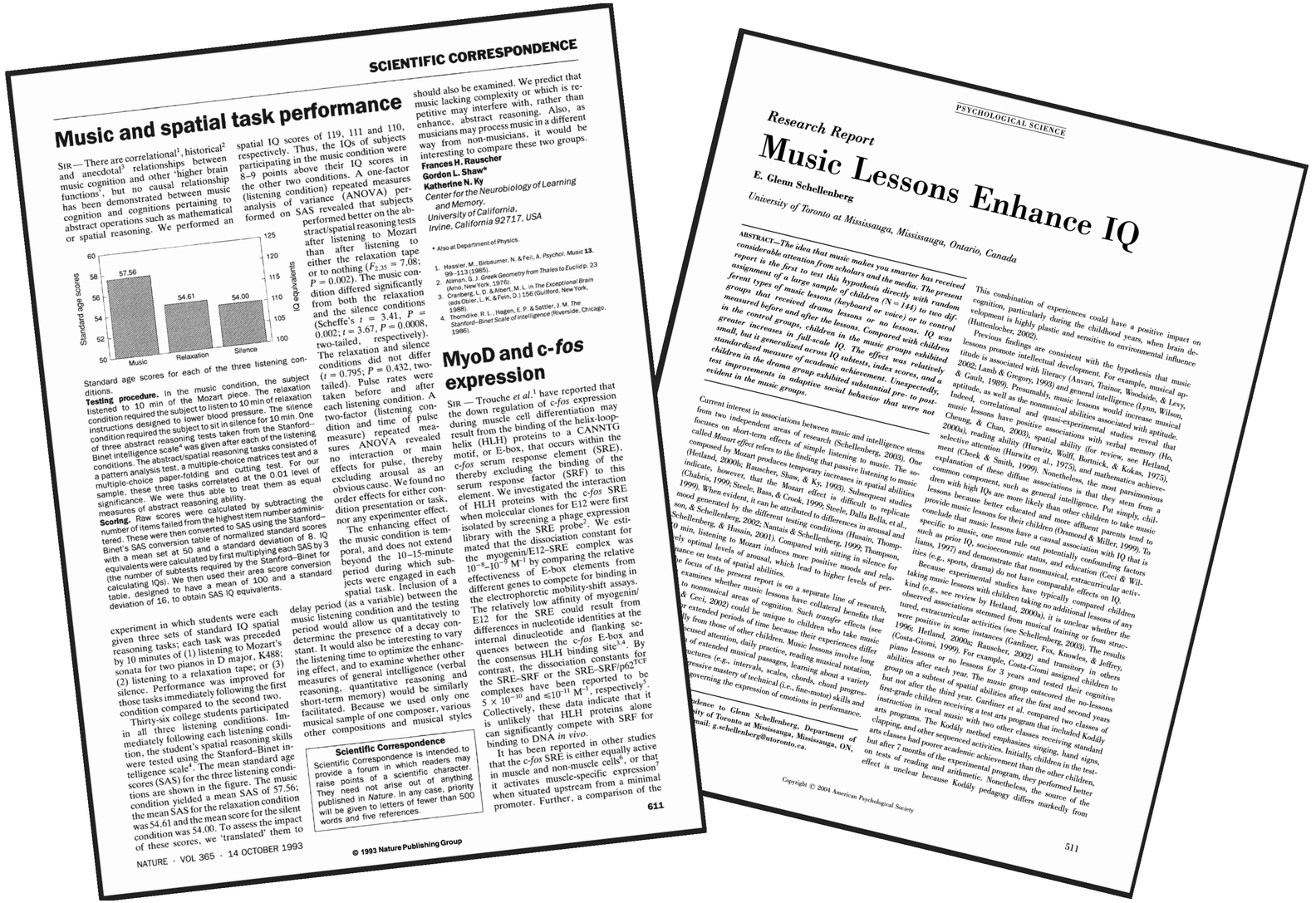

SCIENTIFIC CORRESPONDENCE

Music and spatial task performance

SIR — There are correlational[1], historical[2] and anecdotal[3] relationships between music cognition and other 'higher brain functions', but no causal relationship has been demonstrated between music cognition and cognitions pertaining to abstract operations such as mathematical or spatial reasoning. We performed an experiment in which students were each given three sets of standard IQ spatial reasoning tasks; each task was preceded by 10 minutes of (1) listening to Mozart's sonata for two pianos in D major, K488; (2) listening to a relaxation tape; or (3) silence. Performance was improved for those tasks immediately following the first condition compared to the second two.

Thirty-six college students participated in all three listening conditions. Immediately following each listening condition, the student's spatial reasoning skills were tested using the Stanford–Binet intelligence scale[4]. The mean standard age scores (SAS) for the three listening conditions are shown in the figure. The music condition yielded a mean SAS of 57.56; the mean SAS for the relaxation condition was 54.61 and the mean score for the silent condition was 54.00. To assess the impact of these scores, we 'translated' them to spatial IQ scores of 119, 111 and 110, respectively. Thus, the IQs of subjects participating in the music condition were 8–9 points above their IQ scores in the other two conditions. A one-factor (listening condition) repeated measures analysis of variance (ANOVA) performed on SAS revealed that subjects performed better on the abstract/spatial reasoning tests after listening to Mozart than after listening to either the relaxation tape or to nothing ($F_{2,35} = 7.08$; $P = 0.002$). The music condition differed significantly from both the relaxation and the silence conditions (Scheffe's $t = 3.41$, $P = 0.0008$, 0.002; $t = 3.67$, $P = 0.0008$, two-tailed, respectively). The relaxation and silence conditions did not differ ($t = 0.795$; $P = 0.432$, two-tailed). Pulse rates were taken before and after each listening condition. A two-factor (listening condition and time of pulse measure) repeated measures ANOVA revealed no interaction or main effects for pulse, thereby excluding arousal as an obvious cause. We found no order effects for either condition presentation or task, nor any experimenter effect.

Standard age scores for each of the three listening conditions.

Testing procedure. In the music condition, the subject listened to 10 min of the Mozart piece. The relaxation condition required the subject to listen to 10 min of relaxation instructions designed to lower blood pressure. The silence condition required the subject to sit in silence for 10 min. One of three abstract reasoning tests taken from the Stanford–Binet intelligence scale[4] was given after each of the listening conditions. The abstract/spatial reasoning tasks consisted of a pattern analysis test, a multiple-choice matrices test and a multiple-choice paper-folding and cutting test. For our sample, these three tasks correlated at the 0.01 level of significance. We were thus able to treat them as equal measures of abstract reasoning ability.

Scoring. Raw scores were converted to SAS using the Stanford–Binet's SAS conversion table of normalized standard scores with a mean set at 50 and a standard deviation of 8. IQ equivalents were calculated by first multiplying each SAS by 3 (the number of subtests required by the Stanford–Binet for calculating IQs). We then used their area score conversion table, designed to have a mean of 100 and a standard deviation of 16, to obtain SAS IQ equivalents.

The enhancing effect of the music condition is temporal, and does not extend beyond the 10–15-minute period during which subjects were engaged in each spatial task. Inclusion of a delay period (as a variable) between the music listening condition and the testing period would allow us quantitatively to determine the presence of a decay constant. It would also be interesting to vary the listening time to optimize the enhancing effect, and to examine whether other measures of general intelligence (verbal reasoning, quantitative reasoning and short-term memory) would be similarly facilitated. Because we used only one musical sample of one composer, various other compositions and musical styles should also be examined. We predict that music lacking complexity or which is repetitive may interfere with, rather than enhance, abstract reasoning. Also, as musicians may process music in a different way from non-musicians, it would be interesting to compare these two groups.

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MyoD and c-*fos* expression

SIR — Trouche *et al.*[1] have reported that the down regulation of *c-fos* expression during muscle cell differentiation may result from the binding of the helix-loop-helix (HLH) proteins to a CANNTG motif, or E-box, that occurs within the *c-fos* serum response element (SRE), thereby excluding the binding of the serum response factor (SRF) to this element. We investigated the interaction of HLH proteins with the *c-fos* SRE when molecular clones for E12 were first isolated by screening a phage expression library with the SRE probe[2]. We estimated that the dissociation constant for the myogenin/E12–SRE complex was 10^{-8}–10^{-9} M^{-1} by comparing the relative effectiveness of E-box elements from different genes to compete for binding in the electrophoretic mobility-shift assays. The relatively low affinity of myogenin/E12 for the SRE could result from differences in nucleotide identities at the internal dinucleotide and flanking sequences between the *c-fos* E-box and the consensus HLH binding site[3,4]. By contrast, the dissociation constants for the SRE–SRF or the SRE–SRF/$p62^{TCF}$ complexes have been reported to be 5×10^{-10} and $\leq 10^{-11}$ M^{-1}, respectively[5]. Collectively, these data indicate that it is unlikely that HLH proteins alone can significantly compete with SRF for binding to DNA *in vivo*.

It has been reported in other studies that the *c-fos* SRE is either equally active in muscle and non-muscle cells[6], or that it activates muscle-specific expression[7] when situated upstream from a minimal promoter. Further, a comparison of the

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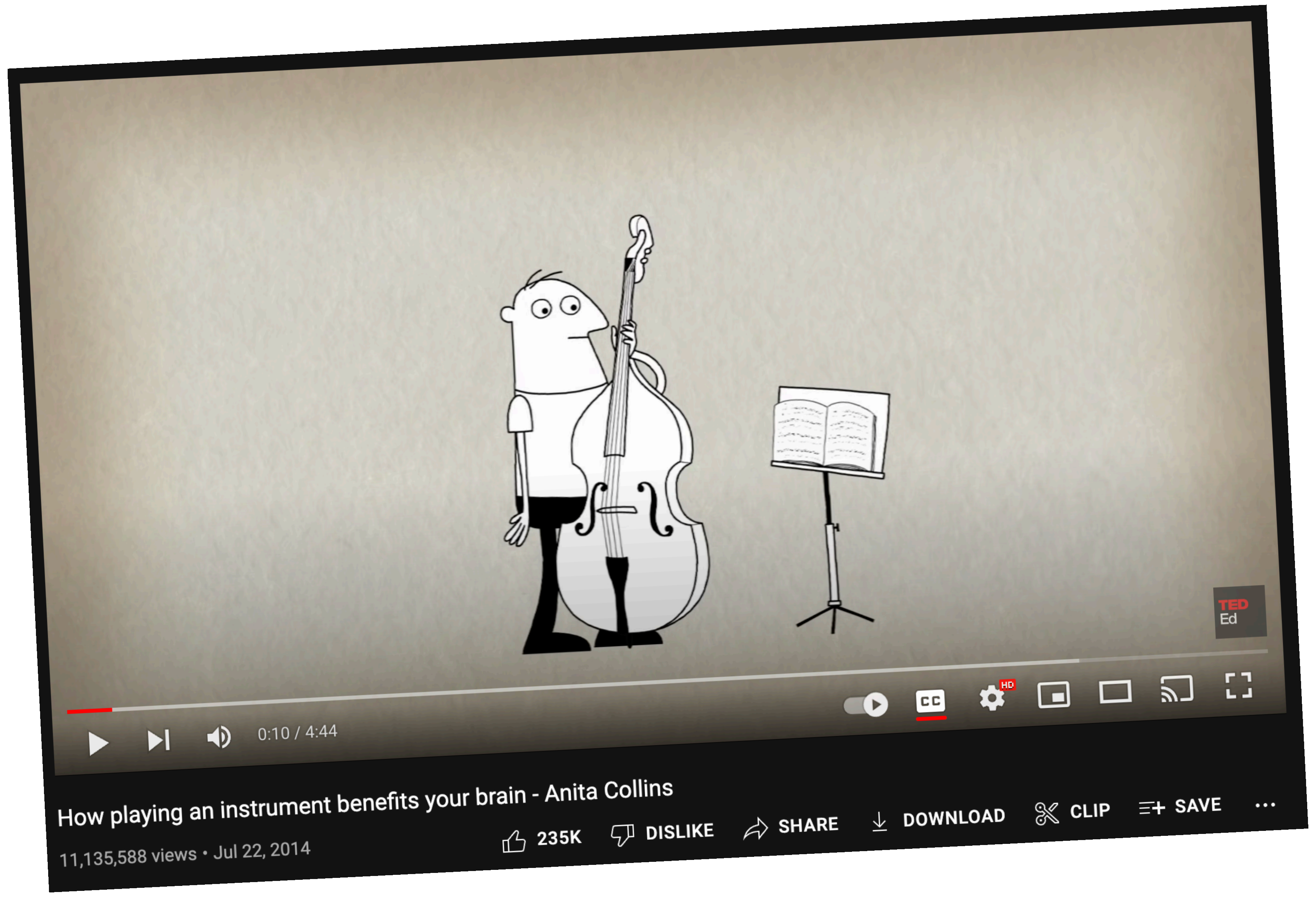

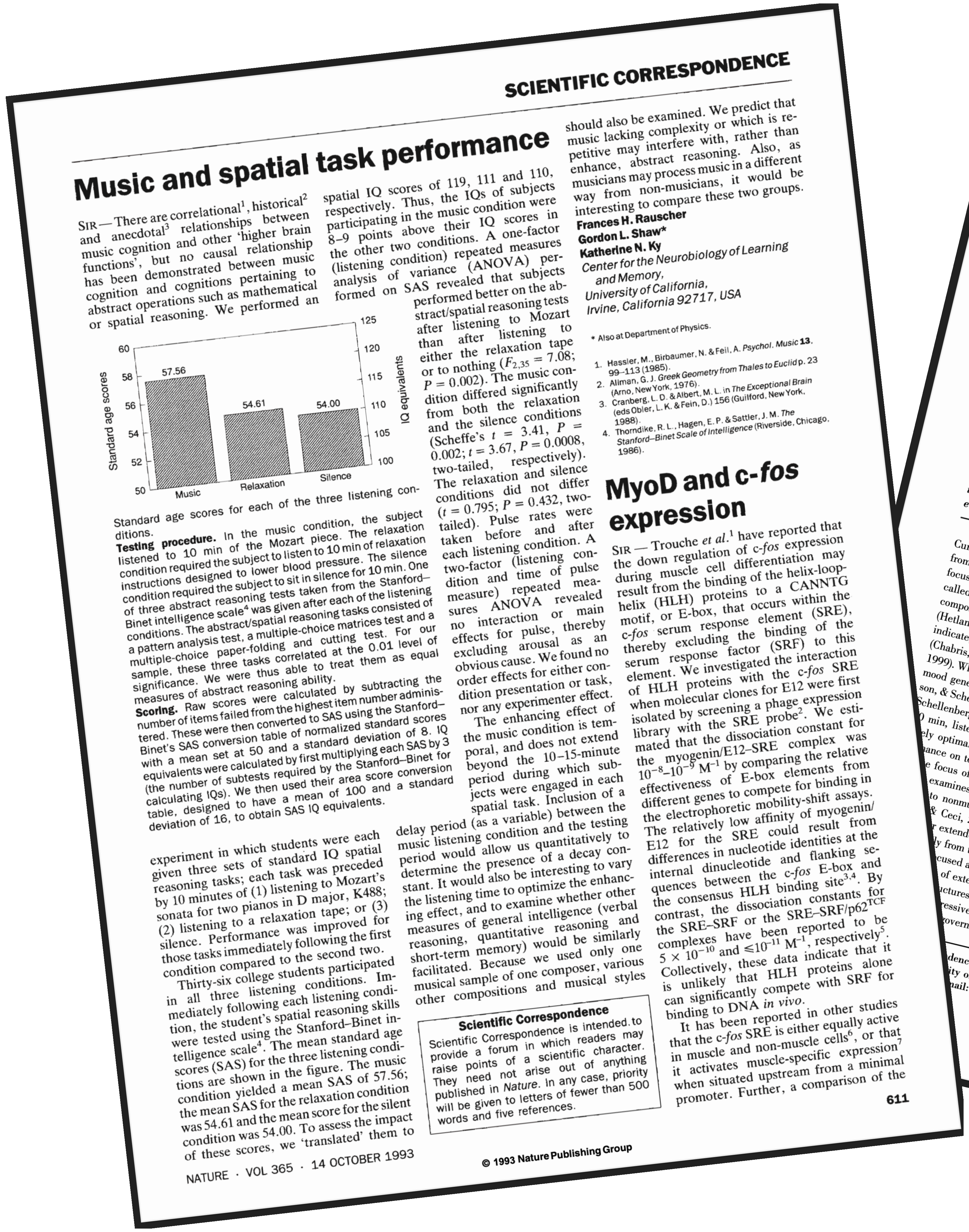

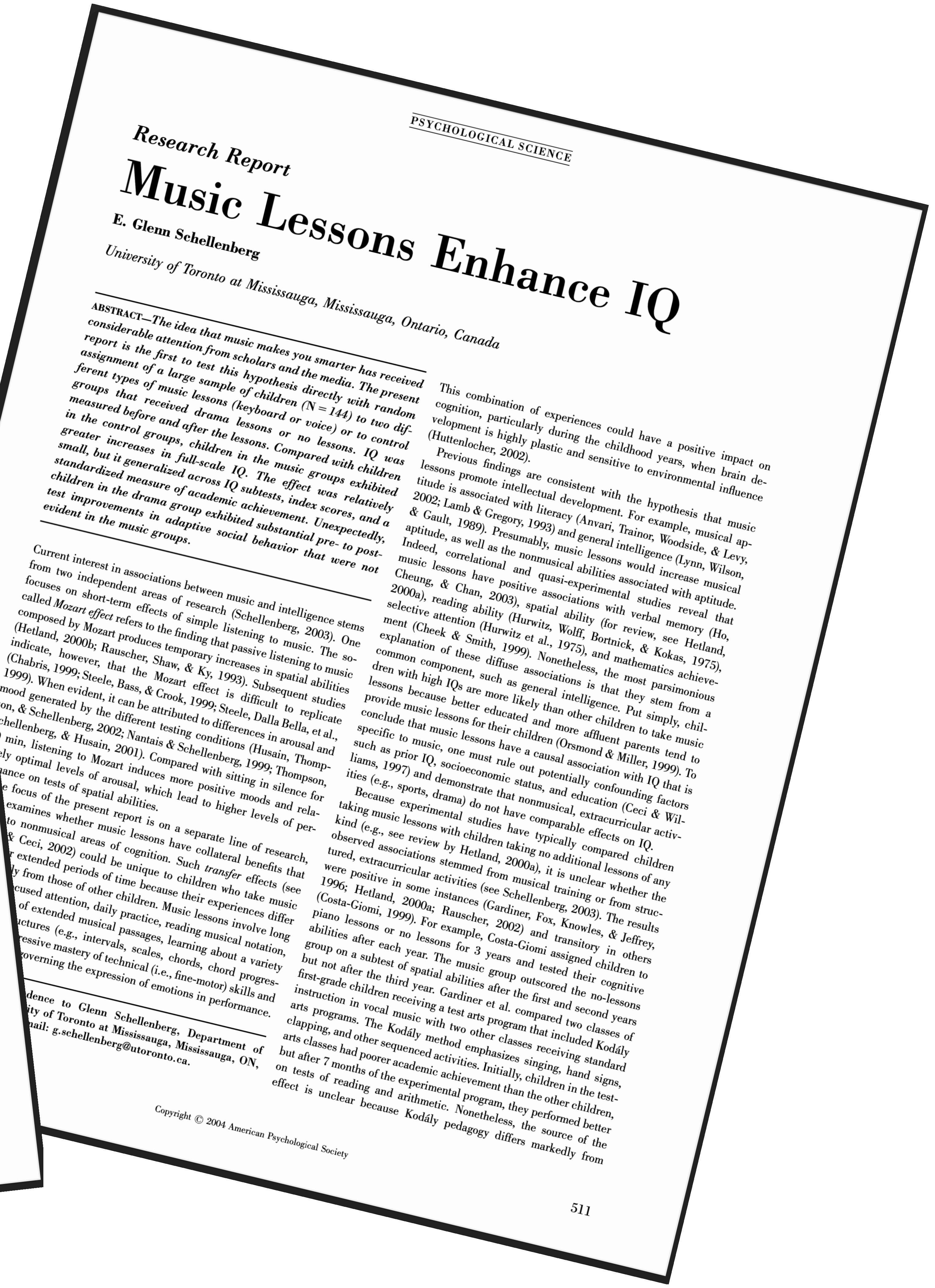

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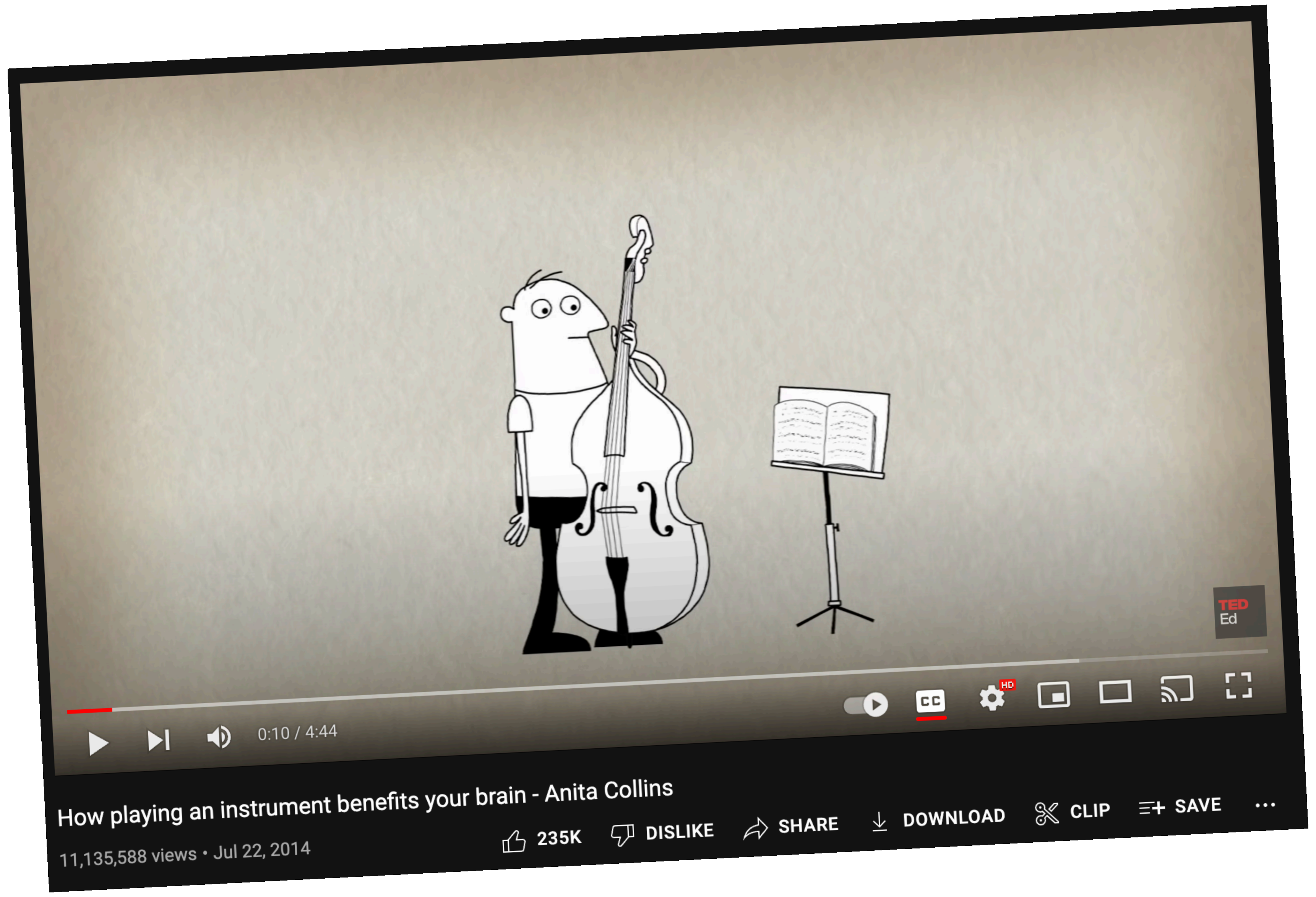

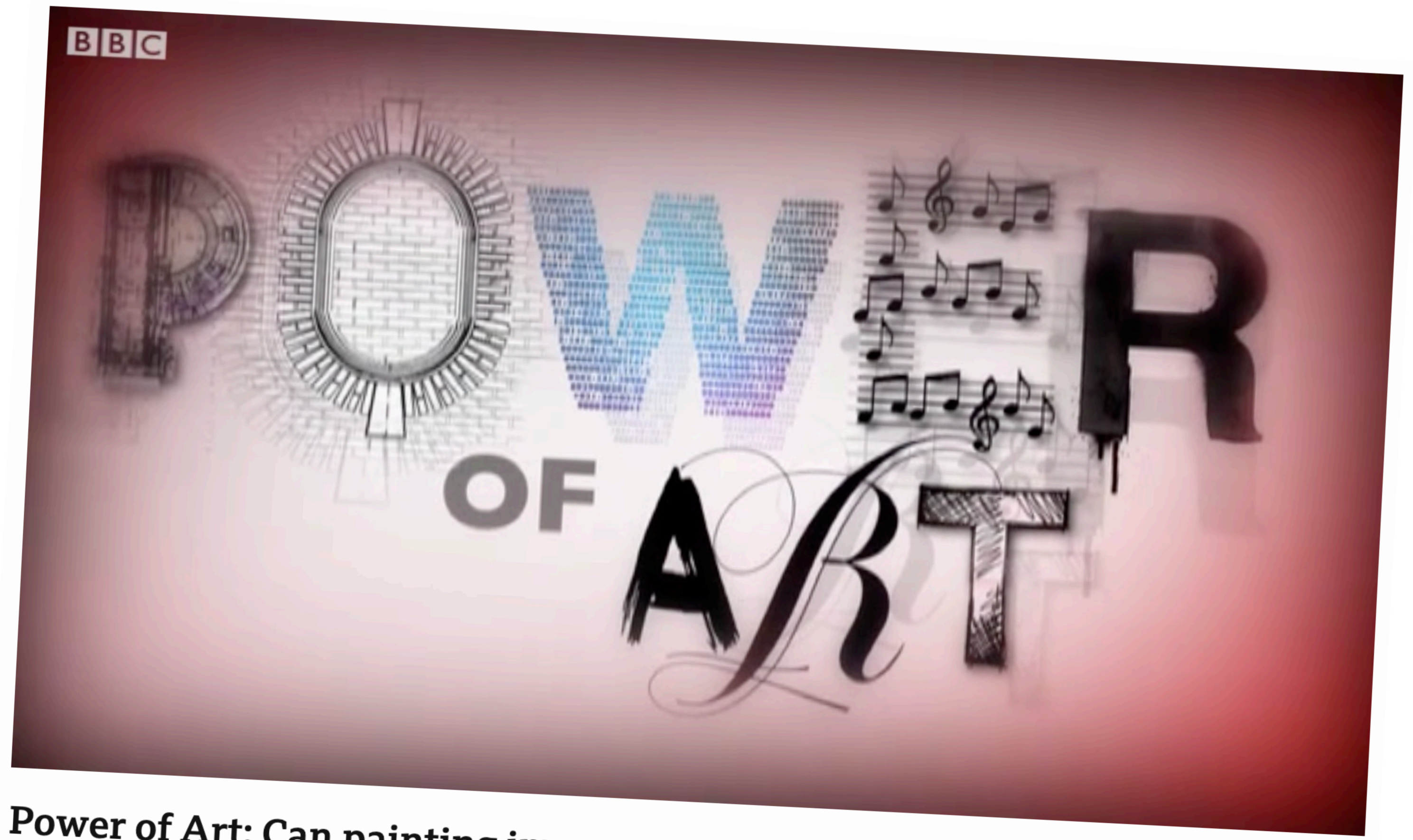

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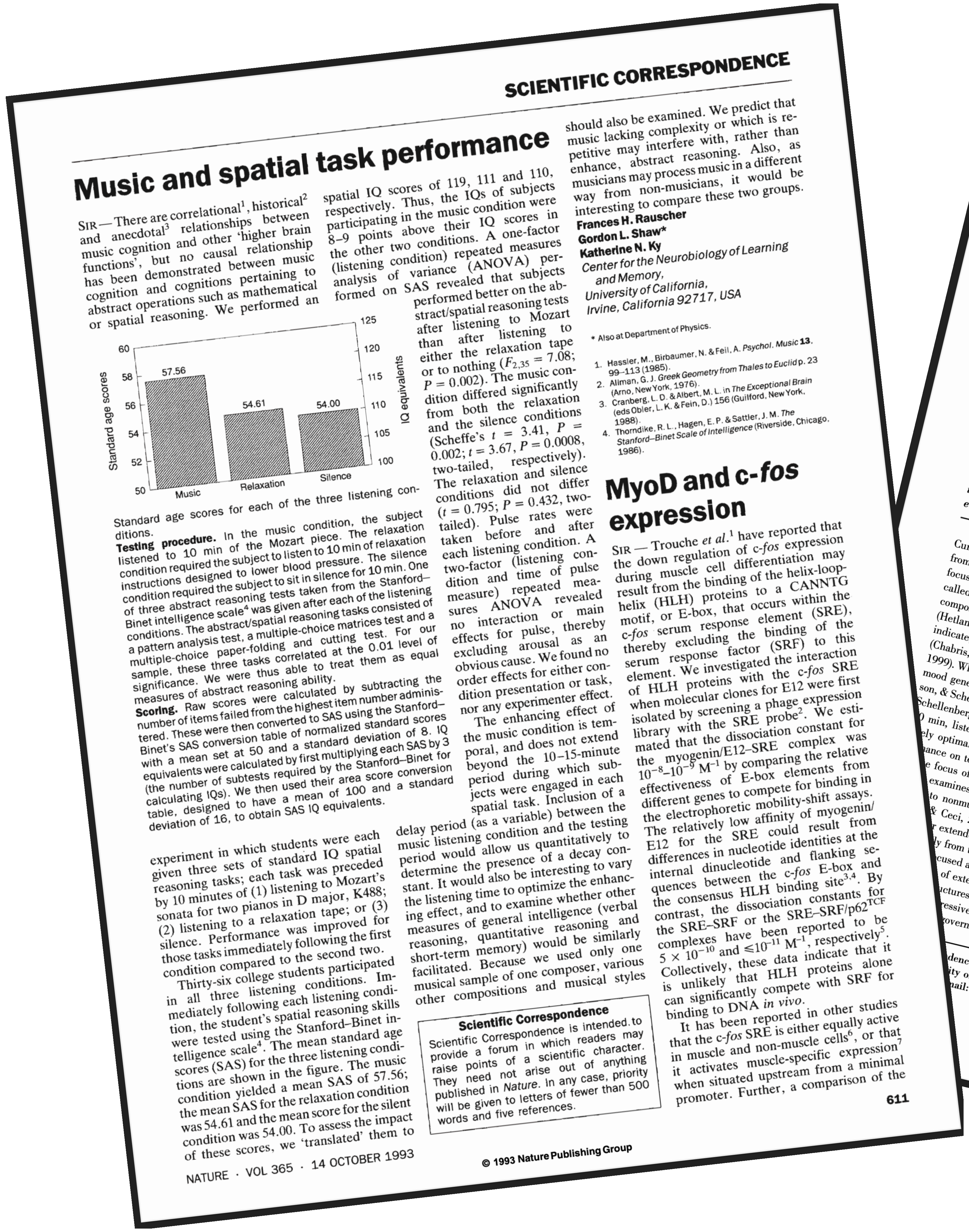

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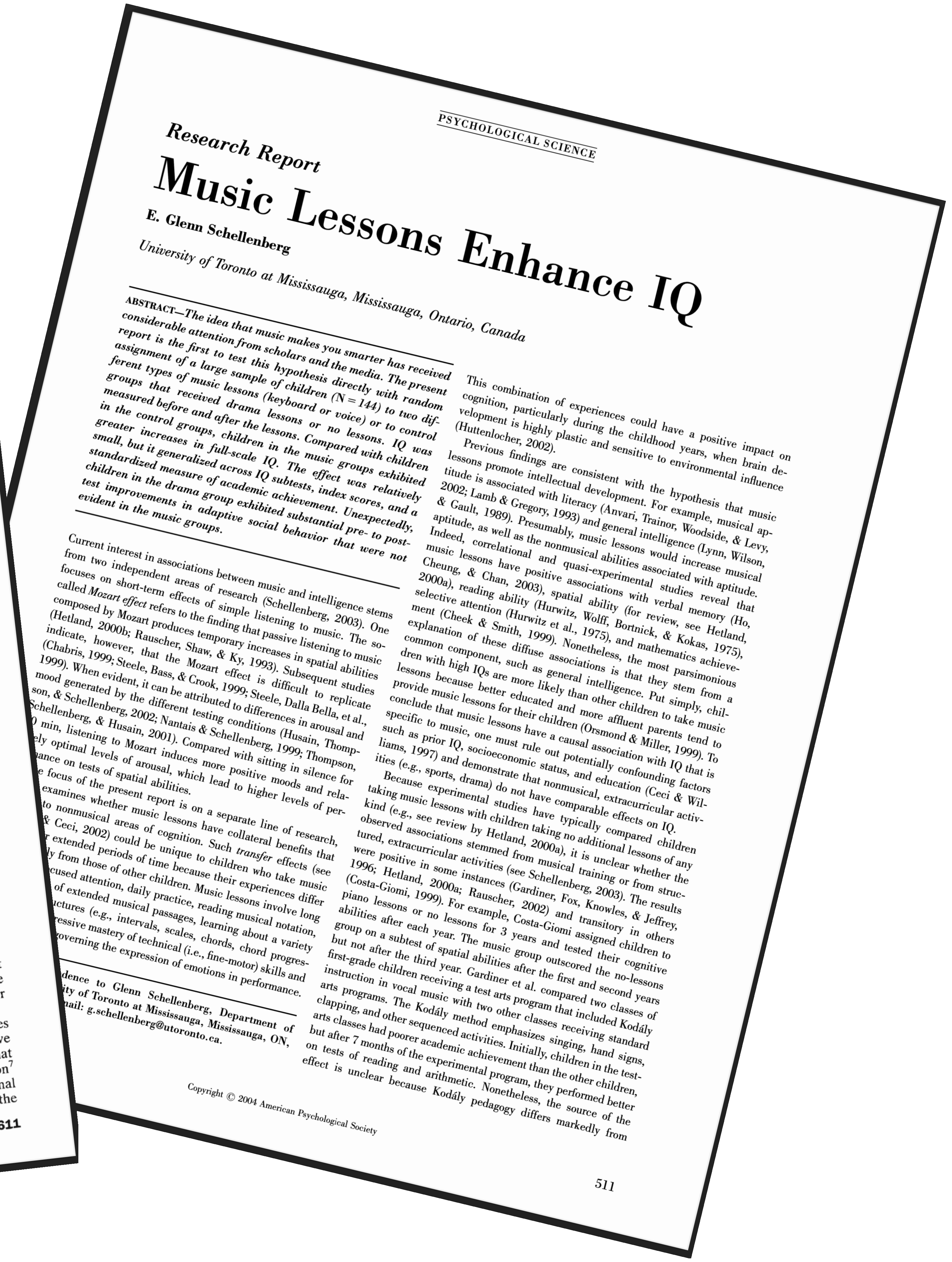

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The focus of the present report is on a separate line of research that examines whether music lessons have collateral benefits that extend to nonmusical areas of cognition. Such *transfer* effects (see ... & Ceci, 2002) could be unique to children who take music ... extended periods of time because their experiences differ ... from those of other children. Music lessons involve long ... focused attention, daily practice, reading musical notation, ... of extended musical passages, learning about a variety ... structures (e.g., intervals, scales, chords, chord progressions), ... progressive mastery of technical (i.e., fine-motor) skills and ... governing the expression of emotions in performance.

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This combination of experiences could have a positive impact on cognition, particularly during the childhood years, when brain development is highly plastic and sensitive to environmental influence (Huttenlocher, 2002).

Previous findings are consistent with the hypothesis that music lessons promote intellectual development. For example, musical aptitude is associated with literacy (Anvari, Trainor, Woodside, & Levy, 2002; Lamb & Gregory, 1993) and general intelligence (Lynn, Wilson, & Gault, 1989). Presumably, music lessons would increase musical aptitude, as well as the nonmusical abilities associated with aptitude. Indeed, correlational and quasi-experimental studies reveal that music lessons have positive associations with verbal memory (Ho, Cheung, & Chan, 2003), spatial ability (for review, see Hetland, 2000a), reading ability (Hurwitz, Wolff, Bortnick, & Kokas, 1975), selective attention (Hurwitz et al., 1975), and mathematics achievement (Cheek & Smith, 1999). Nonetheless, the most parsimonious explanation of these diffuse associations is that they stem from a common component, such as general intelligence. Put simply, children with high IQs are more likely than other children to take music lessons because better educated and more affluent parents tend to provide music lessons for their children (Orsmond & Miller, 1999). To conclude that music lessons have a causal association with IQ that is specific to music, one must rule out potentially confounding factors such as prior IQ, socioeconomic status, and education (Ceci & Williams, 1997) and demonstrate that nonmusical, extracurricular activities (e.g., sports, drama) do not have comparable effects on IQ.

Because experimental studies have typically compared children taking music lessons with children taking no additional lessons of any kind (e.g., see review by Hetland, 2000a), it is unclear whether the observed associations stemmed from musical training or from structured, extracurricular activities (see Schellenberg, 2003). The results were positive in some instances (Gardiner, Fox, Knowles, & Jeffrey, 1996; Hetland, 2000a; Rauscher, 2002) and transitory in others (Costa-Giomi, 1999). For example, Costa-Giomi assigned children to piano lessons or no lessons for 3 years and tested their cognitive abilities after each year. The music group outscored the no-lessons group on a subtest of spatial abilities after the first and second years but not after the third year. Gardiner et al. compared two classes of first-grade children receiving a test arts program that included Kodály instruction in vocal music with two other classes receiving standard arts programs. The Kodály method emphasizes singing, hand signs, clapping, and other sequenced activities. Initially, children in the test-arts classes had poorer academic achievement than the other children, but after 7 months of the experimental program, they performed better on tests of reading and arithmetic. Nonetheless, the source of the effect is unclear because Kodály pedagogy differs markedly from

What Policy and Advocacy Arguments Are Made in Favor of the Arts?

ies INSTITUTE OF EDUCATION SCIENCES

REQUEST FOR APPLICATIONS

Education Research Grants
CFDA Number: 84.305A

➢ ***Arts in Education***

Program Officers: Dr. James Benson (202-245-8333; James.Benson@ed.gov)
Dr. Erin Higgins (202-245-6541; Erin.Higgins@ed.gov)

a) Purpose

The Arts in Education special topic supports research to understand the implementation and effects of arts programs and policies at the K-12 level in order to improve the education outcomes of students. Research connecting student participation in the arts to academic outcomes and social/behavioral competencies has the potential to inform contemporary policy debates regarding the benefits of arts programming in schools. Advocates of the arts have long argued for their inclusion in schools, for their general benefits, such as improved innovation, creativity, and communication (Winner, Goldstein, and Vincent-Lancrin, 2013), as well as for their perceived positive effects on literacy (Walker, Tabone, and Weltsek 2011; Podlozny 2000), math achievement (Courey, Balogh, and Siker 2012; Kinney and Forsythe 2005), critical thinking (Montgomerie and Ferguson 1999), and engagement in school (Smithrim and Upitis 2005). In addition, there is some evidence from cognitive psychology and neuroscience suggesting a relationship between participation in the arts and improved cognitive and neural processing (e.g., Catterall, 2002; Tierney, Krizman, and Kraus 2015; Kraus, Hornickel, Strait, Slater, and Thompson, 2014).

States and school districts often feel the need to make tradeoffs between instruction in core subjects (e.g., math, reading) and instruction in the arts, in part because of the emphasis on testing in core subjects as well as because of budgetary pressure. Given the potential of the arts to contribute positively to students' success in school, new research is needed to rigorously assess the effect of arts participation on education outcomes, including a close look at potential mediators of any effects, the types of outcomes impacted, and the conditions under which these relationships hold.

What Policy and Advocacy Arguments Are Made in Favor of the Arts?

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Are There Actually Arguments Made Against the Arts?

(Cortes et al., 2015; Nomi, 2015)

Are There Actually Arguments Made Against the Arts?

Intensive Math Instruction and Educational Attainment
Long-Run Impacts of Double-Dose Algebra

Kalena E. Cortes
Joshua S. Goodman
Takako Nomi

ABSTRACT

We study an intensive math instruction policy that assigned low-skilled ninth graders to an algebra course that doubled instructional time, altered peer composition and emphasized problem solving skills. A regression discontinuity design shows substantial positive impacts of double-dose algebra on credits earned, test scores, high school graduation, and college enrollment rates. Test score effects underpredict attainment effects, highlighting the importance of long-run evaluation of such a policy. Perhaps because the intervention focused on verbal exposition of mathematical concepts, the impact was largest for students with below-average reading skills, emphasizing the need to target interventions toward appropriately skilled students.

Kalena E. Cortes is an assistant professor of public policy at Texas A&M University and a Faculty Research Fellow at the National Bureau of Economic Research. Joshua S. Goodman is an assistant professor of public policy at Harvard University and a Faculty Research Fellow at the National Bureau of Economic Research. Takako Nomi is an assistant professor of education at St. Louis University. Some of this research was conducted while Cortes was a Visiting Scholar at Stanford's Graduate School of Education. The authors are grateful to the Chicago Public Schools for sharing their data and to Sue Sporte, Director of Research Operations, Consortium on Chicago School Research (CCSR) for facilitating this sharing. They also thank for helpful comments Richard Murnane, Bridget Terry Long, Jeffrey Kubik, Lori Taylor, Jacob Vigdor, Caroline Hoxby, Martin West, Kevin Stange, and Nora Gordon, as well as seminar and conference participants at Harvard's Program on Education Policy and Governance, the State of Texas Education Research Center at Texas A&M University, the Association for Education Finance and Policy, the NBER Economics of Education Program, UT-Austin's Economics Department and the Stanford Graduate School of Education. Colin Sullivan, Heather Sarsons, Shelby Lin, and Napat Jatusripitak provided outstanding research assistance. This research was funded by the Institute of Education Sciences under award R305A120466. Institutional support from Texas A&M University, Stanford's Center for Education Policy Analysis, and Harvard's Taubman Center for State and Local Government are also gratefully acknowledged. The data used in this article can be obtained beginning June 2015 through May 2018 from the authors.

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"Double-dose" English as a strategy for improving adolescent literacy: Total effect and mediated effect through classroom peer ability change

Takako Nomi

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Ninth grade

ABSTRACT

"Double-dose" coursework has become an increasingly popular strategy to assist low-performing students succeed in academic coursework. Chicago implemented a "double-dose" English policy in 2003. This policy not only provided additional instructional time to struggling readers, but also intensified skill-based sorting in English classes. I use policy-induced variation to infer the policy effect on students' reading achievement and the effect mediated by classroom peer ability change. Results show very weak, but positive effects of taking double-dose English for students with average skills. However, potential benefits of doubled instructional time are likely to be offset by negative effects of declines in classroom peer ability. Students with very weak skills experienced minimal change in classroom peer ability, and two-period coursework is likely to benefit these students.

1. Introduction

Advancing the literacy skills of adolescents has been a pressing issue on the nation's education policy agenda for the past decade. US students' literacy skills lag behind particularly during secondary school years. According to the Program for International Student Assessment (PISA) although U.S. students are among the highest performing students in the world in 4th grade, their performance is lower in 8th grade and ranks among the lowest by Grade 10 (Carnegie Council on Advancing Literacy, 2010). The National Assessment of Education Progress (NAEP) also shows that the trend in reading scores of 13 and 14 year olds has been relatively flat for the last four decades, while scores of 9 year old students have risen and reached their highest point ever in 2008 (Rampey et al., 2009).

Past policies primarily focused on improving literacy skills during the early years; however, a lack of improvement at the secondary level has raised concern that not enough effort has been made to improve literacy skills among adolescents (e.g., the National Governors Association, 2005). Researchers have also pointed out that even excellent third-grade readers will fall behind in academic tasks in later grades if the teaching of reading is neglected in secondary grade levels (Biancarosa and Snow, 2006).

Improving adolescent literacy skills is particularly important in this current era, calling for a "college preparatory curriculum for all". Most recently, the Common Core Standards attempts to strengthen an academic curriculum across the board. With increasingly demanding high-school coursework, struggling readers are likely to face even greater challenges as they progress grade levels; poor reading skills can prevent them from mastering content knowledge in other academic subjects, which involve difficult texts with complex narratives and increasingly difficult vocabulary.

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0049-089X/

(Cortes et al., 2015; Nomi, 2015)

Are There Actually Arguments Made Against the Arts?

Are There Actually Arguments Made Against the Arts?

Opportunity cost

Connecting the Arts to Academics

Connecting the Arts to Academics

The arts make kids better at school

(e.g., Catterall, 1997; Catterall et al. 2012)

Connecting the Arts to Academics

The arts make kids better at school

(e.g., Costa-Giomi, 2004; Elpus, 2013; Mehr et al. 2013)

How might the arts make a difference?

Connecting the Arts to Academics

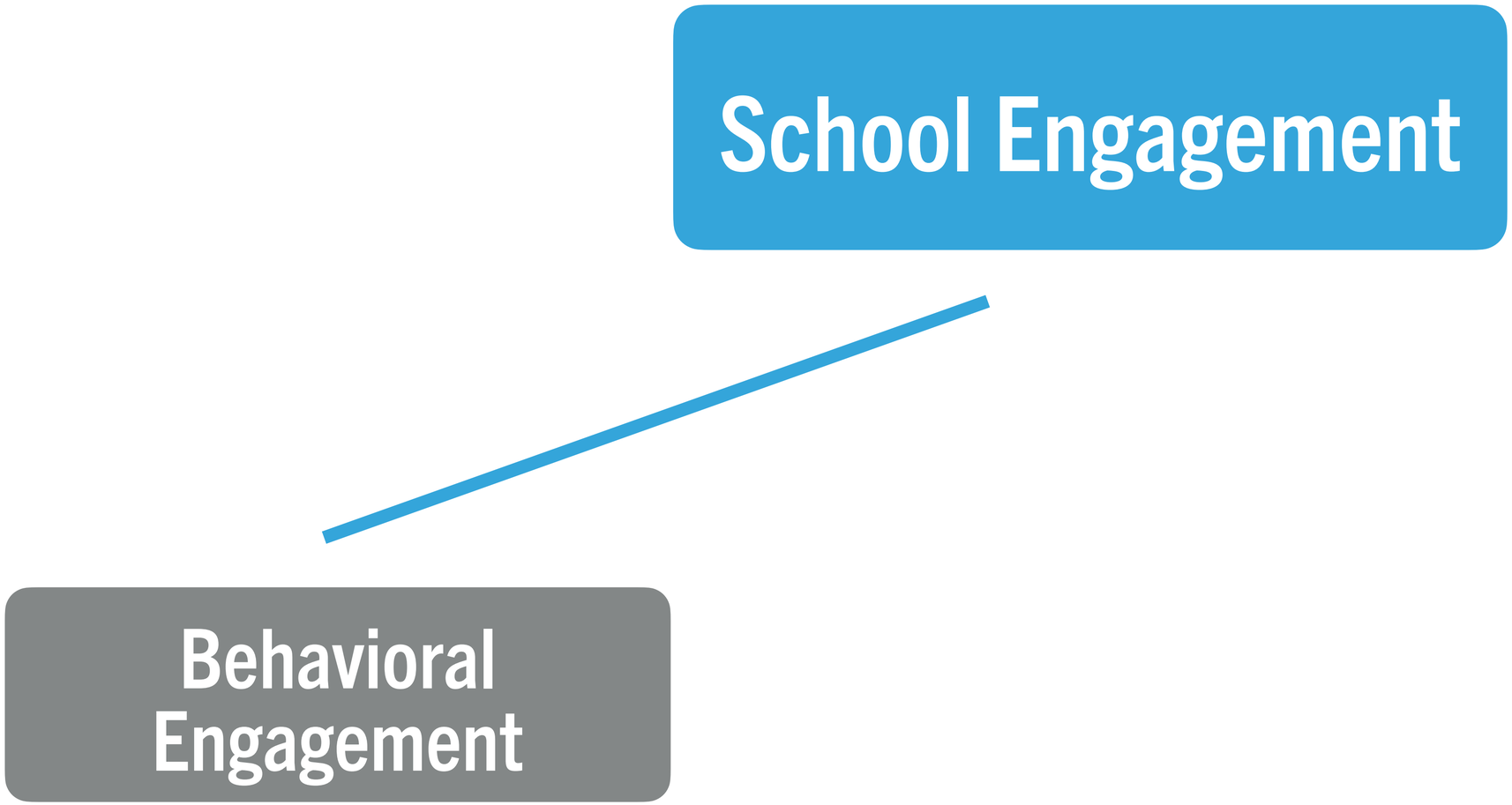
(Fredricks, Blumenfeld, & Paris, 2004; Fredricks et al. 2005)

Connecting the Arts to Academics

School Engagement

(Fredricks, Blumenfeld, & Paris, 2004; Fredricks et al. 2005)

Connecting the Arts to Academics



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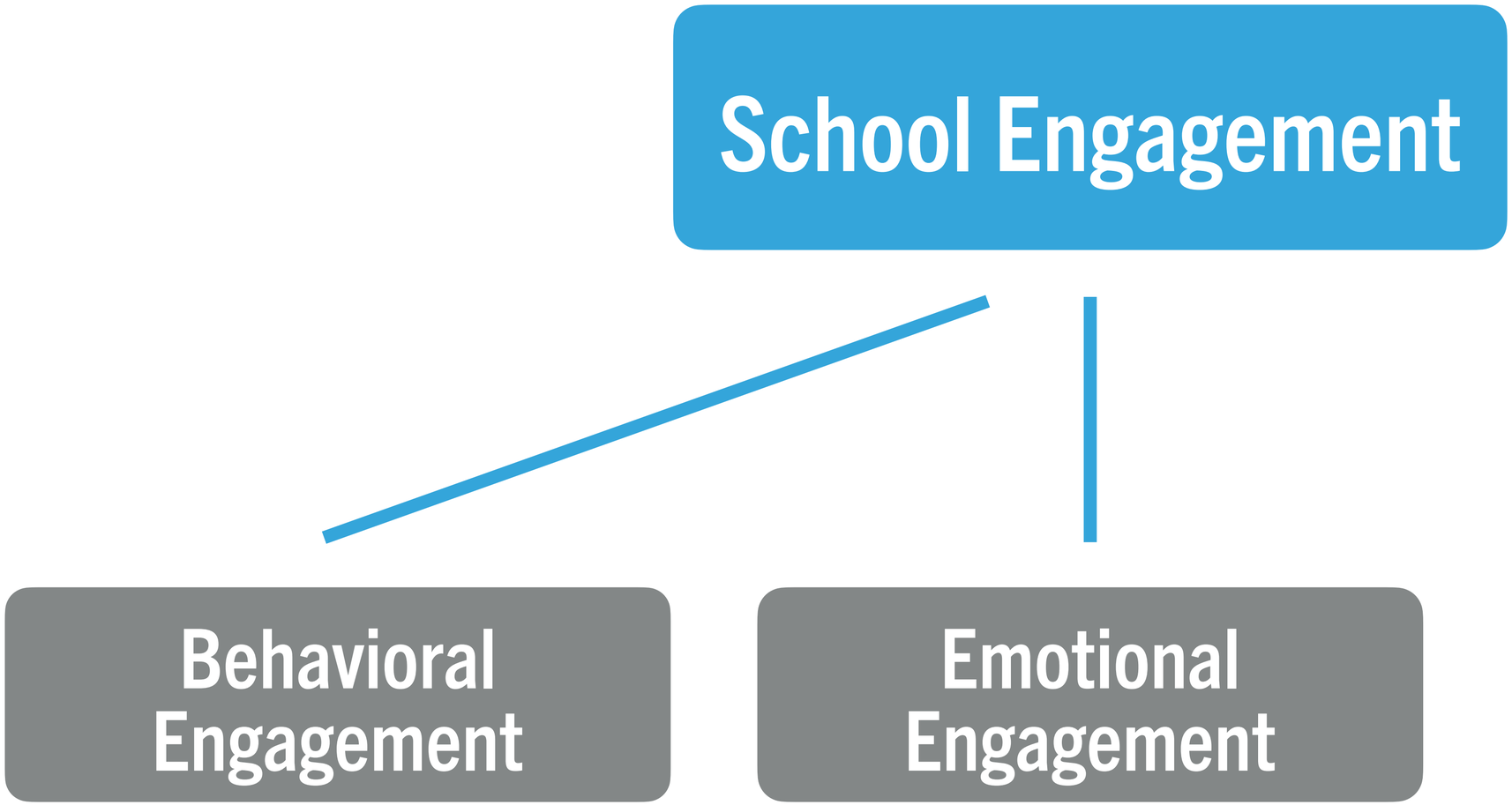
Connecting the Arts to Academics



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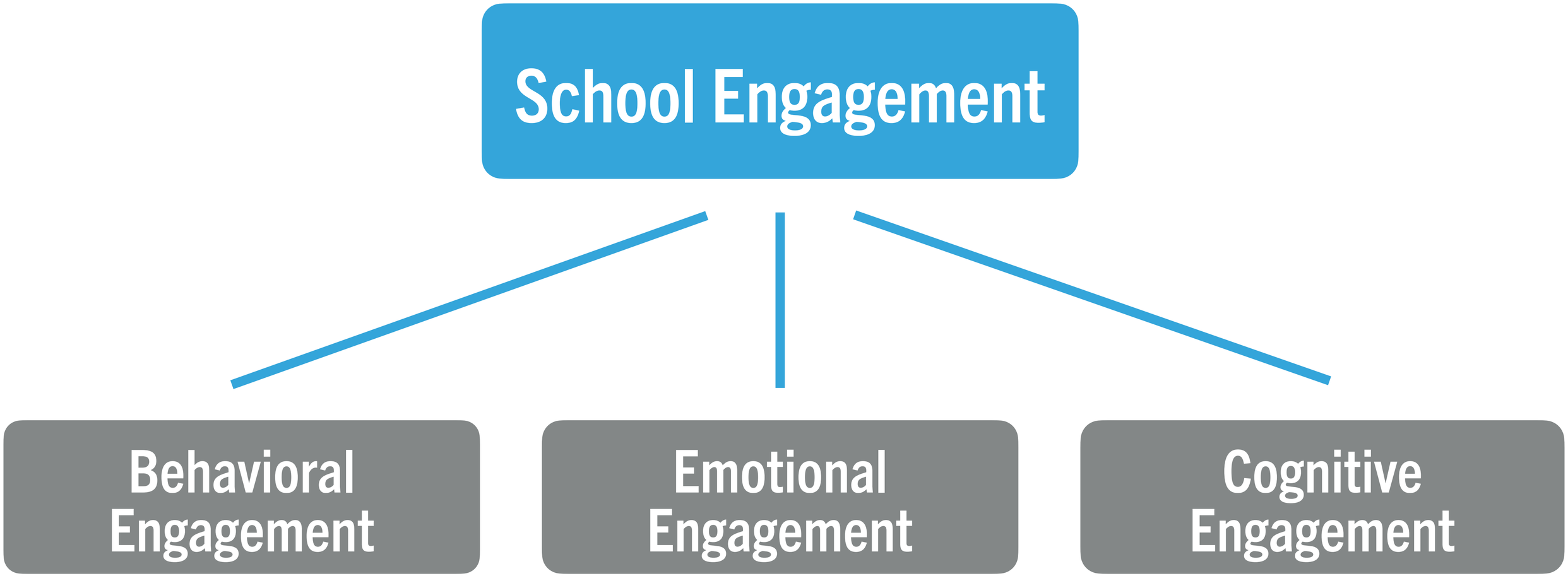

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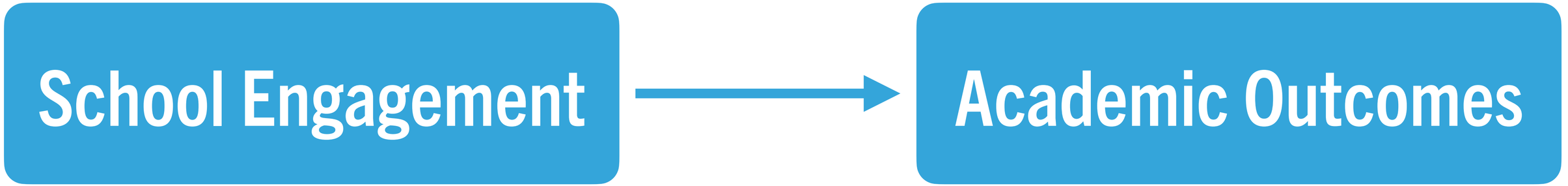

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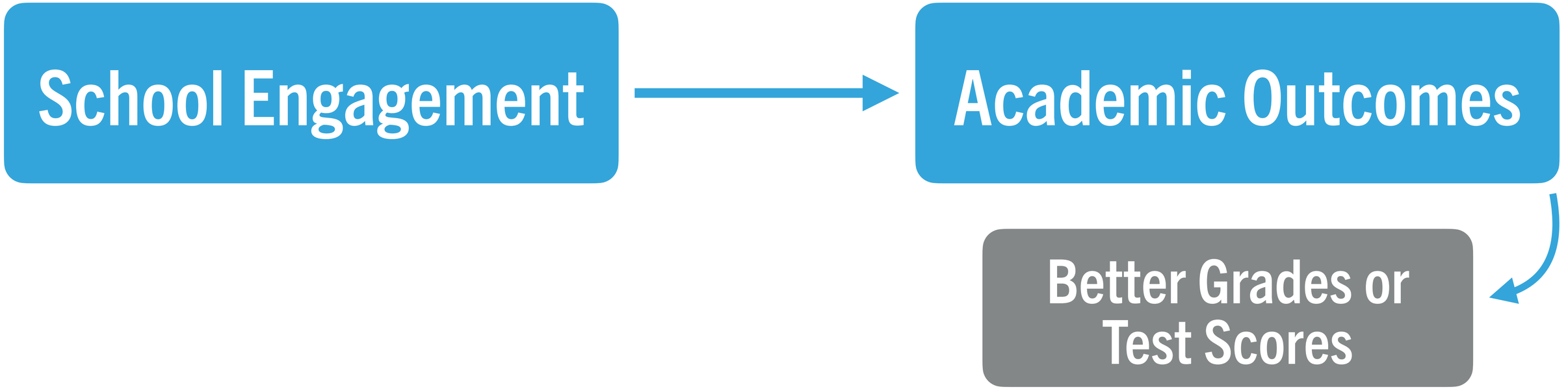

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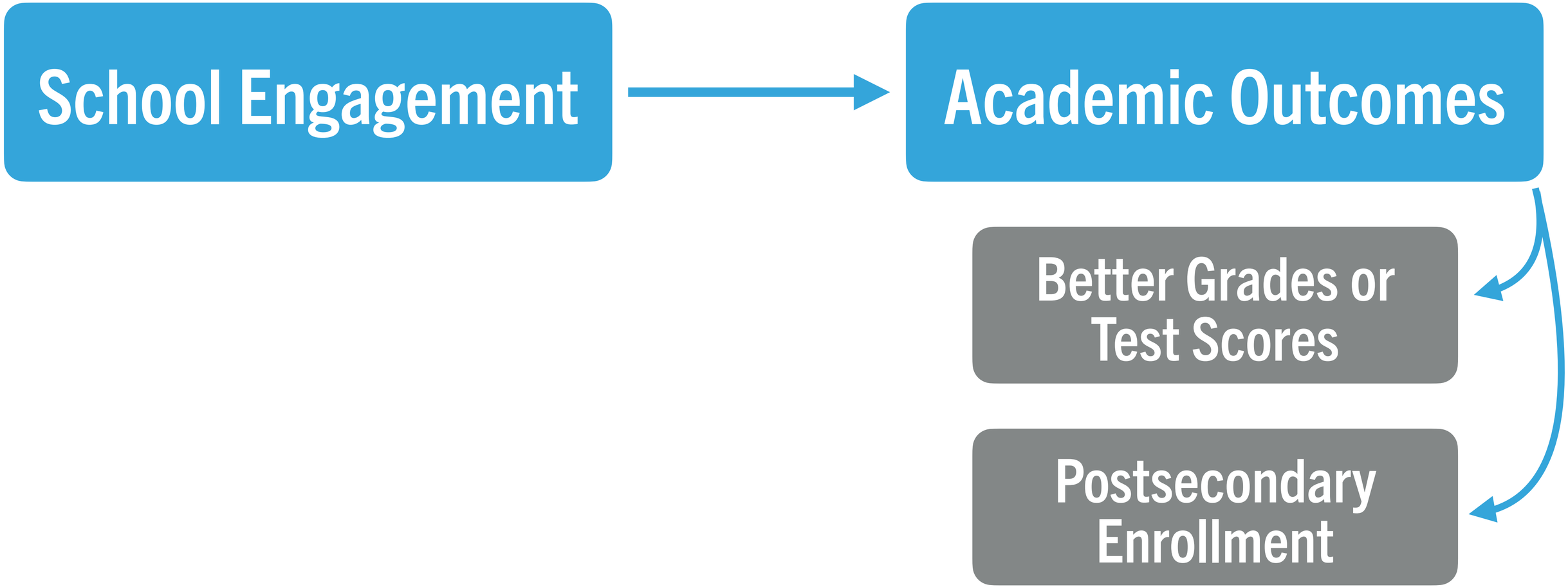

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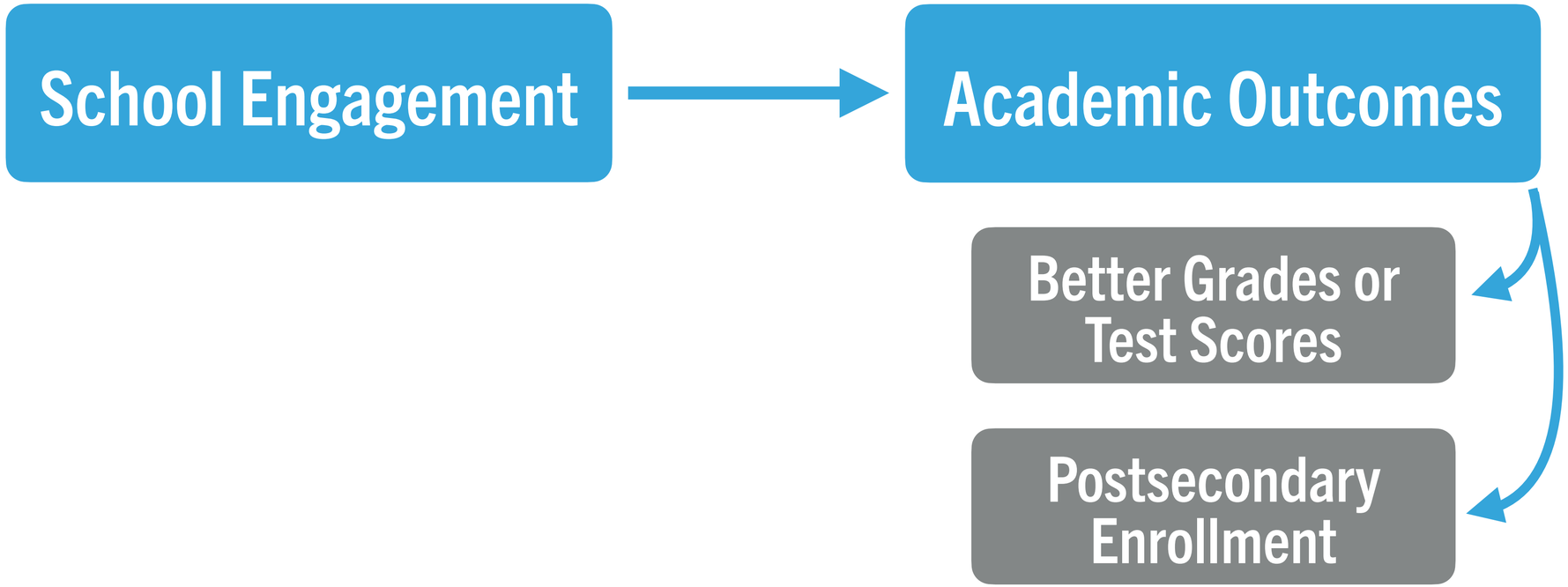

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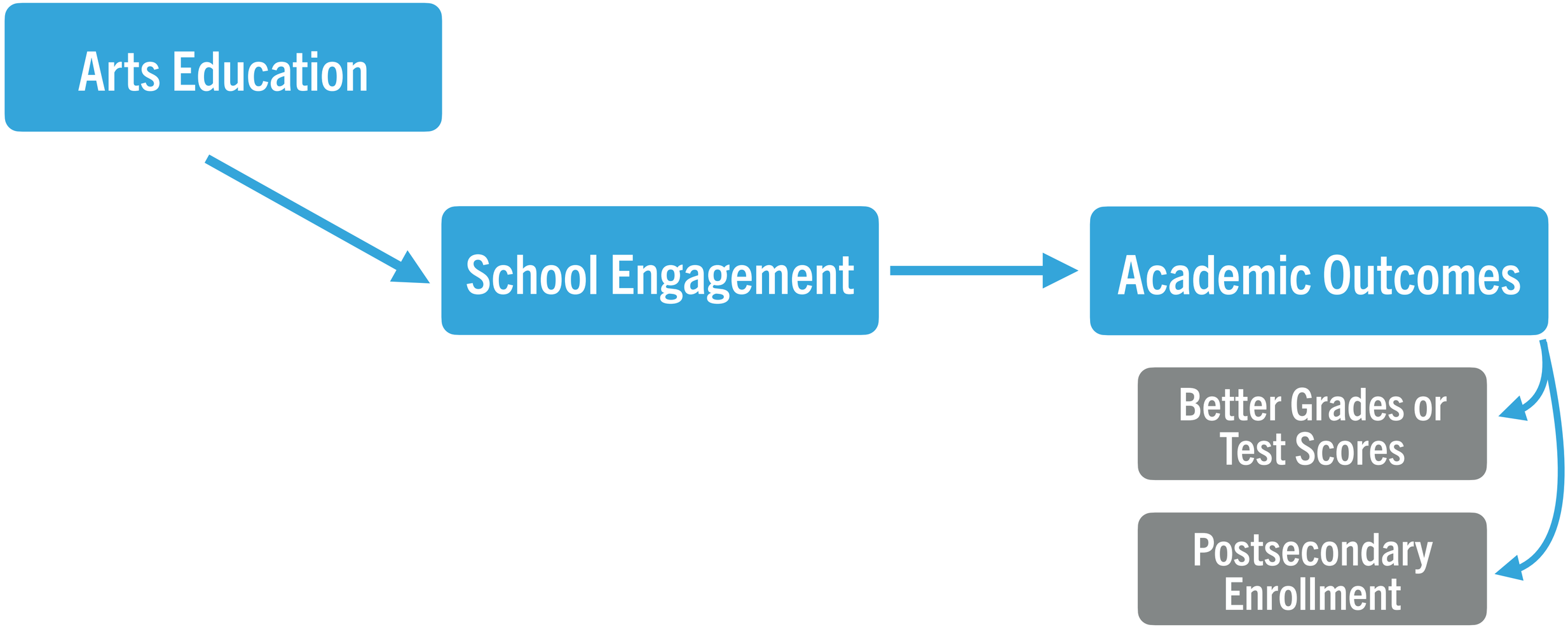

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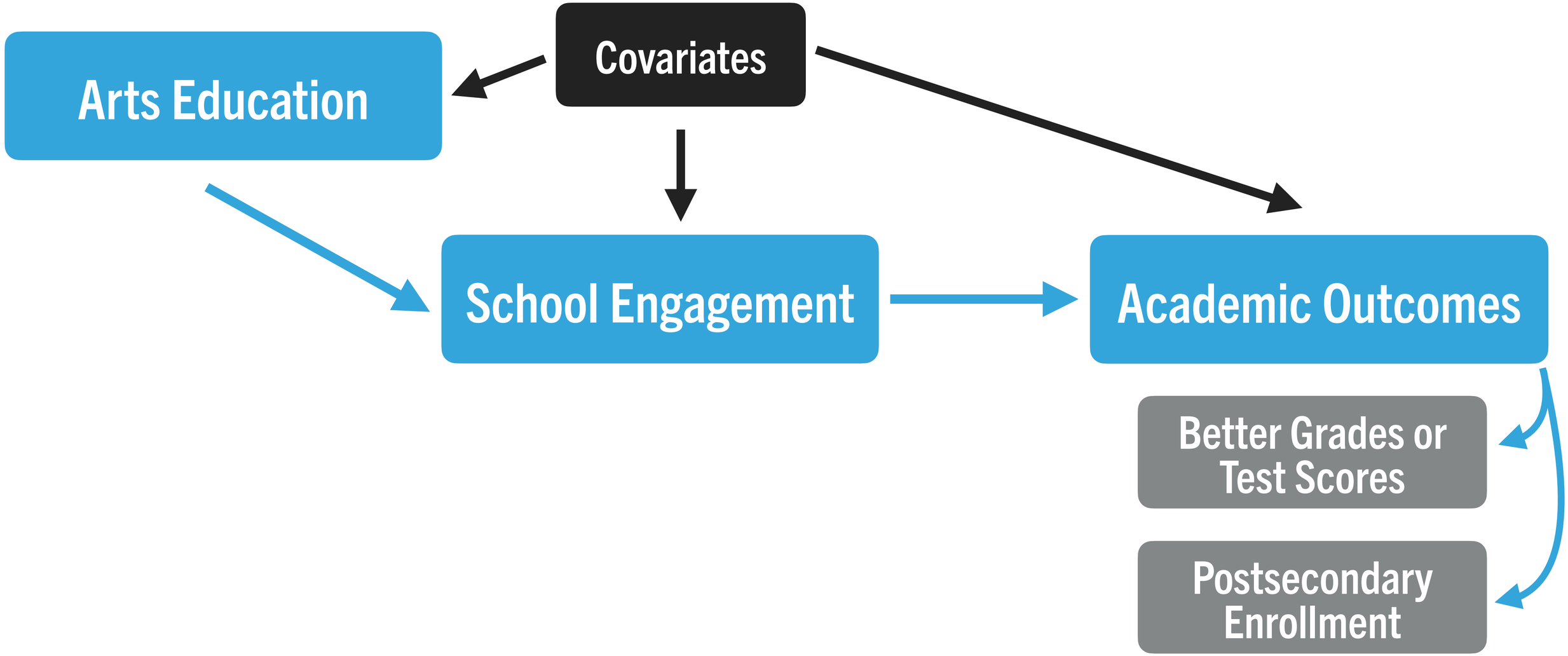

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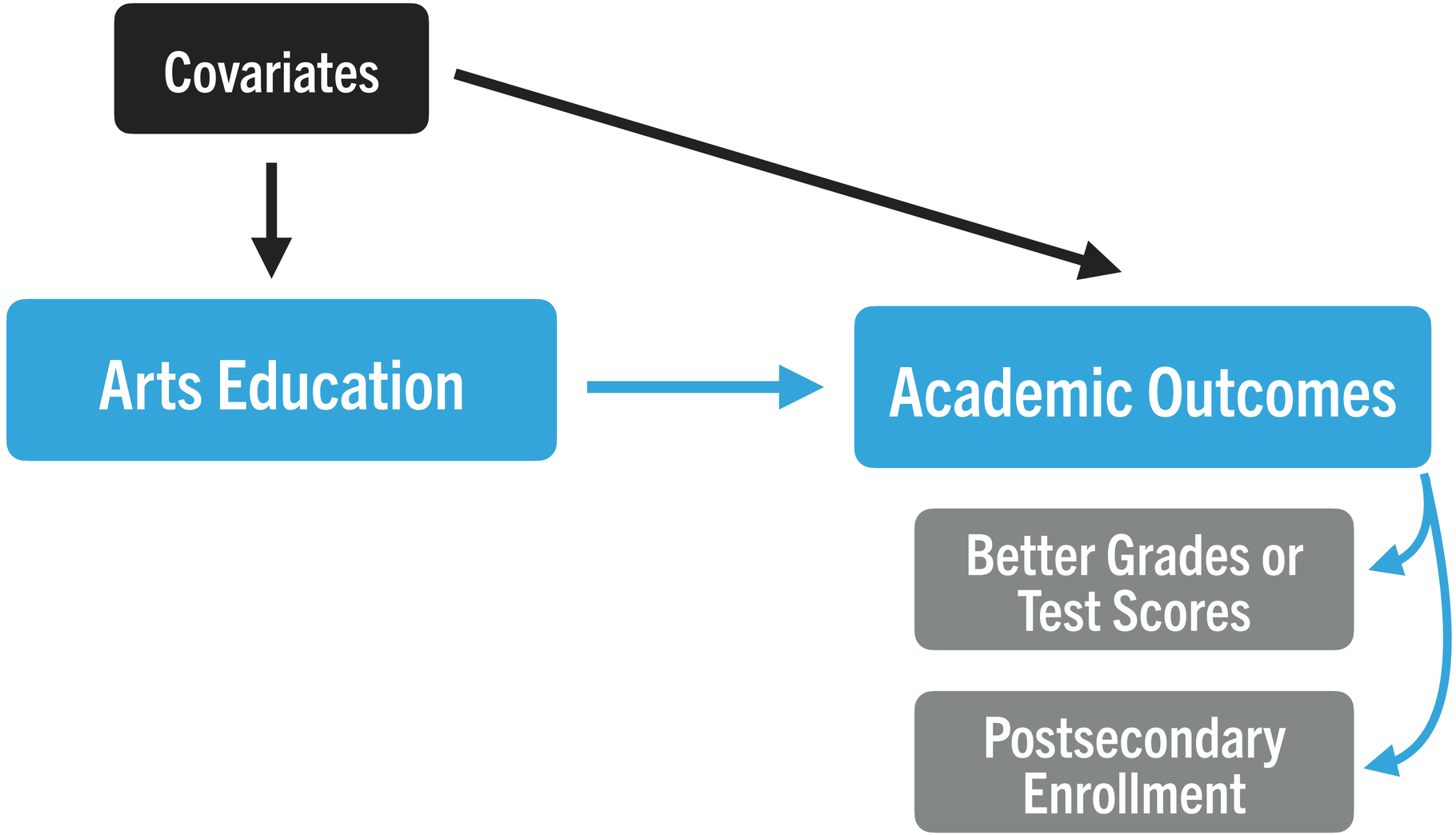

Connecting the Arts to Academics

Some Problems with the Evidence Base

Some Problems with the Evidence Base

Unclear Definition

Some Problems with the Evidence Base

Unclear Definition

Varying Curricula

Some Problems with the Evidence Base

- Unclear Definition
- No Arts Measures
- Varying Curricula

Some Problems with the Evidence Base

- Unclear Definition
- No Arts Measures
- Varying Curricula
- No Fidelity Measures

Some Problems with the Evidence Base

- Unclear Definition
- No Arts Measures
- No Common Teacher Preparation
- Varying Curricula
- No Fidelity Measures

Some Problems with the Evidence Base

- Unclear Definition
- No Arts Measures
- No Common Teacher Preparation
- Varying Curricula
- No Fidelity Measures
- Varying Teacher Quality

Connecting the Arts to Academics

If we could find a common arts curriculum administered across many schools with teachers specifically trained to deliver it, we could improve the evidence base.

Connecting the Arts to Academics

International Baccalaureate®
Baccalauréat International
Bachillerato Internacional

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International Baccalaureate®
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Common Definition

Connecting the Arts to Academics

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Bachillerato Internacional

Common Definition

Identical Curricula

Connecting the Arts to Academics

International Baccalaureate®
Baccalauréat International
Bachillerato Internacional

Common Definition

Common Teacher Preparation

Identical Curricula

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Baccalauréat International
Bachillerato Internacional

Common Definition

Arts Measures

Common Teacher Preparation

Identical Curricula

Connecting the Arts to Academics

International Baccalaureate®
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Bachillerato Internacional

- Common Definition
- Arts Measures
- Common Teacher Preparation
- Identical Curricula
- Fidelity Assurance

Connecting the Arts to Academics

International Baccalaureate®
Baccalauréat International
Bachillerato Internacional

Common Definition

Arts Measures

Common Teacher Preparation

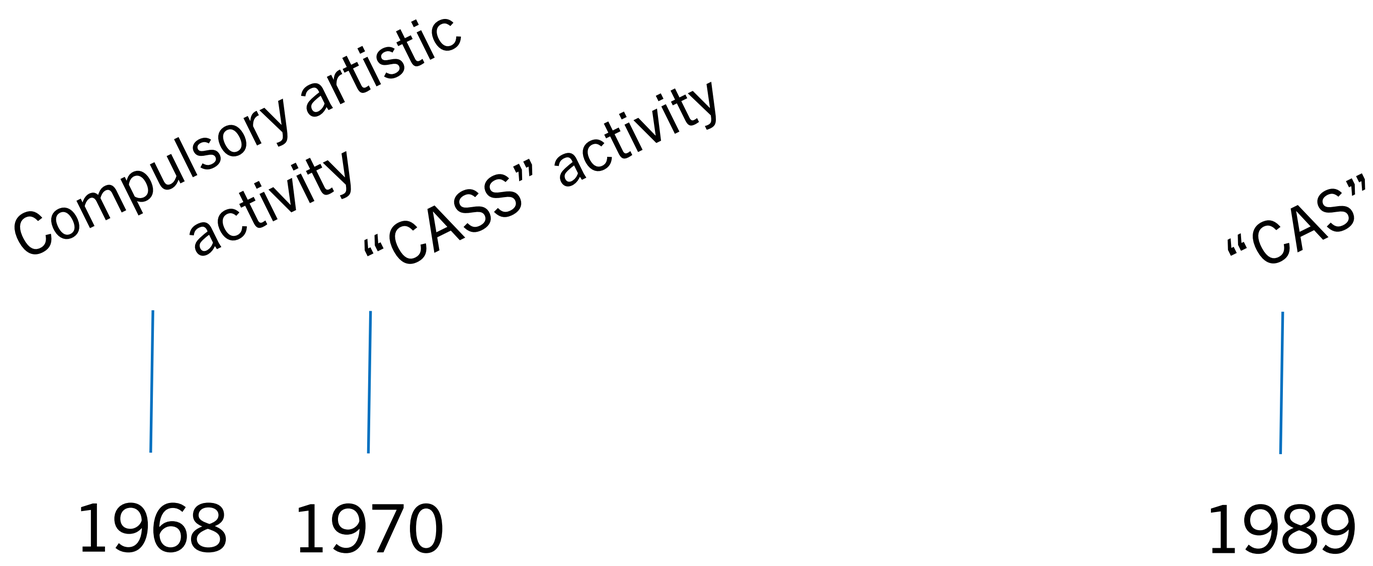
Identical Curricula

Fidelity Assurance

Varying Teacher Quality

Connecting the Arts to Academics

Some form of aesthetic engagement has always been part of the IB ethos.



(Hill, 2010; Peterson, 2003)

Connecting the Arts to Academics

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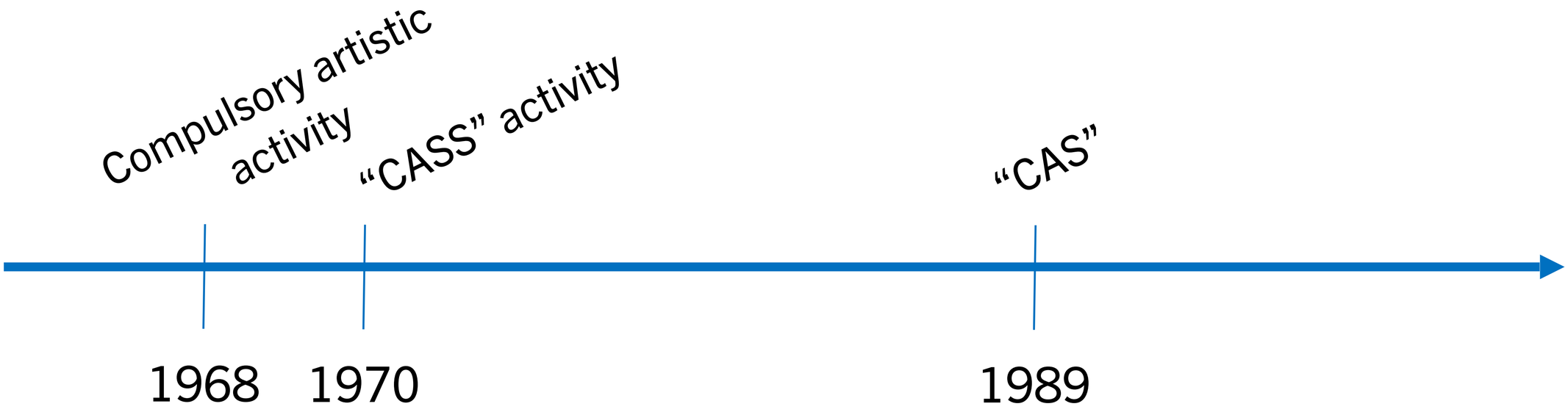


(Hill, 2010; Peterson, 2003)

Connecting the Arts to Academics

Inquirers

Open Minded

Knowledgeable

Caring

Thinkers

Risk-Takers

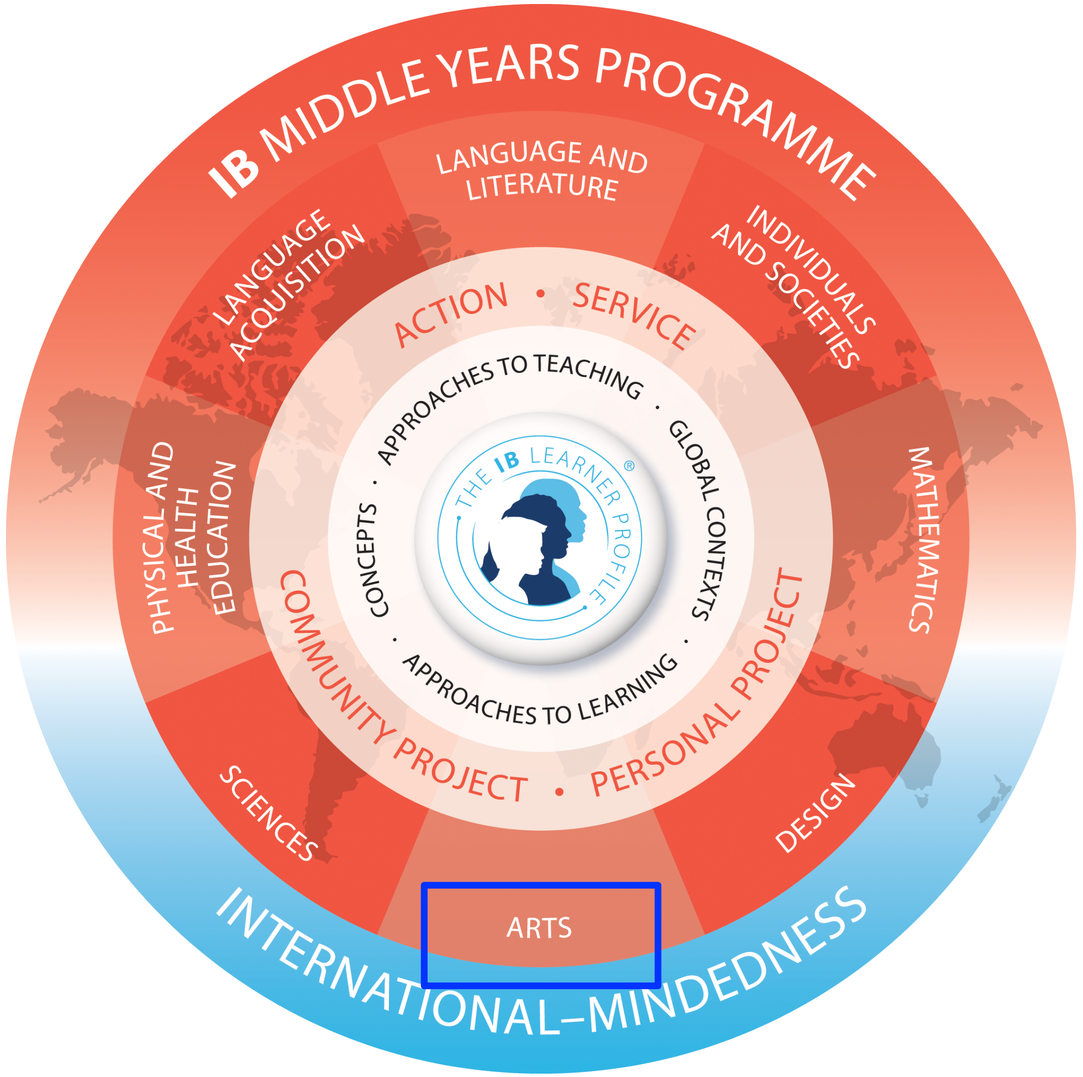
Communicators

Balanced

Reflective

Principled

Connecting the Arts to Academics



Connecting the Arts to Academics

Connecting the Arts to Academics

Connecting the Arts to Academics

23 Public High Schools in Maryland
Authorized to offer the IB Diploma Program
across 8 Local School Systems:

Connecting the Arts to Academics

23 Public High Schools in Maryland
Authorized to offer the IB Diploma Program
across 8 Local School Systems:

Anne Arundel County

Baltimore City

Baltimore County

Frederick County

Harford County

Montgomery County

Prince George's County

Washington County

Connecting the Arts to Academics

Other Issues with the Evidence Base

Other Issues with the Evidence Base

Focus on Music

Other Issues with the Evidence Base

- Focus on Music
- Small Sample Sizes

Other Issues with the Evidence Base

- Focus on Music
- Small Sample Sizes
- Selection Bias

Other Issues with the Evidence Base

- Focus on Music
- Settings With Low External Validity
- Small Sample Sizes
- Selection Bias

This study. . .

- Focus on Music
- Settings With Low External Validity
- Small Sample Sizes
- Selection Bias

Connecting the Arts to Academics

This study. . .

- All IB Arts Disciplines
- Settings With Low External Validity
- Small Sample Sizes
- Selection Bias

This study. . .

- All IB Arts Disciplines
- Settings With Low External Validity
- Decent Sample Size
- Selection Bias

This study. . .

- All IB Arts Disciplines
- Settings With Low External Validity
- Decent Sample Size
- Propensity Score Model

Connecting the Arts to Academics

This study. . .

- All IB Arts Disciplines
- Authentic School Data
- Decent Sample Size
- Propensity Score Model

Connecting the Arts to Academics

We can exploit the elective nature of the arts in the IB DP to compare outcomes of arts and non-arts students in a more rigorous way than some prior research.

Purpose of the Study

The purpose of this study is to explore the academic achievement of IBDP Arts students in Maryland to understand the relationship between arts study and academics in the IBDP.

Research Questions

Controlling for population differences, do DP arts students outperform DP non-arts students on exams in Math?

Research Questions

Does postsecondary enrollment vary among former IBDP arts and non-arts students?

Research Questions

Do IBDP Arts and Non-Arts Students pursue postsecondary STEM majors at similar or dissimilar rates?

Stratified Propensity Score Model

MLDS Data Employed

$N = 810$

Maryland Students enrolled in full IBDP during 10th and 11th Grade

2015 Graduation Cohort

MLDS Data Employed

$N = 810$

Maryland Students enrolled in full IBDP during 10th and 11th Grade

2015 Graduation Cohort

30% enrolled in an IB Arts course
***n* = 250**

MLDS Data Employed

$N = 810$

Maryland Students enrolled in full IBDP during 10th and 11th Grade

2015 Graduation Cohort

30% enrolled in an IB Arts course
***n* = 250**

70% did not enroll in an IB Arts course
***n* = 560**

MLDS Data Sources

MLDS Data Employed

MLDS Data Sources

K12 Course Enrollment

MLDS Data Employed

MLDS Data Sources

K12 Course Enrollment

K12 Assessment

MLDS Data Employed

MLDS Data Sources

- K12 Course Enrollment
- K12 Assessment
- Postsecondary Enrollment

Arts & Non-Arts Sample Characteristics Before and After Propensity Score Stratification

	Sample Proportions (Unmatched)		*Standardized Differences*	
Characteristic	IB Arts	IB Non-Arts	Unmatched	Matched
Female	0.66	0.61	0.119	0.015
White	0.35	0.39	-0.086	0.006
Black	0.37	0.24	0.292	0.000
Asian	0.13	0.22	-0.225	0.007
Hispanic or Latino	0.10	0.12	-0.048	-0.017
Other Race/Ethnicity or Multiracial	0.06	0.05	0.034	0.000
Free or Reduced Meals (FARMS)	0.28	0.22	0.137	0.004
Special Education Services	0.03	0.03	0.030	0.018
English Language Learner	0.03	0.03	-0.002	0.001
Prior Arts Experience	0.93	0.89	0.125	0.006
Prior HS GPA	3.45	3.55	-0.181	-0.007
School Size	1674.10	1747.41	-0.208	0.006
School FARMS Proportion	0.42	0.35	0.454	0.007
N	250	560		

Empirical Approach

Doubly-robust within-stratum estimation averaged across all strata

Math Outcome (OLS):

$$IBMath_{ij} = \alpha + \tau IBArts_{ij} + \beta_1 Female_{ij} + \beta_2 RaceEthnicity_{ij} + \beta_3 FARMS_{ij} + \beta_4 ELL_{ij} + \beta_5 SpecEd_{ij} + \beta_6 PriorArts_{ij} + \beta_7 PriorGPA_{ij} + \beta_8 SchoolSize_j + \beta_9 SchoolFARMSProp_j + \varepsilon_{ij}$$

Postsecondary Outcomes (Logistic Regression):

$$\ln[\frac{P(PostSecondary_{ij})}{1 - P(PostSecondary_{ij})}] = \alpha + \tau IBArts_{ij} + \beta_1 Female_{ij} + \beta_2 RaceEthnicity_{ij} + \beta_3 FARMS_{ij} + \beta_4 ELL_{ij} + \beta_5 SpecEd_{ij} + \beta_6 PriorArts_{ij} + \beta_7 PriorGPA_{ij} + \beta_8 SchoolSize_j + \beta_9 SchoolFARMSProp_j + \varepsilon_{ij}$$

Results: IB Math Score

IB Math Scores are Reported on a 1 to 7 Scale, $M = 4.80$, $SD \approx 1.0$

Doubly Robust Estimator, Average Treatment Effect

	b	*SE*	*p*
IB Arts	-0.36	0.092	.001

Results: Postsecondary Enrollment

Doubly Robust Estimator, Average Treatment Effect

	Odds Ratio	*SE*	*p*
IB Arts	0.77	0.15	.197

Results: Choice of a STEM Major in Postsecondary School

Doubly Robust Estimator, Average Treatment Effect

	Odds Ratio	*SE*	*p*
IB Arts	0.77	0.201	.323

Conclusion & Implications

Choice constraints on IB students may channel *less* academically apt IB students into the IB Arts classes, in contrast to other contexts previously studied.

Conclusion & Implications

Students who pursued an IB Arts course enrolled in postsecondary institutions and majored in STEM fields at rates indistinguishable from non-IB Arts students.

Conclusion & Implications

School counselors and others should be aware that foregoing arts coursework in favor of other academics may not result in better postsecondary transitions.

Limitations of the Study

- Single Cohort
- Strong ignorability assumption may not hold
- Self-selection into IB may limit external validity to other populations

MLDS Research Series Presentation
September 16, 2022

Kenneth Elpus | elpus@umd.edu
David Miller | dmille20@umd.edu

UNIVERSITY OF MARYLAND

Research Branch, MLDS Center