Music Education and Its Causal Impact on Student Engagement and Success

A Program Evaluation of Little Kids Rock

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ABSTRACT

Chronic absenteeism, defined as missing 10 percent of the academic year for any reason, is estimated to affect between 10 and 15 percent of all U.S. public school children (Balfanz & Byrnes 2012). Being chronically absent is associated with lower achievement and is a strong predictor of eventually dropping out of school (Rumberger 2011). Although there are many reasons children miss school on a regular basis, lack of engagement is likely a contributing factor and a potential in-road for arts education to make a difference. If exposure to quality programs in the arts can engage students in their entire education and give them a reason to come to school, strong arts education programming can potentially reduce chronic absenteeism. We have begun exploring this hypothesis by initiating a program evaluation of Little Kids Rock.

Little Kids Rock is a national non-profit program that provides free musical instruments, teacher training, curriculum materials, and instruction for students in program eligible public schools. Little Kids Rock partners with school districts in 29 U.S. cities, including the Dallas Independent School District. Only districts where at least 50 percent of the student body qualify for free or reduced price lunch are eligible to participate. Anecdotal evidence from teachers and administrators in the Dallas Independent School District suggests that Little Kids Rock students who participate in middle school become engaged in their education in ways that help them remain in school. Using publicly available school level data from Texas, we create well-matched treatment and control schools via propensity score matching, which completes Phase I of the project funded by the NEA. We have also begun the assembly of the analytic sample by using longitudinal, student-level administrative data housed at the University of Texas at Dallas Education Research Center. Once we extract the necessary data elements for students enrolled in treatment and control middle schools both before and after Little Kids Rock entered the Dallas

Independent School District, we will conduct a regression based difference-in-differences analysis of the impact of the program on individual attendance rates to complete Phase II of the project.

Estimated program effects will represent a lower bound on impact because we will estimate models over all students who attend a treatment middle school. While quasi-experimental methods are the most promising techniques available to researchers attempting to isolate causal effects when selection into treatment is not random, it may be difficult to recover a statistically significant effect using observational data. Creating a well-matched control group necessitated the exclusion of some middle schools from the matching process, resulting in reduced power. However, we will not know the full implications of our matching strategy conducted in Phase I until we complete the analytic sample necessary for the student-level analysis in Phase II.

EXECUTIVE SUMMARY

A common argument for supporting music in U.S. public schools is that music engages students in learning in ways that other core subjects cannot. High dropout rates are a persistent problem for many school districts, and evidence is mounting that chronic absenteeism strongly predicts eventually dropping out of school (Rumberger 2011). Chronic absenteeism, defined as missing 10 percent of the academic year for any reason, is estimated to affect between 10 and 15 percent of all students in the U.S. public school system (Balfanz & Byrnes 2012). There are many legitimate reasons children miss school on a regular basis. Some are ill or face family responsibilities that prevent them from attending. Others do not attend to avoid bullying or other unsafe conditions. But some do not attend because they or their families do not place a high

value on going to school (Balfanz & Byrnes 2012). Lack of engagement likely contributes to high rates of absenteeism and is a potential in-road for music education to make a difference. If exposure to quality programs in the arts can engage students in their entire education and give them a reason to attend school, strong music education programming can potentially reduce chronic absenteeism. Little Kids Rock is a music program hypothesized to improve this student outcome.

Little Kids Rock is a national non-profit program that provides free musical instruments, teacher training, curriculum materials, and instruction for students in program eligible public schools. Little Kids Rock partners with school districts in 29 U.S. cities, including the Dallas Independent School District. Only districts where at least 50 percent of the student body qualify for free or reduced price lunch are eligible to participate. Little Kids Rock seeks to interest underserved students in music by teaching them to play the popular music they love using contemporary instruments such as electric guitars and drums. Little Kids Rock also emphasizes sound first and then sight. This pedagogical approach helps novice students see results almost immediately, which can be encouraging for those used to failure. Anecdotal evidence from teachers and administrators in the Dallas Independent School District suggests that Little Kids Rock students who participate in middle school become engaged in their education in ways that help them remain in school.

We have completed Phase I of the project funded by the NEA by creating a well-matched control group for Little Kids Rock schools in the Dallas Independent School District. During Phase II of the project, we will examine how the opportunity to participate in Little Kids Rock while in middle school affects daily student attendance using quasi-experimental techniques. Our work is important to the field because the bulk of studies examining the impact of education in

the arts on student outcomes are primarily descriptive studies that do not attempt to isolate causal effects (e.g. Catterall 2009; Catterall, Dumais, & Hampden-Thompson 2012). We push the field forward by utilizing more rigorous statistical techniques in combination with rich school and student level data that allow us to control for many of the observable characteristics likely to influence both student attendance rates and the availability of Little Kids Rock in the district.

The Dallas Independent School District partnered with Little Kids Rock beginning in 2008 with the adoption of the program by two middle schools. By 2011, the end of our observation period, almost half of the middle schools in the district had supported a Little Kids Rock program for at least one year. Many of the early adopters in the district maintain the program today. Using publicly available school level data from Texas, we create well-matched treatment and control schools via propensity score matching in Phase I of the project. We match on average daily attendance, percentage of low-income students, and the 8th grade passing rates for the math Texas Assessment of Knowledge in Skills, a standardized state test used during our period of observation.

We have begun the assembly of the analytic sample by using longitudinal, student-level administrative data housed at the University of Texas at Dallas Education Research Center. Once we extract the necessary data elements for students enrolled in treatment and control middle schools both before and after program implementation, we will conduct a regression based difference-in-differences analysis to complete Phase II of the project. In general, a difference in differences estimate of a treatment effect is obtained by subtracting the difference in outcomes before and after program implementation for the control group from the difference in outcomes before and after program implementation for the treated group. The difference in outcomes for the control group forms the necessary counterfactual--in our case, an estimate of what individual

attendance rates would be for those students enrolled in a Little Kids Rock middle school if they had not been exposed to the program.

Estimated program effects will represent a lower bound on impact because treatment is at the school level, and we will estimate models over all students who attend a control middle school or a middle school that has adopted Little Kids Rock in the Dallas Independent School District. This is because the district does not maintain data on which students actually participate in Little Kids Rock. While quasi-experimental methods are the most promising techniques available to researchers attempting to isolate causal effects when selection into treatment is not random, it may be difficult to recover a statistically significant effect using observational data. Creating a well-matched control group in Phase I necessitated the exclusion of some middle schools from the matching process, resulting in reduced power. However, we will not know the full implications of our matching strategy until we complete the analytic sample necessary for the student-level difference in differences analysis in Phase II.

FULL RESEARCH REPORT

I. Research motivation

A common argument for supporting music education in U.S. public schools, as well as other artistic disciplines, is that music engages students in learning in ways that other core subjects cannot. Consistently high dropout rates are a vexing problem for many school districts, and evidence is mounting that chronic absenteeism is a strong predictor of eventually dropping out of school (Rumberger 2011). If music education can improve individual attendance rates and keep students at-risk of failing in school, then education policies that support music in public schools have the potential to improve economic development and the lifetime success of these

at-risk students.

One notable and growing music education program adopted by a number of large school districts across the United States is Little Kids Rock. The founder, staff, foundation supporters, and local teachers involved with this program believe it has done more than teach vulnerable students how to play an instrument, but has redirected young lives and forged connections between participating students and their school that fosters persistence.

Founded in 2002 by David Wish, a former elementary school music teacher, Little Kids Rock is a national non-profit program that provides free musical instruments, teacher training, curriculum materials, and instruction for interested students in program eligible districts (www.littlekidsrock.org). Little Kids Rock partners with school districts in 29 U.S. cities, including the Dallas Independent School District and has provided over 50,000 musical instruments to K-12 public school students with struggling or nonexistent music programs. Only districts where at least 50 percent of the student body qualify for free or reduced price lunch are eligible to participate in the Little Kids Rock program.

Little Kids Rock does not simply donate instruments to high need schools. It provides training in an immersion style of pedagogy so instructors will be equipped to teach students modern band. Little Kids Rock provides an initial professional development workshop for interested teachers as well as additional online resources teachers can access after they complete the workshop. According to Ryan Zellner, National Program Director at Little Kids Rock, their preferred method of teaching modern band models language practice and emphasizes sound first and then sight. Teachers are instructed in how to teach their students to perform, improvise and even compose music. Modern band emphasizes both the instruments, such as electric guitar, drums, and keyboard, and the musical styles that most

students listen to on a daily basis. Little Kids Rock teachers teach students how to play modern band instruments in the musical genres kids can relate to such as rock, hip hop, funk, and country in order to make music education more accessible and relevant to these students' lives. In addition to this culturally responsive approach, Little Kids Rock emphasizes experiential learning over traditional music pedagogy. Students enjoy immediate results because they learn to play an instrument before they can read a musical score.

How might a music education program improve student outcomes? One theory is that engaging in artistic activities produces cognitive changes that transfer to the learning of non-arts subjects (Catterall 2009; Catterall 2005). The arts community and its advocates have embraced this theory, but to date the empirical evidence of such transfer is thin. While it is common for a pianist, for example, to have relatively better typing skills (an example of a near transfer of skills), far transfer is more difficult to document and study (Hyde, et al 2009). Neuroscientists are beginning to examine how training in the arts might alter general cognitive abilities, but brain research in this area is in its infancy (Gazzaniga 2008).

We illustrate how we expect the Little Kids Rock intervention to impact education outcomes in the theory of change model depicted in Figure 1. Little Kids Rock teachers and administrators believe that their program fosters student engagement because 1) teachers use methods that move students to performance faster than traditional instrumental pedagogy, and 2) students learn to play popular music relevant to their age group. These components of the intervention are thought to foster strong student-school connections and improve overall interest in schooling. Although we expect increases in engagement to affect longer-term outcomes such as greater levels of student achievement and grade promotion, we choose to focus on engagement as measured by individual student attendance rates.

Evidence indicates that chronic absenteeism, defined as missing 10 percent of the academic year for any reason (Balfanz & Byrnes 2012) is a strong predictor of eventually dropping out of school (Rumberger 2011), and Balfanz and Byrnes (2012) estimate that between 10 and 15 percent of U.S. public school children are chronically absent. There are many legitimate reasons children miss school on a regular basis. Some are ill or face family responsibilities that prevent them from attending. Others do not attend to avoid bullying or other unsafe conditions. But some do not attend because they or their families do not place a high value on going to school (Balfanz & Byrnes 2012). Lack of engagement likely contributes to high rates of absenteeism and is a potential in-road for music education to make a difference. Anecdotal evidence suggests that participation in Little Kids Rock engages students and promotes a sense of enthusiasm in their overall education, including core academic subjects. We hypothesize that strong engagement translates into improved individual attendance rates. We have completed Phase I of the project funded by the NEA by creating a well-matched control group for Little Kids Rock schools in the Dallas Independent School District. During Phase II of the project, we will examine how the opportunity to participate in Little Kids Rock while in middle school affects daily student attendance using quasi-experimental techniques.

II. Literature review

Our work is important to the field because the bulk of studies examining the impact of education in the arts on student outcomes are primarily descriptive studies that do not attempt to isolate causal effects. These correlational studies do consistently document a positive relationship between arts participation and a variety of outcomes. For example, by examining nationally

representative, longitudinal databases, Catterall (2009) and Catterall, Dumais, and Hampden-Thompson (2012) find that arts participation, broadly defined as participation in visual art, music, theatre, or dance activities, is associated with positive education outcomes. But while both studies benefit from the longitudinal structure of these large databases, the authors control only for an index of arts involvement and some measure of socio-economic status. Their analysis is parsimonious, and they do not consider how including other student or school characteristics might weaken the apparent sharp contrasts between arts and non-arts students. The unobserved characteristics that influence a school to offer a strong arts curriculum or a student to select an arts course over another may be the very characteristics that drive student success.

Thomas, Singh, and Klopfenstein (2015) address some of these selection issues in their paper examining the link between in-school arts participation and high school dropout behavior. Using longitudinal administrative data from Texas, they track first-time 9th graders until they drop out of high school or graduate using survival analysis and are able to control for school level selection. They find that accumulating credits in the arts is consistently associated with reduced dropout even after controlling for school and student characteristics expected to influence both dropout behavior and the decision to enroll in a visual arts, music, theatre, or dance course. This is particularly important given recent research showing that some positive education outcomes are driven completely by observable characteristics and not the program itself. Elpus (2013), for example, finds that the gap in SAT and math standardized test scores for music and non-music students disappears once he controls for demographic and prior achievement variables contained in the Educational Longitudinal Study of 2002. That is not the case with Thomas, Singh, and Klopfenstein (2015) who still observe differences in the risk of dropping out for arts and non-arts students even after controlling for a host of relevant student

and school characteristics. Still, they fall short of making any causal claims because they cannot control for student-level selection into the arts.

In general, the studies that exist to date are plagued by the same problems facing other researchers seeking to conduct program evaluations in education and the social sciences--the selection bias that arises when individuals or groups are not randomly assigned to the condition the researcher wants to evaluate (Murnane & Willett 2010). In the absence of random assignment it is impossible to determine whether the positive relationship between educational outcomes and arts participation is the result of program effects or if it is a function of the schools that offer quality arts programs or the students who choose to study the arts. We, like other researchers in the field, must look for other statistical techniques we can use to form the necessary counterfactual. Although one must be careful to assert causality when not using data from an experimental design with random assignment, rich school and student-level data combined with rigorous quasi-experimental techniques offer the best opportunity to estimate empirical models that address the potential endogeneity of music participation on education outcomes.

III. Description of data

The Dallas Independent School District is an income-eligible district that partnered with Little Kids Rock beginning in 2008 with the adoption of the program by two middle schools.[1] Dallas is the second largest school district in the state of Texas behind Houston. It is classified as a major urban school district by the Texas Education Agency and serves approximately 160,000 students.[2] By 2011, 17 Dallas middle schools, almost half of the middle schools in the district, had supported a Little Kids Rock program for at least one year. Many of the early

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[1] The year references the spring term of the academic calendar.
[2] See http://tea.texas.gov/acctres/analyze/1011/district1011.html accessed June 25, 2015.

adopters in the district maintain the program today.

The data we utilize in Phase I of the project are publicly available school-level data maintained by the Texas Education Agency's Academic Excellence Indicator System. Completion of Phase II will require the use of proprietary student-level data housed at the University of Texas at Dallas Education Research Center (UTD-ERC). The public-use files provide data at the school-level such as the percentage of students eligible for free or reduced price lunch and the racial and ethnic composition of the student body. The UTD-ERC data, provided by the Texas Education Agency, The Texas Higher Education Coordinating Board, and the State Board for Educator Certification, track all students in grades pre K-16 attending public schools in the state of Texas over time. The data are restricted-use files and provide student-level information such as demographics, attendance rates, and standardized test scores going back to the early 1990s. The longitudinal nature of the data enables us to observe outcomes for middle school students in the Dallas Independent School District and control for the pretreatment characteristics of students that attended a Texas elementary school.

IV. Methodology

To evaluate the impact of the Little Kids Rock program on individual attendance rates in Phase II, we plan to employ a difference in differences strategy.[3] In general, a difference in differences estimate of a treatment effect is obtained by subtracting the difference in outcomes (Y) before

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[3] While Little Kids Rock does impose a low-income eligibility criterion that 50 percent of the students must qualify for free or reduced price lunches, it is not possible for us to employ a regression discontinuity design. Almost all of the middle schools in the Dallas Independent School District have large populations of low-income students, and there are no middle schools with free or reduced price lunch rates marginally above and below the cutoff for comparison.

and after program implementation for the control group from the difference in outcomes before

and after program implementation for the treated group:

$$(Y_{post}^T - Y_{pre}^T) - (Y_{post}^C - Y_{pre}^C)$$

The difference in differences model assumes that the decision to participate is driven in part by

unobservable characteristics, but that these characteristics are time-invariant. With well-matched

treatment and control groups, the effect of these time-constant unobservables can be differenced

out. In other words, we can account for any unobserved trend that affects the treatment and

control groups in the same way. This is one of the key identifying assumptions of the model.

Figure 2 illustrates the difference in differences model conceptually. We could estimate

the impact of the Little Kids Rock program on outcome Y simply by examining the difference in

average attendance rates for those students attending a Little Kids Rock middle school from

those students who attend a middle school without the program. However, because students are

not randomly assigned to public schools and Little Kids Rock does not randomly choose schools

for program implementation, this would be a naïve estimate of the treatment effect. In Figure 2

this naïve estimate is represented by the distance between *Y_1 Treated* and *Y_1 Control*. The

difference in differences model forms the counterfactual by differencing the outcomes before and

after program implementation for a control group and assuming that this trajectory would be the

same trajectory students in Little Kids Rock middle schools would experience if they had not

been treated. In Figure 2, this reduces the estimated treatment effect to the distance illustrated by

DID. This also highlights why the creation of a well-matched control group in Phase I is an

important component of our overall research design and why propensity score matching is often

paired with difference in differences analysis.

Consequently, before we can estimate any student-level outcomes in Phase II of the project, we create the appropriate control group in Phase I. We observe treatment at the school-level, and Little Kids Rock administrators do not randomly designate a school as a treatment school once they partner with an income-eligible school district interested in the program. Furthermore, qualified teachers must be interested in learning Little Kids Rock pedagogy to teach modern band to their students. In order to reduce this form of selection bias, we use propensity score matching to create a comparison group of middle schools that is observationally similar to our group of treatment middle schools but does not provide the Little Kids Rock program. Matching in general has been shown to reduce the selection bias that plagues evaluation studies using observational data, and propensity score matching eliminates the *curse of dimensionality* described by Rosenbaum and Rubin (1983) from attempting to match on a large number of covariates. By estimating the probability that a Dallas middle school has a Little Kids Rock program as a function of pretreatment measures of the outcome and demographic characteristics highly correlated with that outcome, we match Little Kids Rock middle schools with non-Little Kids Rock middle schools with the most similar propensity scores.

V. Summary of current results

We examine middle schools that adopted the Little Kids Rock program at any time between 2008 and 2011. Based on program eligibility requirements established by Little Kids Rock, we exclude schools where less than 50 percent of students qualify for free or reduced-price lunch. We also exclude treatment schools with less than 2 years of post-treatment data, treatment schools with less than 2 years of pre-treatment data, and treatment schools with Little Kids Rock programs that lasted less than three years. We also make sure that potential control schools have

never adopted the Little Kids Rock program, even outside of our observed time-period. Despite the fact that schools adopted the Little Kids Rock program at different times, given our small sample size, we match all treatment middle schools meeting our inclusion criteria to control middle schools using pretreatment data from 2007.

We estimate the following logit model specified in equation 1:

$$\Pr(LKR_s = 1) = \frac{e^{\beta_0 + \beta_1 school_s}}{1 + e^{\beta_0 + \beta_1 school_s}} \tag{1}$$

where $LKR_s = 1$ if the middle school adopted the Little Kids Rock program and 0 otherwise, and s*chool_s* is a vector of characteristics for school s.[4] We match on average daily attendance, percentage of low-income students, and the 8th grade passing rates for the math Texas Assessment of Knowledge in Skills (TAKS).

Table 1 provides the descriptive statistics for treatment and control middle schools as well as the pooled sample on the common support. While program eligibility requires that the district low-income population be at least 50 percent, the average percentage of students receiving free or reduced price lunches at both treatment and control middle schools in our sample is quite high, about 84 percent. Average daily attendance varies little across schools, masking the significant variation that occurs in student-level attendance rates. Average 8th grade pass rates in Dallas on the math portion of the TAKS are significantly lower than the average for Texas as a whole, which is reported to be 73 percent in 2007.[5] The Dallas Independent School District serves large proportions of minority and low-income students, and pass rates for these subgroups tend to be lower than those in the aggregate. Table 2 shows that the difference in means between treatment and control middle schools is less than 0.25

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[4] We utilize the psmatch2 Stata routine developed by Leuven and Sianesi (2003).
[5] See the 2006-07 State Performance Report at http://ritter.tea.state.tx.us/perfreport/aeis/2007/state.html (Texas Education Agency).

adjusted standard deviations, a standard metric for establishing baseline equivalence between treatment and control groups according to What Works Clearinghouse standards (U.S. Department of Education 2011).

We began the student-level analysis by examining our outcome variable, attendance records, for 8th grade students enrolled at a Little Kids Rock middle school or control school during the period after program implementation. Because Dallas middle schools adopted the Little Kids Rock program at different times, our current analytic sample contains repeated cross-sections of 8th grade students from 2008-11.[6] Table 3 shows how the program grew over the observation period. Little Kids Rock began in two middle schools in Dallas in 2008, one of which is a magnet school eliminated from observation because its characteristics are too unique to match to any available middle schools in the control group. The 8th grade students potentially exposed to the Little Kids Rock program grew ten-fold over the observation period.

Table 4 provides a summary of select student and school characteristics for the 8th graders in our current observation window. A majority of the students in our sample are economically disadvantaged, meaning they qualify for free or reduced price meals through the federal government's National School Lunch Program. These urban schools serve predominately minority students--only 4 percent of the students in our sample are white. Over half of the students are deemed by the state of Texas to be at-risk of dropping out of school. The primary reason for receiving an at-risk designation is failing one or more classes, but students are determined to be at-risk for other reasons such as disciplinary problems, pregnancy, or homelessness (Texas Education Agency 2010). Many of the students in the Dallas Independent School District are

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[6] We cannot conduct the difference in differences analysis until we add students at treated and non-treated middle schools prior to program implementation to the analytic sample. That process is ongoing.

recent immigrants, and English is not the first language spoken at home. Consequently, over 20

percent of the students in our sample are identified as limited English proficient. On average these

students attend large Dallas middle schools serving predominately low-income, minority students.

On average, the individual attendance rate for Dallas 8th graders in our treatment and

control middle schools is high--95 percent. However, a sizeable group of students have poor

attendance rates and meet the definition of chronic absenteeism (Balfanz & Byrnes 2012). Texas

law requires that school districts provide between 175-180 days of instruction depending upon the

number of days teachers are offered professional development opportunities (Texas

Administrative Code 1995). Our outcome variable is reported in percentage terms to account for

the slight variation in number of instructional days. To receive class credit, students must attend at

least 90 percent of the days the course is offered, and students whose attendance rates fall below

that threshold are considered chronically absent. Table 5 provides the distribution of our outcome

variable for the 1,468 students in our sample who meet that definition. Based on a 180-day school

year, those at the median and below of the percent attendance distribution are missing an

additional 10 or more days than Texas law allows to receive class credit. Those at the very

bottom of the distribution are missing more days in the school year than they are attending. For

DISD in our period of observation, 11.2 percent of the 8th graders in our sample meet the

definition of chronically absent, which is comparable to the nationwide estimates that Balfanz and

Byrnes (2012) report.

We will operationalize the model in Phase II by employing a regression based difference

in differences approach estimated by ordinary least squares. Consider the equation (2) for student

i in school *s* at time *t*:

$$Y_{ist} = \beta_0 year_t + \beta_1 LKR_{st} + \beta_2 LKR_{st} year_t + \beta_3 school_{st} + \beta_4 student_{it} + \varepsilon_{ist}, \tag{2}$$

where *LKR*, the presence of the Little Kids Rock program, is the dichotomous treatment variable. β_2, the interaction between treatment and time, is the estimate of the impact of the Little Kids Rock program on the percentage of days attended at the end of 8th grade, Y_{ist}.

Because students are not randomly assigned to their music classes, treatment is most certainly endogenous. Theoretically, the ability to participate in Little Kids Rock by attending a middle school that offers the program can serve as an instrument for actual participation and form the basis of an empirical strategy that can identify a causal effect. Because the availability of the Little Kids Rock program is related to actual participation, this instrument is theoretically correlated with our endogenous variable of interest. In an instrumental variables (IV) framework, this would be analogous to estimating an intent to treat effect where random treatment assignment serves as an instrument for endogenous selection into actual treatment. This means that any estimated treatment effect would represent a lower-bound on the true program effect because the outcomes of students who actually take-up the program would be averaged with the outcomes of students who did not.

It is important to note one critical limitation of the UTD-ERC data and how it affects our overall identification strategy in Phase II. While theoretically sound, data limitations preclude us from producing IV estimates of the treatment effect. No information on which students participate in Little Kids Rock are available. Interested teachers in the district receive professional development training from Little Kids Rock staff and teach a subset of middle school students through a course labeled Instrumental Ensemble. Not all Instrumental Ensemble courses are Little Kids Rock classes. Furthermore, the Texas Education Agency does not provide

any course completion data for K-8 students to the UTD-ERC. As a result, we cannot produce first-stage estimates that show the correlation between Little Kids Rock availability and our endogenous treatment precisely because we do not know which students enrolled in a Little Kids Rock instrumental ensemble class. So while there is a theoretical relationship between this potential instrument and our endogenous variable of interest, we cannot estimate a first-stage regression, test the strength of the instrument, or use predicted participation in Little Kids Rock in a second-stage regression of the outcome.

Consequently, our identification strategy involves the following: 1) we mitigate school-level selection by matching treatment middle schools with observationally similar middle schools without the Little Kids Rock program in Phase I; 2) we will estimate student-level models controlling for a rich set of school and student characteristics likely to influence both individual attendance rates and participation in Little Kids Rock in Phase II; and 3) we will employ a difference in differences methodology that controls for time-invariant unobserved heterogeneity in Phase II.

After we acquire additional data on Dallas middle school students in treatment and control schools *prior* to program implementation, we can conduct the difference in differences analysis described in Equation 2 for Phase II of the project. For now, Table 6 provides estimates from an ordinary least squares regression of percentage of days attended on Little Kids Rock availability after controlling for the school and student characteristics described in Table 4. Because we do not yet have data on cross-sections of students prior to program implementation, these results do not control for time-invariant unobservables expected to influence treatment and control students identically.

At this point, it would certainly be premature for us to conclude that the availability of

Little Kids Rock has no discernible impact on individual student attendance or could even reduce

attendance rates. Other regression results not provided here show the expected positive sign

when the current (albeit incomplete) analytic sample is confined to those students with the

highest rates of absenteeism.[7] There is very little variation in our outcome variable to exploit in

the full sample, and it may be easier to pick up an effect if we restrict our sample to the

chronically absent. But even with a restricted sample, we will not be able to produce credible

estimates of program impact until we can include students from treatment and control schools in

the period before Little Kids Rock entered the Dallas Independent School District and complete

Phase II of the project.

The preliminary results from Phase II reported in Table 6 potentially point to the

difficulties researchers face when attempting to recover statistically significant program effects

using observational data. In our case, this difficulty is likely due to low power and the data

limitations that prevent us from observing student-level take-up into the program. This does not

mean that Little Kids Rock does not improve student engagement. It simply means that even

after assimilating data for students prior to program implementation, we may not be able to

detect a program effect using administrative data and our current research design.

VI. Conclusions and policy recommendations

Because Phase II is not complete, we cannot make a specific recommendation at this time

regarding the efficacy of Little Kids Rock in the Dallas Independent School District or the likely

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[7] That sign remains statistically insignificant.

impact of the program if it was implemented in U.S. public schools on a larger scale. We have received further access to the UTD-ERC data to continue exploring these questions.

Our quasi-experimental design is a second-best path to determine the causal impact of Little Kids Rock on student engagement. A randomized design would be a superior evaluation plan. Unfortunately, randomized control trials in the social sciences can be very expensive to conduct. The Coalition for Evidence-Based Policy (2012) profiles five low-cost randomized control trials and the least expensive evaluation costs $50,000. The average low-cost evaluation for the randomized trials they review is $125,000. While low-cost randomized evaluations are possible, we do recommend that relevant stakeholders make more funds available to support well designed randomized control trials and other rigorous evaluation studies of arts education programming.

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Figure 1: Theory of Change

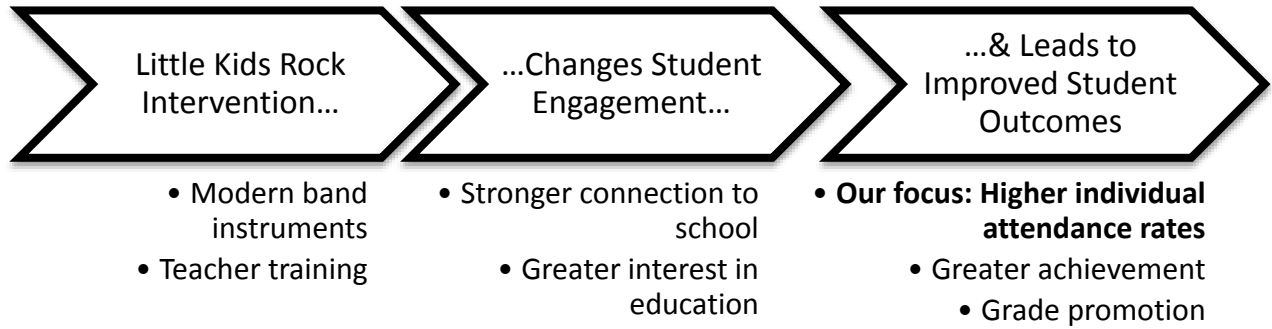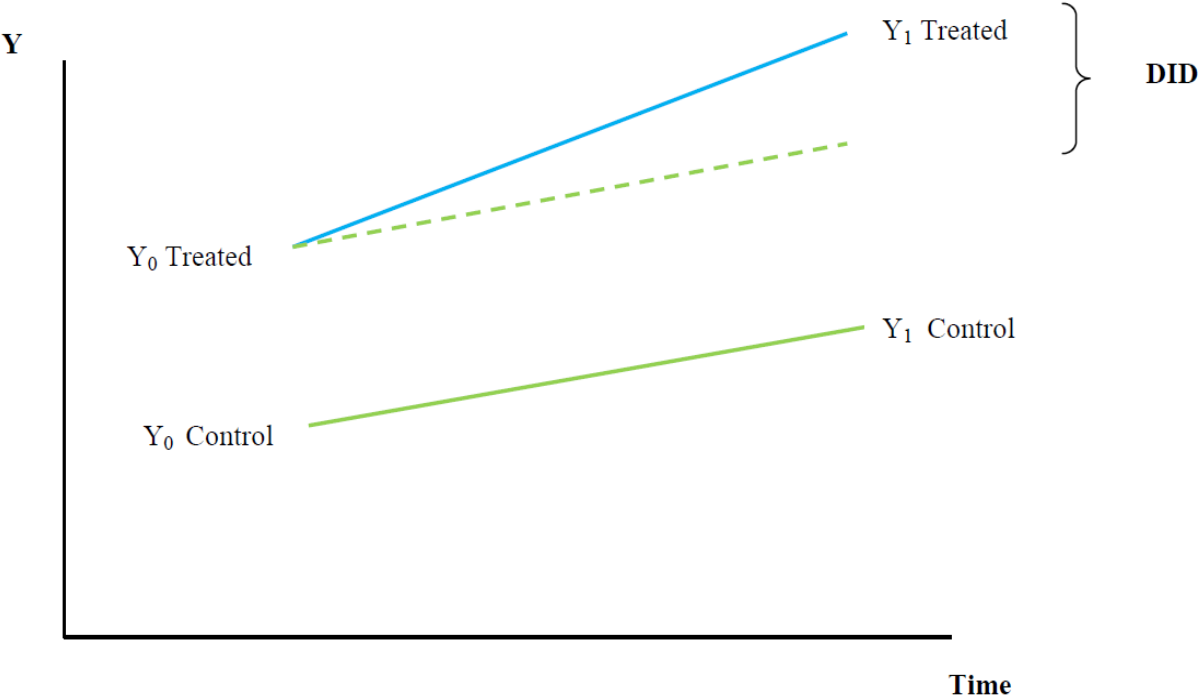| Little Kids Rock Intervention…	…Changes Student Engagement…	…& Leads to Improved Student Outcomes
• Modern band instruments • Teacher training	• Stronger connection to school • Greater interest in education	• **Our focus: Higher individual attendance rates** • Greater achievement • Grade promotion

Figure 2: Basics of the Difference in Differences Model

Source: Created by the author

Table 1: Descriptive Statistics for Matched Treatment and Control Middle Schools

	Mean (Standard Deviation)		
	Little Kids Rock	Control	Pooled Sample
Percent average daily attendance	95.21	94.53	94.93
	(1.28)	(1.59)	(1.40)
Percent low-income	83.92	84.56	84.40
	(7.14)	(7.50)	(7.47)
Math TAKS pass rates	56.97	55.40	56.94
	(11.92)	(13.49)	(12.95)
Number of observations	*8*	*10*	*18*

Source: Academic Excellence Indicator System, Texas Education Agency

Table 2: Assessment of Match Quality

	Difference in Means	Pooled Standard Deviations	Adjusted Standard Deviation	Standardized Difference in Means
Percent average daily attendance	0.676	1.397	3.124	0.216
Percent low-income	0.641	7.473	16.711	0.038
Math TAKS pass rates	1.569	12.955	28.967	0.054

Notes: The adjusted standard deviations are equivalent to the pooled standard deviation divided by the square root of 0.2, the intraclass correlation coefficient (U.S. Department of Education 2011).

Table 3: 8th graders in matched treatment and control schools in the Dallas Independent School District (2008-2011)

Year	8th graders in LKR middle schools	8th graders in matched control middle schools
2008	218	2,005
2009	608	2,206
2010	1,444	2,032
2011	2,434	2,162
Total	*4,704*	*8,405*
Grand Total		*13,109*

Source: UTD-ERC data

Table 4: Select descriptive statistics for pooled repeated cross-sections of 8th graders (2008-2011)

Variable	Mean (Std Dev)	Min	Max
Student characteristics			
Percent days attended	94.95	15	100
	(6.25)		
Attended Little Kids Rock middle school	0.359	0	1
	(0.48)		
Economically disadvantaged	0.899	0	1
	(0.301)		
Black	0.281	0	1
	(0.45)		
Hispanic	0.663	0	1
	(0.473)		
At-risk	0.524	0	1
	(0.499)		
Limited English proficiency	0.208	0	1
	(0.406)		
Math TAKS (z-score)	-.076	-5.3	1.5
	(1.03)		
School characteristics			
Enrollment	949	379	1,672
	(267)		
Percent black	29.5	2.2	76.6
	(23.95)		
Percent Hispanic	64.6	22.9	96.4
	(22.5)		
Percent LEP	21.8	1.6	38.5
	(9.05)		

Source: UTD-ERC

Table 5: Distribution of individual attendance rates for the chronically absent

1 percent	39.5
5 percent	62.8
10 percent	70.3
25 percent	79.4
50 percent	84.6
75 percent	87.4
90 percent	88.8
95 percent	89.1
99 percent	89.3
Mean	81.5
Number of students	*1,468*

Source: UTD-ERC

Note: The students in the chronically absent subgroup have individual attendance rates less than 89.5 percent.

Table 6: Association between Little Kids Rock availability and percent days attended: Select OLS estimates for treatment and control students after program implementation

	Coefficient	Standard Error
Attended Little Kids Rock middle school	-0.112	0.239
Economically disadvantaged	-1.39***	0.191
Black	1.80**	0.564
Hispanic	2.62***	0.519
At-Risk	-0.738***	0.184
Math TAKS (z-score)	0.839***	0.072

Source: UTD-ERC

$* p \leq .05; ** p \leq .01; *** p \leq .001$; Standard errors are clustered at the school level.