Seeing is Believing: Identity, Inequality, and the Impact of Television on the Hispanic Achievement Gap*

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October 2021

Abstract

Can identity reduce inequality? Using a spatial regression discontinuity arising from a FCC regulation, I investigate the impact of Spanish Language Television (SLTV) on Hispanic students in public schools. I find that SLTV improves academic performance and helps close the Hispanic achievement gap. I marshal three of sources of evidence that each indicate an identity mechanism is at play: (1) more Hispanic students are labelled 'limited English proficiency' and bullied on the basis of their ethnicity in SLTV schools, (2) Hispanic students perform better academically in locales where SLTV programming focuses more on the Hispanic identity, and (3) Hispanics with access to SLTV differentially visit Hispanic branded establishments more frequently. Collectively, they suggest that identity is a mechanism through which SLTV reduces the Hispanic achievement gap.

JEL Codes: I24, J15, L82, Z13.
Keywords: Hispanic, television, education, identity

*Many appreciated suggestions, critiques and encouragement were provided by Leonardo Bursztyn, Lucas Cusimano, Benjamin Enke, Victor Lima, Aakaash Rao, Jaya Wen, David Yang, and Kotaro Yoshida, seminar participants at EPoD and Harvard PE, as well as Mark Colombo for technical advice.

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1 Introduction

The Hispanic achievement gap is wide and persistent. Hispanics face the lowest high school and college completion rates out of all major ethnic and racial groups in the United States.[1] In this paper, I argue that Spanish Language Television (SLTV) is a media technology that has reduced educational inequality, and that moreover, these gains in Hispanic student performance can be attributed (at least in part) to a heightened sense of a Hispanic identity.

Despite the rise of the internet, broadcast Spanish Language TV remains an important fixture of Hispanic households. 78% of Spanish-dominant households watch SLTV (and 50% of multi-language Spanish-speaking homes do). In 2010, every single one of the top 10 shows watched by Hispanics were Spanish language programs (Pardo and Dreas, 2011). By investigating Spanish Language TV, I take a closer look at Hispanic communities and examine the ties between SLTV, identity, and education.

To identify the causal effect of SLTV, I follow Velez and Newman (2019) and exploit a spatial regression discontinuity arising from a Federal Communications Commission (FCC) regulation. This regulation grants federal protection of a TV station's broadcast signal only within a certain distance of a station's main antenna. Thus, households and schools just inside a TV station's coverage contour should be observably similar to those just outside the contour, except for the presence of broadcast and satellite TV. I argue that this allows me to identify the causal effect of SLTV, given several features: (1) contours are mechanically decided by a formula involving geographical features and antenna strength, (2) contours are large and tend to cut across small towns, rather than dense urban areas which corporations might try to capture for profitability reasons (urban centers fall squarely within contours), (3) SLTV stations were often built before this regulation was imposed, (4) demographic and other controls across the regression discontinuity are similar, and (5) Hispanics do not differentially migrate across contours, minimizing the possibility of selection. To further dispel concerns over potential confounds, I employ a difference-in-discontinuities design, comparing outcomes for Hispanic students against Asian students in schools with and without SLTV based on a 100 kilometer cut-off to SLTV coverage contours.[2]

I verify the relevance of this instrument's first stage by employing the difference-in-discontinuities approach with the American Time Use Dataset. I find that Hispanics watch 10 minutes more of TV when within coverage contours, a plausible lower bound for the amount of extra Spanish Language TV watched if Hispanics substitute watching English programs with Spanish ones. I further show that Hispanics watch more TV with their children—Hispanic students, in other words. No-

[1] See Tienda (2009). This achievement gap extends to many more educational outcomes, from test scores to disciplinary incidents to enrolment in advanced classes. Factors such as segregation (Cascio and Lewis, 2012), XXX, XXX exacerbate the achievement gap, whereas interventions such as providing free computers (Fairlie, 2012) XXX help close it. TODO: other cites on the achievement gap.

[2] I compare against Asian rather than white students because they are much less likely to identify as Hispanic.

tably, non-Hispanics do not exhibit differential TV viewership across SLTV coverage contours.

Next, I utilize the Civil Rights Data Collection to analyze the effect of SLTV on Hispanic students in public schools. Academic outcomes improve across the board: compared to Asians, Hispanics with SLTV are 16% more likely to take the SAT or ACT, 27% more likely to enrol in calculus and higher math, and pass 8% more AP exams. These gains are also present in absolute terms, extend to other academic outcomes, and remain qualitatively similar under a variety of robustness tests, establishing that SLTV reduces the Hispanic achievement gap.

Given this finding, I then marshal three sources of evidence that each indicate an identity mechanism may drive these results. First, using the same data, I show that Hispanic students are differentially classified as having 'limited English proficiency' under SLTV despite greater general academic achievement, a likely outcome if these students shift from English to Spanish mastery due to the presence of SLTV. Furthermore, Hispanic students are also differentially bullied more on the basis of their ethnicity, directly indicating a more salient identity that other students may target. Second, I use archive.org's TV transcript database to classify the proportion of programs in each SLTV station that focus on the Hispanic identity. I show that locales with a greater amount of SLTV programming focused on the Hispanic identity are associated with stronger Hispanic academic performance when compared against locales with fewer such programs on identity. However, a greater amount of programming focused on education & schools or positive role models for children each have a null effect on Hispanic performance. This indicates that the content of these television programs matter, and that identity is a primary channel through which these gains are attained. Finally, I use foot-traffic data from Safegraph to demonstrate the general strengthening of the Hispanic identity under SLTV. Hispanics with SLTV are differentially more likely to visit Hispanic branded restaurants and recreation establishments. Conducting a placebo exercise, I find that Hispanics with SLTV are no more likely to visit Brazilian, Greek, and Korean establishments. This speaks to the specific strengthening of the Hispanic identity versus a broader Latin American one. Collectively, these results suggest that identity is an important mechanism through which SLTV reduces inequality and the Hispanic achievement gap.

Literature Americans spend an average of three hours a day watching TV—more than any other activity bar sleep. Accordingly, a large literature has examined the impact that television has on education. Prior work has frequently been correlational and findings remain conflicted: one line of research contends that TV is as a distraction which 'rots' the mind and harms student outcomes (Zavodny, 2006),[3] while another line of inquiry has found consistent null effects.[4] I contribute to

[3]See Aksoy and Link (2000), Hornik (1981), and Keith et al. (1986). This theory enjoys popular support (see Winn (2002) or Gentile (2004) which finds broad support for the theory among paediatricians). Huang and Lee (2010) and Nakamuro et al. (2015) use more sophisticated panel data approaches and also find negative (but smaller) effects.

[4]Gaddy (1986), Gortmaker et al. (1990), and Hu et al. (2020) take correlational approaches, while Munasib and Bhattacharya (2010) and Kureishi and Yoshida (2013) use self-reportedly weak instruments that may generate the null.

this literature by taking a quasi-experimental approach. Gentzkow and Shapiro (2008) are closest to this paper in using a difference-in-difference strategy to find that TV improves student test scores—particularly among nonwhite students and English language learners.

Others have studied the effect of television on Hispanic communities. Oberholzer-Gee and Waldfogel (2009) demonstrate that the presence of Spanish language local news increases Hispanic voter turnout, whereas Velez and Newman (2019) (who develop the instrument used in this paper) find that SLTV depresses voter turnout. Trujillo and Paluck (2012) run an experiment measuring trust in the government and the census based on a scripted soap opera scene. I extend on this literature by moving beyond the political realm, arguing that the consequences of SLTV are large in educational settings too, and also provide the first evidence on a mechanism through which SLTV operates: identity.

There is a growing literature that looks at how identity can influence behaviour. This has been studied through theory, in the lab, and the field.[5] However, the underlying forces that construct identity (rather than simply triggering them via priming or other short-term interventions) are less well understood. Bisin et al. (2010), Atkin, Colson-Sihra and Shayo (2019), and Bazzi et al. (2019) encompass some recent studies on this topic, and all come to the conclusion that intergroup tensions or differences lead to a strengthening of identity. Alesina, Giuliano and Nunn (2013) take the long view and show how gender norms can be traced back to early agricultural practices. I contribute to this literature by proposing a media-based channel through which identity may be strengthened and influence action. This is closest to work such as Jensen and Oster (2009) and Gentzkow and Shapiro (2004), which establish a link between media & gender norms and media & anti-Americanism respectively.[6]

Finally, in the education and psychology literature, the stereotype threat phenomenon pinpoints minority identities as a root cause of achievement gaps (Spencer, Logel and Davies (2016), Appel and Kronberger (2012)), leading to the rise of methods such as "situational disengagement" (Nussbaum and Steele, 2007). This paper suggests that a stronger sense of identity may not have uniformly negative consequences on Hispanic students, creating space for a more positive conception of identity.

Layout. Following this Introduction, Section 2 presents the data sources used. Section 3 describes the difference-in-discontinuities empirical strategy and establishes the first stage. Section 4 presents evidence that SLTV closes the Hispanic achievement gap. Section 5 presents evidence that an identity mechanism underlies these results. Finally, Section 6 concludes with a discussion

[5]See Akerlof and Kranton (2000), Benjamin, Choi and Strickland (2007), Benjamin, Choi and Fisher (2010), and Bursztyn et al. (2019), among others.

[6]Other related work on the impact of mass media on social outcomes include Ferrara, Chong and Duryea (2012), Kearney and Levine (2015), Olken (2009), DellaVigna and Kaplan (2007), Yanagizawa-Drott (2014), and Putnam (2001). For an overview, see DellaVigna and La Ferrara (2015).

of research questions opened by the preceding analysis.

2 Data

Coverage contours The central instrument in this paper is the discontinuity in SLTV coverage across coverage contours introduced by FCC regulation. To build the coverage contours of SLTV stations in the United States, I collect a list of the callsigns for all SLTV stations from TMS Media, a large provider of data on TV, movies, and other media.[7] There are 103 of these stations located across the United States. These callsigns are matched against data from the FCC's OET Bulletin No. 69 and the FCC's Consolidated DataBase System (CDBS) to directly obtain the coverage contour boundaries in 2015.[8] Figure 1 presents an example of a coverage contour, while Figure 2 displays a map of all SLTV contours in the United States.

Time use data I collect time use data from the American Time Use Survey between 2003-2015 and construct the total amount of time individuals spent watching TV, time spent watching TV with children and parents, time spent on children's education, and demographic variables. Individuals in the data are located at the county level—I classify a given county as falling within a SLTV contour coverage if at least 50% of its area does. 68,373 individuals in the sample live within 100 kilometers of the contour boundary. Table 1, Panel A presents summary statistics for this data.

Public school data I collect data on public schools from the US Department of Education's Civil Rights Data Collection (CRDC) dataset in 2015. For anti-discrimination and transparency purposes, all public schools in the United States are required to report data to the CRDC on an annualized basis. This data contains information on various indicators of educational performance by demographic category, including SAT/ACT tests taken, calculus courses taken, AP tests passed, students classified under 'Limited English Proficiency', students bullied on the basis of ethnicity or race, the number of teachers and students in the school, and more.[9] School addresses are geocoded using ArcGIS and coded as receiving SLTV if they fall within a coverage contour. 83,004 schools across 11,065 school districts fall within 100 kilometers of the contour boundary. Figure 2 presents a map of these schools and Table 1, Panel B presents summary statistics for this data.

Television transcript data To code the content of programs broadcasted by SLTV stations, I make use of archive.org's television transcript database covering the years 2005-2015. Because transcript data is available at the television network level, I assign all affiliate stations data from their parent

[7] A TV station is defined to be SLTV if at least one of the primary broadcasts languages are Spanish.

[8] 2015 coverage contour data is used due to the 'FCC Spectrum Repack' that began in 2018 which altered the reception and coverage for a substantial number of stations. Coverage contours prior to 2015 were generally stable.

[9] Comprehensive variable descriptions are provided under Appendix A.

network.[10] For each network in the database, I code the fraction of television programs whose transcripts contain kesywords related to the mechanisms that I study: identity, education, and role models.[11] Table 1, Panel C presents summary statistics for this data.

Foot-traffic data I gather Safegraph foot-traffic data from 2019 to analyze whether Hispanics differentially visit Hispanic-branded establishments under the presence of SLTV. Safegraph uses location tracking data from mobile phones to compile comprehensive foot-traffic data to over 10 million points of interest around the world. I restrict the analysis to two commercial sectors where ethnic branding is common: food services (NAICS code 72) and arts, entertainment, and recreation (NAICS code 71). Restaurants and other food service establishments are tagged by Safegraph with the type of cuisine served, which I use to classify an establishment as Hispanic or not. Recreation establishments are not tagged, so I match establishment names with the same identity keywords used to classify the transcript data to code establishments as Hispanic. I repeat this for a number of placebo ethnicities: Greek, Korean, and Brazilian. Safegraph provides data on the number of visitors to each establishment at the census block group level. Thus, I use census data and the instrument to impute the number of Hispanics and non-Hispanics, with and without SLTV, who visit each establishment within 100 kilometers of a SLTV coverage contour.[12] There are 273,216 establishments included in my sample. Table 1, Panel D presents summary statistics for this data.

Other data Appendix A describes other data used in the paper. Briefly, they are IPUMS migration data at the origin county-destination county level from 2010-2015, used to test for selection via migration, and the American Community Survey data for county level demographic controls. The appendix also describes in greater detail the data construction process for the datasets above.

3 Empirical Strategy

To isolate the causal effect of Spanish language television, I adapt the technique used in Velez and Newman (2019) and extend it from two counties to the entirety of the United States. Velez and Newman construct a spatial regression discontinuity based on a FCC (Federal Communications Commission) regulation which determines the distance from a TV station in which the station's broadcast signal is protected from interference.

[10] There are nine major Spanish Language TV networks present in the data: Telemundo, Univision, UniMás, Azteca América, PBS, Estrella TV, MundoMax, Enlace TBN, and Mega TV.

[11] More sophisticated text analysis techniques such as NLP are not possible due to copyright law restricting direct access to the text corpus. Thus, only keyword searches are feasible. The specific set of keywords used are displayed in Appendix Table A.10 and the process for constructing this set is described under Appendix A.

[12] Given the potential selection concern of users whose data are covered by Safegraph, I also apply a Heckman correction based on moments from the census data to adjust the number of visitors in each category.

Digital and satellite TV stations operate by broadcasting signals from a central antenna, and the antenna's field strength at any given point is a mechanical product of several factors: the antenna's ERP (Effective Radiated Power, which is the amount of input power given to the antenna adjusted for antenna idiosyncrasies that may boost or attenuate its effective power), the antenna's HAAT (High Above Average Terrain), and the distance from the point to the antenna. This signal declines in strength with the square of distance, making it subject to interference and general loss of signal. When one gets far enough away from a TV station, this interference becomes widespread and meaningfully impedes TV viewership: the FCC completely repacked the spectrum between 2018-2020 to more efficiently allocate the frequencies on this spectrum and prevent interference.[13] To safeguard TV signals, the FCC passed in 1997 a series of regulations to protect signals for commercial TV stations from interference. These took the form of contour areas for which service holds at 50% of locations 10% of the time, termed a noise-limited bounding contour, inside of which sufficiently strong interfering signals are banned.[14] The blue contour line in Figure 1 presents an example of one such coverage contour.

This regulation creates a natural spatial regression discontinuity. Combined with the decaying strength of a TV signal due to distance, this cut-off in broadcast protection creates a split among households and schools just inside and outside of these coverage contours that should be ex ante comparable save for their access to broadcast TV. This is operationalized as a 100 kilometer cut-off from the coverage contour border in my baseline specifications. By studying Spanish Language TV in particular, I should be able to examine its causal effect on Hispanic communities, so long as the location of these contours are uncorrelated with any of the other determinants for the outcomes studied.

Given that these contours are purely determined by an algorithm and only dependent on physical variables like local elevation and antenna strength, these precise regulatory boundaries are located in more or less random locations. Coverage contours are large enough that they tend to cut across small towns rather than large cities—television networks have not constructed their antennae to be just large enough to only cover the most dense and populous areas.[15]

[13] Interference is most common from other TV broadcasters, as even weak signals and signals from adjacent channels (both digital and analog) can cause major reception issues. Distance also aggravates common TV signal quality issues such as ghosting (the appearance of double images due to geographical obstacles/multiple signals) and exacerbates interference from other signals, including radio transmitters (whether commercial, CB, or amateur), and can even result in electrical sources (such as power lines or large motors) disrupting reception.

[14] The relevant sections of federal law are 47 C.F.R. 73.622, 73.623, and 74.704. The FCC's OET Bulletin No. 69 most clearly summarizes and provides guidance on the salient features in this law. These contour interference protection lines are constructed following the Longley-Rice methodology adopted in 1997 and are termed $F(50, 10)$ lines. In practice, this regulation is most frequently used to restrict new TV station allotments. There are also $F(50, 90)$ lines which demarcate minimum field strength for digital TV service; these coverage contours are strict subsets of the interference contours and are not as suitable for a regression discontinuity as it is likely that people just outside of these contours are still able to access a television signal.

[15] These urban centers fall squarely within the aforementioned $F(50, 90)$ lines where minimum field strength must be guaranteed. This implies that network executives aiming to maximize profit, ratings, or audiences, should not have the

Another reassurance is that the interference protection regulation and the Longley-Rice methodology used to determine TV service coverage were only adopted in 1997, making it unlikely that stations were built or adapted in response to the policy. Univision, the largest owner of SLTV stations, was founded in 1955, and had built the vast majority of their television stations and antennas by 1997. Telemundo, the second largest owner of SLTV, was founded in 1984 and the stations it initially acquired were built in 1954. Like most SLTV networks, it primarily expanded through the acquisition of existing stations, rather than building out its own new ones. Nonetheless, one may still believe that SLTV stations target areas with more Hispanic people, or wealthier communities, or more populous areas, all of which are factors that could affect the areas of interest. Hence, I include explicit controls for these variables in regressions.

Finally, one may still be worried that unobserved variation across coverage contours could drive the observed results. Therefore, I follow a recent literature on difference-in-discontinuities (Casas-Arce and Saiz (2015), Grembi, Nannicini and Troiano (2016)) and employ a design that, in addition to the regression discontinuity, also compares outcomes for Hispanic students against Asian students.[16] Thus, any alternative explanation for these results would need to differentially affect Hispanics across these coverage contours.

The instrument therefore consists of two variables interacted: first, an indicator for whether the observation falls within any SLTV station's coverage contour boundary, and second, a Hispanic indicator. To ensure similarity between obervations inside and outside the boundaries, only observations located within a distance of 100 KM of the boundary are kept. The main specification is:

$$y_{i,j} = \beta \mathbb{I}[InsideContour_{i,j}] \times \mathbb{I}[Hispanic_{i,j}] + \gamma_k + \delta X_i + \epsilon_{i,j}$$

where $y_{i,j}$ is an outcome for observation i (which may be an individual, school, or establishment) under demographic category $j \in \{\text{Hispanic, not Hispanic}\}$, γ_k is a school district fixed effect (included when relevant), and X is a vector of controls for the observation. The main coefficient of interest is β, and in particular, the interaction term between the Inside Contour and Hispanic indicators.

Two potential concerns remain:

- *Can we guarantee that it is Hispanic people who watch SLTV?* If it were the case that non-Hispanic people were frequent viewers of SLTV, the main effects could also be attributed to non-Hispanics directly changing their behavior based on SLTV viewership. This could be the case if, for instance, white people treated Hispanics and Asians differently after having

$F(50, 10)$ interference lines used in this paper at the forefront of their decision calculus.

[16] I compare against Asian rather than white students because they are much less likely to identify as Hispanic. The achievement gap between Hispanics and Asians tend to be as large, if not larger, than the Hispanic-white achievement gap, making this a result of independent interest.

viewed SLTV, or Asian students performed worse in schools after watching SLTV. However, $< 1\%$ ofs TV programming watched by non-Hispanics is in Spanish, making such stories unlikely to hold water (FCC, 2016).

- *How do we account for potential selection?* It is theoretically possible that Hispanic people move in response to these television coverage contour boundaries, and that the effects seen are therefore a result of Hispanics self-sorting. If true, this would be a remarkable result—people moving in large numbers for the sake of access to better television. However, using census migration data, I find that Hispanics do not differentially move into or out of counties with access to SLTV. Appendix Tables A.1 and A.2 present these regression results and suggest that, if anything, Hispanics are *averse* to moving across coverage contour boundaries.

3.1 Evidence of a first stage: do Hispanics in SLTV coverage contours watch more television?

Over 85% of Hispanic households own a television. A further 85% of SLTV viewership occurs over satellite or broadcast television—important because coverage contours are only applicable for these types of television.[17] Thus, a substantial fraction of Hispanics may be affected by the presence of these coverage contours.

I test for the amount of television watched across these contour boundaries with the American Time Use Survey data. Figure 3 graphs the minutes of television watched against the distance to the contour boundary: it is clear that Hispanic television viewership increases inside the boundary while non-Hispanic viewership remains flat. However, there is not a sharp break in Hispanic viewership at the border, but rather a continuous increase as one draws closer to the main station—this indicates a fuzzy regression discontinuity, combining the natural effect of distance to the signal with the effect of the FCC interference protection.

Table 2, Panel A presents a regression following the main specification. Hispanics watch an average of 10 minutes more television when within the contour, whereas the effect of the contour on non-Hispanics is insignificant. Panel B examines the effect of the contour on minutes of TV watched with one's children: this too increases for Hispanics by 3.5 minutes while not affecting viewership for non-Hispanics. Thus, Hispanics overall and Hispanic students (the children of individuals surveyed) both appear to watch more TV within the coverage contour. But does more TV viewership mean that *Spanish Language* TV viewership increases? Unfortunately, I cannot directly observe the amount of SLTV watched. However, if one reasonably assumes that English and Spanish Language TV are substitutes,[18] then these estimates would serve as a lower bound

[17] See FCC (2016) and De La Merced and Gelles (2014). This fraction of broadcast TV viewership is substantially larger than the national average, 24%.

[18] Though no direct economic research exists on the substitutability of English and Spanish Language TV, the Department of Justice's ruling on the Univision-HBC merger (68 Fed. Reg. at 66,857 (2003)) interprets these English vs.

for the increase in SLTV watched by Hispanics.

Compared to other viewers of television, Hispanics are also uniquely likely to watch television in a social context rather than watching alone—this is partially driven by the fact that non-Hispanic households have 40% more TV sets per person than Hispanic ones (Coghill and McGinnis, 2018). This social aspect, wherein SLTV is watched with family and friends, may be one way in which identity is reinforced through television. Appendix Table A.3, Panel A shows that Hispanics differentially watch more TV with their parents when inside SLTV coverage contours. Appendix Table A.3, Panel B replicates the analysis in Table 2, Panel A, restricting the sample to only foreign-born residents. These people are less likely to have English mastery and may thus view more foreign-language TV. Accordingly, the panel reports even greater differential TV viewership among foreign-born Hispanics.

4 The impact of Spanish language television on Hispanic educational performance

How big is the Hispanic achievement gap in public schools? Table A.4, columns 1 and 3 present the achievement gap between Asians and Hispanics and whites and Hispanics respectively. In almost every outcome of interest, Hispanics trail substantially behind their Asian and white peers. Compared to Asian students, Hispanic students take the SAT or ACT 46.8% less frequently, take calculus 53.6% less frequently, and pass 72.3% less AP examinations. These are startlingly large figures, making it imperative for us to find solutions that can help close the achievement gap.

To determine the effect of SLTV on the Hispanic achievement gap, I apply the main difference-in-discontinuity specification at the school-ethnicity level and compare differential outcomes between Hispanics and Asians while varying the presence of SLTV. I apply the inverse hyperbolic sine transform to all outcome variables in order to study the elasticity, or percentage difference, of these academic outcomes with respect to SLTV. Only schools within 100 KM of the coverage contour boundary are kept and standard errors are clustered at the school district level.

Table 3, Panel A presents results on the IHS transformed number of SAT and ACT tests taken, Panel B presents results on the IHS transformed number of calculus courses taken, and Panel C presents results on the IHS transformed number of AP exams passed.[19] All columns control for school district fixed effects and the number of Hispanic and Asian students in the school. Columns 2 and 3 add controls for the total number of students and teachers in the school, and column 3 adds controls for the school type (elementary, middle, and high school indicators). Results are

Spanish language networks as substitutable products.

[19]The sample size changes across panels due to schools not reporting data when it is irrelevant. Not all schools offer the SAT/ACT test or calculus or AP exams. In order for missing data to bias results, selection would need to be correlated with the presence of coverage contours. It is unclear that schools have such an incentive to differentially manipulate reporting along this dimension.

statistically and economically significant. SLTV differentially improves the number of Hispanics taking the SAT or ACT by 16% (Panel A), the number of Hispanics taking calculus by 27% (Panel B), and the number of Hispanics passing an AP exam by 10% (Panel C). The degree to which this decreases the achievement gap is presented in Appendix Table A.4.

One may naturally wonder whether Hispanic students only gain in relative terms to their peers. Appendix Table A.5 presents results utilizing only the regression discontinuity instead of the difference-in-discontinuities specification.[20] Although the estimated coefficients are generally smaller, the effect of SLTV remains positive, indicating that Hispanic students gain in absolute as well as relative terms. These gains in academic performance are present in a variety of other academic outcomes: Appendix Table A.6 shows that the Hispanic achievement gap is reduced in the number of gifted students (Panel A), advanced math courses taken (Panel B), biology courses taken (Panel C), physics courses taken (Panel D), and chemistry courses taken (Panel E). Appendix Table A.4 presents the size of the achievement gap and the degree to which SLTV ameliorates it for these auxiliary outcomes.

Robustness and ruling out alternative hypothesis The difference-in-discontinuities strategy should take care of most concerns regarding identification. I next perform several robustness checks and rule out potential alternative hypotheses that may explain the data in Appendix Table A.7. For each of these checks, I replicate results for SAT and ACT tests as Panels X.X.1, calculus classes taken as Panels X.X.2, and AP exams passed as Panels X.X.3. Baseline results are presented in Panel A.1.

One may be concerned that schools near the outer bounds of the 100 kilometer cutoff may look quite different from one another. I narrow the sample distance cutoff to the contour boundary from 100 kilometers to 50 kilometers and 33 kilometers and find that coefficients remain stable (see Panels A.2 and A.3). One may also be concerned about treatment effects very close to the coverage contour: students who attend a school 1 kilometer outside the contour may in fact live inside the contour, and the interference protection regulation may not be tightly enforced down to the last square foot. Thus, I keep only schools between 25 and 100 kilometers of the contour boundary and find qualitatively similar results (see Panel A.4). Given that television signals decrease with the square of distance from the main station, I additionally add controls for distance and distance^2 and find that results are robust (see Panel A.5). Any variation along state or county levels that may ex ante affect school similarity are also absorbed by the school district fixed effects.

Given the interest in the Hispanic achievement gap and the presence of 0s in the data, it is natural to use the IHS transform on outcome variables. The results are also robust to using the $log(x+1)$ transform instead (see Panel B.1). If one is interested in the numerical difference (rather

[20] Due to the high degree of collinearity between school districts and the presence of SLTV, the school district fixed effects must be dropped from this specification.

than percentage change) that SLTV induces, Panel B.2 presents results for raw counts and Panel B.3 presents results for the standardized count of the variables. In each case, results remain positive and significant. Similarly, though results are run at the school level, one may be interested in student-level outcomes. Panel C.1 weights observations by the size of schools whereas Panel C.2 weights observations by the number of students in the given demographic category to make the data representative at the student level; results remain largely unchanged.

The presence of bilingual stations that broadcast in both English and Spanish may alter the interpretation of results if change in Hispanic behavior is driven by these particular stations. There are 14 such stations in the data. Panel D.1 drops these stations and finds that coefficients remain stable.

Reverse causality could be a concern if TV executives strategically place TV stations to capture certain markets by the edges of the coverage contours. Panel E.1 controls for the station-level determinants of a TV signal's field strength (its antenna's effective radiated power, height above average terrain, radiation center above mean sea level, and presence of a directional antenna), which should account for the factors that a network could manipulate to increase or decrease coverage, and finds that results are robust.[21] Panel E.2 drops the 11 SLTV stations that were built after 1997 (when the FCC regulation was passed), which may have been constructed with the interference coverage contour in mind; results remain qualitatively similar.

Selection *within* schools may also be a concern: perhaps the worst Hispanic students drop out more under the presence of SLTV, or the best Hispanic students move to private schools in areas without SLTV. I test for this in Appendix Table A.8 and find an insignificant difference in the number of Hispanic students retained across the SLTV boundary.

The main results also remain significant under different treatments of standard errors. Appendix Table A.7, Panels F.1 and F.2 correct for spatial autocorrelation, accounting for arbitrary spatial clusters and allowing for linear decay in the correlation structure (using the Bartlett kernel). Panel F.3 two-way clusters standard errors by school district and the parent TV network of the closest station. Panel F.4 clusters standard errors at the TV station level. Panel F.5 uses heteroskedasticity robust standard errors.

Finally, one might wonder how SLTV affects the white-Hispanic achievement gap. Panel G.1 presents results using white students as the omitted category instead of Asian students. Hispanics make up even more ground under this specification.

Taken as a whole, these results suggest that SLTV is a meaningful force that can improve Hispanic student performance in public schools

[21] In practice, the local topography is also important for determining field strength. But if the mountain will not come to Muhammad, then Muhammad must go to the mountain. Thus, controlling for the above technical factors should be sufficient until terraforming is prevalent.

EDIT

5 The identity mechanism

SLTV programming is also more likely to contain content that is directly salient to a Hispanic person's identity. This occurs not only because of the language of the broadcast, but also its content: roughly 20% of programming on SLTVs are telenovelas produced in foreign (Latin American) countries, with a similar proportion of programming dedicated to non-locally produced news and paid programming.[22]

We marshal three

5.1 Identity within schools

Evidence of Identity as a Mechanism The results in Table **??** provide some concrete evidence that identity changes as a result of the effect of television. We believe that access to SLTV reinforces Hispanic identities, making them more salient to the Hispanic individuals consuming the broadcast programs. The most direct evidence for this stems from the results on harassment and bullying based on ethnicity. Given that very few non-Hispanic people view SLTV programming, the fact that more Hispanic students are bullied on the basis of their ethnicity suggests that some change must be occurring within the students along this dimension.[23]

A substantial literature has shown that increased visibility of (non-majority) ethnicities is associated with greater amounts of bullying,[24] consistent with the results that we see. Though it is impossible to rule out all other stories (perhaps children who watch more TV overall are more likely to be victims of bullying—but this is not supported by the literature. If anything, there is support for television causing children to become bullies (Kuntsche et al., 2006), but this is not borne out in our data), the most parsimonious explanation is one in which television increases identity salience and hence ethnicity-based bullying.

We make a similar argument in the interpretation of the greater number of Hispanic students classified as having Limited English Proficiency. This increase demonstrates that these students possess a lower degree of command over the English language, suggesting two possibilities: either (1) that academic/linguistic abilities are lowered across the board, or that (2) there is some

[22] For more information, see FCC (2016).

[23] This increase in bullying does not appear to be the result of 'retaliation' to Hispanic students bullying others: the coefficient only attenuates slightly when further controlling for the total number of students bullied, and running the main specification with the number of Hispanic students as perpetrators of race/ethnicity based bullying yields an insignificant negative coefficient.

[24] See Scherr and Larson (2009) for a review of this literature.

substitution in ability towards the Spanish language instead. Given that academic abilities appear to be *enhanced* by the presence of SLTV, the substitution story appears more plausible to us.[25] Unfortunately, we do not have direct evidence on the Spanish-speaking abilities of students, and so recognize that this is not a settled matter. Thus, while the evidence presented is fairly suggestive, more research could be done on this matter.

The Difference Between 'Identity' and Other Outcomes It appears that while Hispanic discipline issues are generally improved by SLTV, this does not extend to the measure directly tied to identity: bullying and harassment based on ethnicity. Similarly, while academic achievement is generally improved by SLTV, this finding does not also generalize to LEP rates. This puzzle—explaining how identity driven results move in opposite directions from the others—is not easily resolved without relying on identity in some form.

Though we do not have a rigorous argument that can fully resolve this puzzle, we suggest that a substitution effect based on SLTV affecting identity can explain much of the results seen. That is, SLTV might in the immediate affect the identity based mechanisms that we see (more social issues, worse academic performance on metrics tied to identity), but that student performance in other non-identity tied outcomes might in turn shift to make up for the difference. If this were the case, we would expect to see results in line with what we see. An alternative explanation not relying on identity would still need to be able to explain why most academic and disciplinary measures point in one direction, whereas the ones more tightly linked to identity reverse.

5.2 The content of TV programs: narrowing down mechanisms

Table A.9 provides further evidence that no direct time spent on education

5.3 Foot-traffic and identity

Firm Name Classification Unlike the names of firm principals, there is no readily available or standardized method to determine whether a firm's name is a 'Hispanic name' or not. Although a machine learning approach is still theoretically possible under these circumstances, a quick visual inspection of the data revealed that a relatively low percentage of firms had names that were explicit tied to a Hispanic identity—hence, many approaches would likely identify a significant number of false positives.

In order to be conservative and ensure that firms identified as bearing Hispanic names actually are such, we construct a measure that classifies a firm name as Hispanic if it contains certain keywords that are explicitly associated with a Hispanic identity. These keywords are split into

[25] Granted, the measures of academic ability measure only the performance of students at the top end. But given the existence of these results, a countervailing narrative in which SLTV decreases the academic performance for other Hispanic students would need require a mechanism that could produce such differential effects.

three major categories: (1) References to countries in Latin America or Latin America itself. Firms that include the base forms of country names in Latin America are considered to be explicitly referencing a Hispanic identity (examples include: 'Cuban Guys 102, LLC' , 'Bravo Latino Brands, LLC.') (2) Names containing common one of the top 50 most Spanish words that are not also present in English (examples include: 'La Joya Estates, Ltd.', 'Conselho Nacional De Saude Mental E Medicina Psicossomatica Inc.'), and (3) Names containing common Hispanic foods. (examples include: 'Charlie Cactus Tacos, LLC', 'Taqueria Casas 2 Inc.') Due to the lack of a systemic means to construct this last category, I conduct robustness checks dropping this category; results do not substantially change when omitting this third category. Table **??** contains a list of these keywords as well as some additional detail on the classification process.

Out of our sample, 1.1% of firms meet this criteria (1% if omitting the food-based names). A manual check of firms that are classified as Hispanic also confirms that the firm name classification process succeeds.

6 Conclusion

In this paper, we provide a number of high-level results: we show that SLTV has a substantial impact on reducing the inequality that Hispanics face as entrepreneurs and students. From a business standpoint, SLTV increases Hispanic firm ownership, while also increasing the total number of firms bearing Hispanic names, pointing to an expansion in demand for goods and services linked to the Hispanic identity. From an educational standpoint, SLTV further improves the academic performance of top achievers while decreasing the occurrence of disciplinary issues among Hispanic students; instances in which this is violated are instances that one would expect to arise from a stronger sense of identity being reinforced.

Undergirding these findings is the consistent notion that identity is strengthened from the presence of television, and though we cannot ever perfectly confirm that this is the case, we believe the cumulative weight of the results is suggestive. However, this would be a prime area for future work to be done: we think that a more precise and direct effect on identity from the media (for both Hispanics and other minorities), would be of value—especially if one could show its relative influence and power over time.

Political consequences? Not a monolith, what about subgroups? How do these interact with other dimensions along which the achievement gap has been observed, such as socioeconomic status or gender?

More broadly speaking, we think that looking at the spillover effects of identity for both those within the in-group and those in the out-group would be of interest (how are Hispanic people who don't watch SLTV be affected by peers who do? How do white people, or other minorities react?). Finally, it may also be interesting to examine the role that media as a whole plays on identity, and

whether Spanish Language Television serves as a complement or substitute with other forms of media.

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Figures and Tables

Figure 1: Coverage map for TV station WUVC-DT

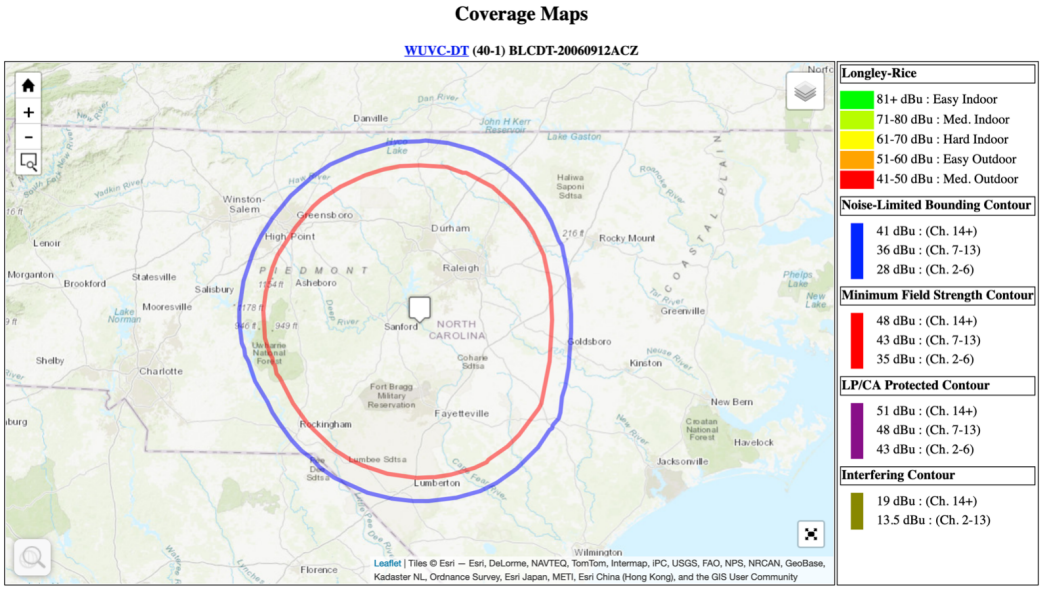


Figure 2: Map of coverage contours of Spanish Language TV stations and public schools in the US

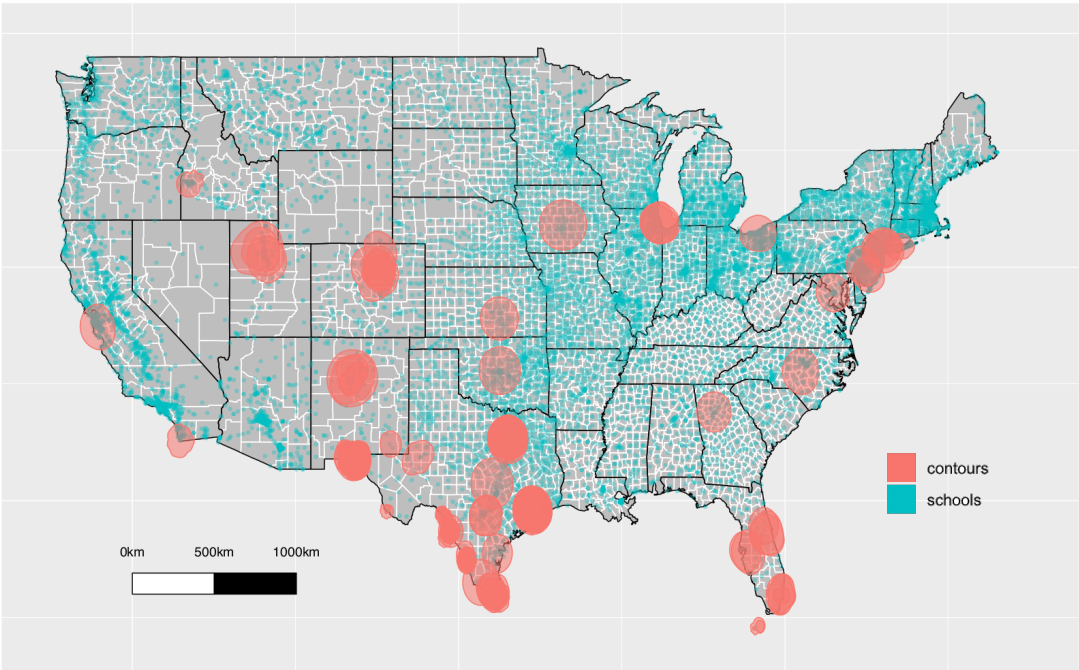
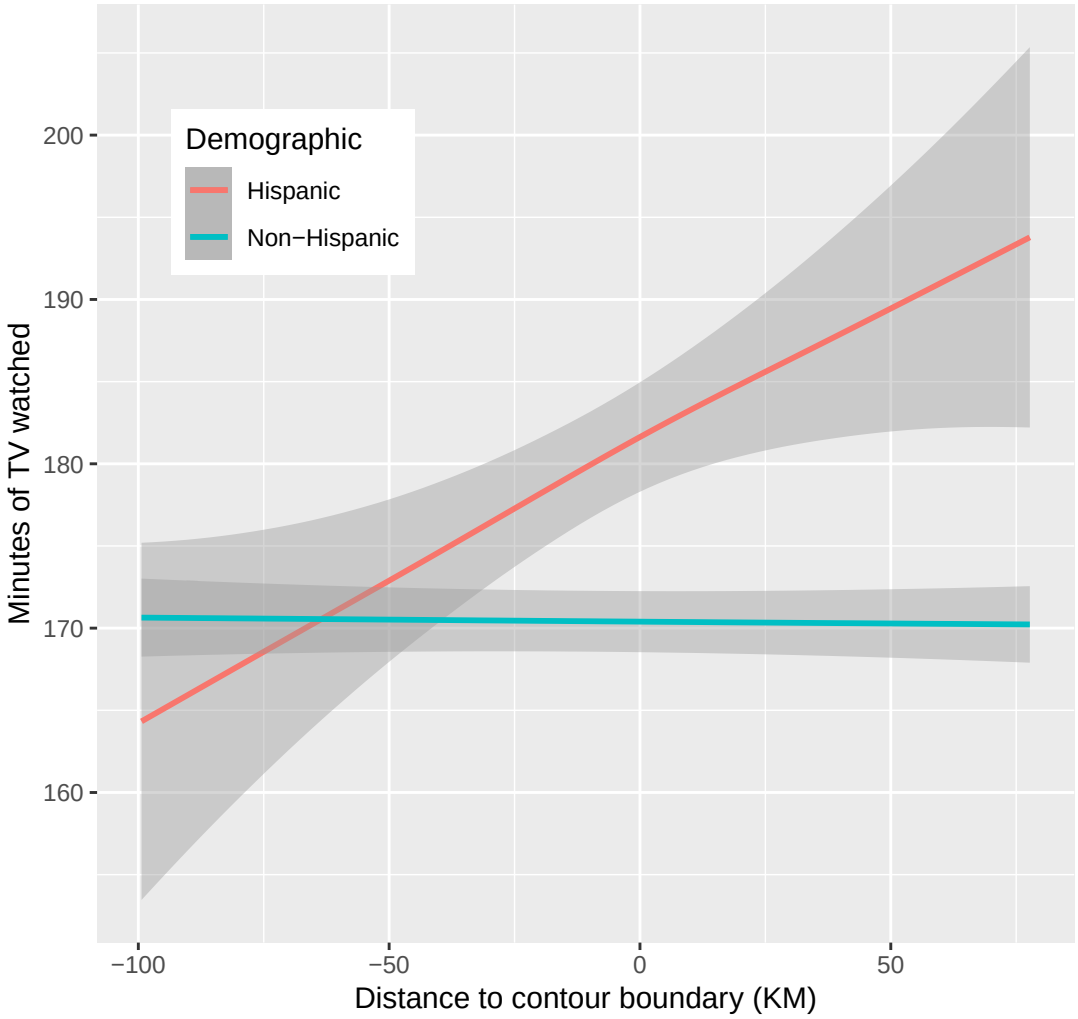


Figure 3: Minutes of TV watched across the coverage contour



Lowess smoothed minutes of television watched by distance to SLTV coverage contour boundary. Negative values indicate individuals outside of a contour (no SLTV). Minutes of TV watched are residualized by individual level age, age^2, sex, and county level controls for log(income), log(population) and percent Hispanic.

Table 1: Summary statistics

	All	*No SLTV*	*SLTV*
	(1)	(2)	(3)
Panel A: American Time Use Survey			
Hispanics	0.251	0.254	0.248
	(0.434)	(0.432)	(0.436)
Minutes of TV watched	170.846	172.140	169.649
	(177.361)	(177.897)	(176.858)
TV watched with children	19.061	19.139	18.990
	(63.577)	(63.481)	(63.666)
TV watched with parents	1.644	1.773	1.526
	(14.243)	(14.721)	(13.785)
Observations	68,373	32,844	35,529
Panel B: Schools, Civil Rights Data Collection			
IHS(SAT/ACTs taken)	1.719	1.233	2.006
	(1.926)	(1.515)	(2.079)
IHS(calculus taken)	1.907	1.197	1.760
	(1.717)	(1.373)	(2.333)
IHS(APs passed)	4.081	3.564	4.174
	(0.951)	(0.706)	(0.960)
IHS(limited English proficiency)	2.061	1.503	2.349
	(1.943)	(1.660)	(2.015)
IHS(harassment based on ethnicity or race)	0.032	0.016	0.041
	(0.229)	(0.163)	(0.257)
Log income	9.547	9.430	9.608
	(0.303)	(0.200)	(0.328)
Log population	12.484	11.559	12.964
	(1.576)	(1.471)	(1.405)
Fraction county Hispanic	0.107	0.037	0.143
	(0.160)	(0.079)	(0.179)
# School teachers	39.591	32.684	43.169
	(30.764)	(24.090)	(33.146)
# Hispanic students	164.343	68.500	214.011
	(259.096)	(117.433)	(295.883)
# Total students	581.524	478.166	635.086
	(482.595)	(383.924)	(518.467)
Observations	83,004	22,504	60,500
Panel C: Schools, archive.org TV transcripts			
% programs on identity	-	-	0.108
	-	-	(0.017)
% programs on education	-	-	0.150
	-	-	(0.028)
% programs with role models	-	-	0.005
	-	-	(0.008)
Observations	-	-	60,500
Panel D: Establishments, Safegraph foot traffic			
Restaurants — IHS(visitors)	2.673	2.183	3.685
	(2.273)	(2.291)	(3.685)
Restaurants — Hispanic dummy	0.116	-	-
	(0.321)	-	-
Observations	203,236	101,806	101,806
Recreation — IHS(visitors)	2.642	1.943	3.341
	(2.259)	(2.106)	(2.190)
Recreation — Hispanic dummy	0.107	-	-
	(0.103)	-	-
Observations	70,096	35,048	35,048

Notes: The table presents means (and standard deviations). Column 1 shows data for all observations. Columns 2 and 3 show data for the subsample without and with Spanish Language TV (SLTV) coverage, respectively. All panels only keep observations within 100 KM of the SLTV coverage contour boundary. Data in Panel A are at the individual level from the American Time Use Survey. Data in Panel B are at the school level from the Civil Rights Data Collection. Data in Panel C are at the school level from the archive.org TV transcript database—columns 1 and 2 are omitted because transcript data only applies where there is television. Data in Panel D are at the establishment level from the Safegraph traffic data—columns 2 and 3 are omitted for the location dummy because although visitor home location is used to instrument for the presence of TV, the location of the establishment is not.

Table 2: Effect of TV contour regulation on TV watched by ethnicity

	Minutes of TV watched			
	(1)	(2)	(3)	(4)
Panel A: Total TV watched				
TV dummy × Hispanic	10.822**	9.050**	11.060**	10.362**
	(4.508)	(4.494)	(4.566)	(4.534)
TV dummy	-1.341	-0.1722	0.9478	2.039
	(3.532)	(3.188)	(2.901)	(2.809)
Panel B: TV watched with children				
TV dummy × Hispanic	3.171**	2.857*	3.211**	3.172**
	(1.490)	(1.517)	(1.479)	(1.490)
TV dummy	-0.0081	0.2059	0.4106	0.4703
	(0.7991)	(0.6820)	(0.7167)	(0.7135)
Indiv. demographic	Yes	Yes	Yes	Yes
County log(income)	Yes	Yes	Yes	Yes
County % Hispanic	No	Yes	Yes	Yes
County log(pop.)	No	No	Yes	Yes
Foreign born × Hispanic	No	No	No	Yes

Notes: The table presents coefficient estimates from regressions at the individual level, only keeping those living in a county within 100 KM of a Spanish language TV contour boundary. The dependent variable in Panel A is the total number of minutes of TV watched and in Panel B the number of minutes of TV watched with children. TV dummy is an indicator variable for a person living in a county with access to Spanish language television based on the FCC regulation OET Bulletin 69, which is interacted with an indicator for whether the individual is Hispanic. Columns 1-4 include demographic controls for sex, age, and age squared, as well as the mean log(income) of the county. Columns 2-4 control for the percentage of the county that is Hispanic. Columns 3-4 control for the county's log(population). Column 4 controls for whether the individual is foreign born interacted with a Hispanic dummy. Standard errors are clustered at the county level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 3: Effect of Spanish language TV on Hispanic vs. Asian academic achievement

	(1)	(2)	(3)
Panel A: IHS(SAT/ACTs taken)			
TV dummy × Hispanic	0.1598***	0.1598***	0.1598***
	(0.0264)	(0.0264)	(0.0264)
N	21,610	21,610	21,610
Panel B: IHS(calculus taken)			
TV dummy × Hispanic	0.2718***	0.2718***	0.2718***
	(0.0369)	(0.0369)	(0.0369)
N	11,460	11,460	11,460
Panel C: IHS(APs passed)			
TV dummy × Hispanic	0.0964***	0.0966***	0.0972***
	(0.0346)	(0.0353)	(0.0360)
N	3,757	3,757	3,757
School district FE	Yes	Yes	Yes
# Hispanic, Asian students	Yes	Yes	Yes
School size controls	No	Yes	Yes
School type controls	No	No	Yes

Notes: The table presents coefficient estimates from regressions at the school-ethnicity level, only keeping schools within 100 KM of a Spanish language TV contour boundary. The dependent variable are inverse hyperbolic sine transformed counts of the number of students taking the SAT or ACT in Panel A, the number of students enrolled in calculus in Panel B, and the number of Advanced Placement tests passed in Panel C. TV dummy is an indicator variable for a school with access to Spanish language television, which is interacted with an indicator for whether the demographic is Hispanic (the omitted group are Asians). Columns 1-3 control for the number of Hispanic and Asian students enrolled. Columns 2-3 control for the number of teachers and total number of students at the school. Column 3 controls for indicators denoting whether the school contains a primary, middle, and high school division. School district fixed effects are always included. Standard errors are clustered at the school district level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 4: Effect of Spanish language TV on Hispanic vs. Asian identity outcomes

	(1)	(2)	(3)
Panel A: IHS(limited English proficiency)			
TV dummy × Hispanic	0.3042***	0.3042***	0.3042***
	(0.0379)	(0.0379)	(0.0379)
N	83,004	83,004	83,004
Panel B: IHS(bullied based on ethnicity or race)			
TV dummy × Hispanic	0.0015*	0.0015*	0.0015*
	(0.0009)	(0.0009)	(0.0009)
N	52,068	52,068	52,068
School district FE	Yes	Yes	Yes
# Hispanic, Asian students	Yes	Yes	Yes
School size controls	No	Yes	Yes
School type controls	No	No	Yes

Notes: The table presents coefficient estimates from regressions at the school-ethnicity level, only keeping schools within 100 KM of a Spanish language TV contour boundary. The dependent variable are inverse hyperbolic sine transformed counts of students classified as having limited English proficiency in Panel A and the number of students bullied on the basis of their ethnicity or race in Panel B. TV dummy is an indicator variable for a school with access to Spanish language television, which is interacted with an indicator for whether the demographic is Hispanic (the omitted group are Asians). Columns 1-3 control for the number of Hispanic and Asian students enrolled. Columns 2-3 control for the number of teachers and total number of students at the school. Column 3 controls for indicators denoting whether the school contains a primary, middle, and high school division. School district fixed effects are always included. Standard errors are clustered at the school district level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 5: Differential effect of Spanish language TV by program content on Hispanic vs. Asian academic achievement

	(1)	(2)	(3)
Panel A: IHS(SAT/ACTs taken)			
TV × Hispanic × % programs on identity	2.313**		
	(0.943)		
TV × Hispanic × % programs on education		−0.516	
		(0.626)	
TV × Hispanic × % programs with role models			−2.085
			(2.151)
N	21,610	21,610	21,610
Panel B: IHS(calculus taken)			
TV × Hispanic × % programs on identity	2.788***		
	(1.034)		
TV × Hispanic × % programs on education		0.829	
		(0.666)	
TV × Hispanic × % programs with role models			1.616
			(2.463)
N	7,112	7,112	7,112
Panel C: IHS(APs passed)			
TV × Hispanic × % programs on identity	1.721		
	(1.280)		
TV × Hispanic × % programs on education		0.903	
		(0.922)	
TV × Hispanic × % programs with role models			−1.184
			(2.989)
N	3,168	3,168	3,168
School district FE	Yes	Yes	Yes
# Hispanic, Asian students	Yes	Yes	Yes
School size controls	No	Yes	Yes
School type controls	No	No	Yes

Notes: The table presents coefficient estimates from regressions at the school-ethnicity level, only keeping schools within 100 KM of a Spanish language TV contour boundary. The dependent variable are inverse hyperbolic sine transformed counts of the number of students taking the SAT or ACT in Panel A, the number of students enrolled in calculus in Panel B, and the number of Advanced Placement tests passed in Panel C. % programs on identity, education, and role models are coded based on TV channel network transcripts. TV dummy is an indicator variable for a school with access to Spanish language television, which is interacted with an indicator for whether the demographic is Hispanic (the omitted group are Asians). Columns 1-3 control for the number of Hispanic and Asian students enrolled. Columns 2-3 control for the number of teachers and total number of students at the school. Column 3 controls for indicators denoting whether the school contains a primary, middle, and high school division. School district fixed effects are always included. Standard errors are clustered at the school district level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 6: Effect of Spanish language TV on Hispanic foot traffic

	IHS(visitors to location)			
	(1)	(2)	(3)	(4)
Panel A.1: Restaurants — Hispanic dummy				
TV × Hispanic × Hispanic food	0.872***	0.872***	0.872***	0.872***
	(0.057)	(0.057)	(0.057)	(0.056)
Panel A.2: Restaurants — Korean dummy				
TV × Hispanic × Korean food	0.233	0.233	0.233	0.233
	(0.225)	(0.225)	(0.225)	(0.223)
Panel A.3: Restaurants — Greek dummy				
Hispanic × TV × Greek food	-0.305	-0.305	-0.305	-0.305
	(0.215)	(0.214)	(0.214)	(0.211)
Panel A.4: Restaurants — Brazilian dummy				
TV × Hispanic × Brazilian food	0.058	0.058	0.058	0.058
	(0.525)	(0.530)	(0.530)	(0.526)
N	203,236	203,236	203,236	203,236
Panel B.1: Recreation — Hispanic dummy				
TV × Hispanic × Hispanic brand	0.569*	0.569*	0.569*	0.569*
	(0.303)	(0.304)	(0.304)	(0.302)
Panel B.2: Recreation — Korean dummy				
TV × Hispanic × Korean brand	0.190	0.190	0.190	0.190
	(1.020)	(0.989)	(0.977)	(0.804)
Panel B.3: Recreation — Greek dummy				
Hispanic × TV × Greek brand	-0.286	-0.286	-0.286	-0.286
	(4.317)	(4.460)	(4.397)	(3.905)
Panel B.4: Recreation — Brazilian dummy				
TV × Hispanic × Brazilian brand	0.328	0.328	0.328	0.328
	(0.598)	(0.598)	(0.599)	(0.610)
N	69,980	69,980	69,980	69,980
County log(income)	Yes	Yes	Yes	Yes
County % Hispanic	No	Yes	Yes	Yes
County log(pop.)	No	No	Yes	Yes
County FE	No	No	No	Yes
NAICS code FE	No	No	No	Yes

Notes: The table presents coefficient estimates from regressions at the establishment-visitor identity level, where a visitor identity is one of 4 categories (Hispanic or not × TV or not), only keeping locations within 100 KM of a Spanish language TV contour boundary. The dependent variable are inverse hyperbolic sine transformed counts of visitors to a given location from the ethnicity group. Panel A restricts the universe of locations to food service establishments, while Panel B restricts to arts, entertainment, and recreation establishments. TV dummy is an indicator variable for visitors to the location with home access to Spanish language television based on the FCC regulation OET Bulletin 69, which is interacted with an indicator for whether the visitor group is Hispanic (the omitted group are non-Hispanics). Panels A.1 and B.1 interact these variables with an indicator for Hispanic establishments, Panels A.2 and B.2 interact these variables with an indicator for Korean establishments, Panels A.3 and B.3 interact these variables with an indicator for Greek establishments, and Panels A.4 and B.4 interact these variables with an indicator for Brazilian establishments. Columns 1-4 include controls for the mean log(income) of the county. Columns 2-4 control for the percentage of the county that is Hispanic. Columns 3-4 control for the county's log(population). Column 4 adds fixed effects for the county and NAICS code. Standard errors are robust. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

ONLINE APPENDIX

Appendix A Auxiliary data sources

In addition to the primary data sources described in Section 2, we also use a number of auxiliary data sources for the empirical analysis.

Migration data Data on migration comes from the 2011-2015 American Community Survey (ACS), which reports the number of people moving from each origin county to destination county (aggregated over the four years).[1] This sample also contains migration flows by Hispanic origin, allowing us to determine whether they move based on geographic boundaries.

The migration data from the ACS is provided at the origin county-destination county level. Given the relative size of a county, to define whether a county is inside a coverage contour or not, we further impose that at least 95% of the area that the county encompasses must be inside of the coverage contour.[2]

American Time Use (ATUS)

Civil Rights Data Collection (CRDC) The outcome data from the CRDC can be split into two categories:

- **Academic Achievements:** We focus on two outcomes that track the effect of television on the top end of the academic distribution of students: the number of Advanced Placement (AP) classes students enrol in and pass, as well as the number of students placed into gifted programs, and one outcome on the bottom: the number of students with Limited English Proficiency (LEP).

  The AP program is administered by the College Board, and defines a standardized college-level curriculum that is taught to high school students in AP Classes. In conjunction with AP Classes, AP Exams are national examinations which are designed to test mastery of material taught in AP classes. These exams are scored on a scale ranging from 1 to 5, with scores below a 3 marked as a failed exam. Even among the students who select into these classes (22% in 2015[3]), a substantial number of students who take these exams fail them - approximately 35% (College Board (2020*b*)).

  Gifted and talented programs are "programs during regular school hours that provide special educational opportunities including accelerated promotion through grades and classes and an enriched curriculum for students who are endowed with a high degree of mental ability or who demonstrate unusual physical coordination, creativity, interest, or talent." (CRDC (2016)) These programs, while not mandatory, are common across school districts, and vary in their implementation.

[1] Historically, approximately 15% of the ACS migration data has been allocated, or imputed based on salient characteristics (United States Census Bureau (2020*a*)).

[2] Results are robust to different area cut-offs for a county to be considered inside the coverage contour.

[3] Data computed from number of high school graduates in 2015 (National Student Clearinghouse Research Center, (2015*a*)), and number of seniors who sat an AP exam in 2015. This is how the College Board currently tracks national AP participation (no comparable summary statistic was released in 2015) (College Board, (2015*b*))

LEP students (also called English Learner students) are students that, as a result of their limited command over the English language, have difficulty participating in regular school activities.[4] 9% of all public school students are considered LEP, and while students are placed into the program is at the discretion of individual school districts, all districts must provide language assistance services and have staff qualified to implement the LEP programs.[5]

- **Disciplinary Issues:** Three forms of academic discipline are considered as outcome variables: the number of out of school suspensions, the number of absences, and the amount of harassment and bullying on the basis of race/ethnicity experienced by students.

  Out of school suspensions are instances "in which a child is temporarily removed from his/her regular school for at least half a day (but less than the remainder of the school year) for disciplinary purposes to another setting (e.g., home, behavior center)." (CRDC, (2016)) We consider only students without disabilities, and note that depending on school policy, educational services may still be provided during this time.[6]

  A chronically absent student is one "who is absent 15 or more school days during the school year. A student is absent if he or she is not physically on school grounds and is not participating in instruction or instruction-related activities at an approved off-grounds location for at least half the school day." (CRDC, (2016)) Each day for which a student is absent for 50 percent or more of the school day is counted. Absences are counted regardless of whether they are excused or not, and so include absences due to illness, needing to care for a family member, or simple truancy.

  Harassment or bullying on the basis of race, color, or national origin "refers to intimidation or abusive behavior toward a student based on actual or perceived race, color, or national origin. Harassing conduct may take many forms, including verbal acts and name-calling, as well as non-verbal behavior, such as graphic and written statements, or conduct that is physically threatening, harmful or humiliating. The conduct can be carried out by school employees, other students, and non-employee third parties. Bullying on the basis of race, color, or national origin constitutes racial harassment." (CRDC, (2016)) Though there are other categories of bullying and harassment reported (and other types of infractions and disciplinary measures taken), these are less directly relevant to the question at hand.

Notably, all the outcome information described above is also provided for Hispanic subpopulations — hence, the outcome of interest is generally the number of Hispanic students passing AP tests, or being bullied on the basis of their ethnicity, etc. These variables are all reported at the school level. dummies for whether the school contains a primary school, middle school, and high school.

Controls at the county level are sourced from IPUMS and consist of basic relevant demographic information: population, income, percent of county that is Hispanic etc. County level data is

[4]The specific definition of a LEP student depends on individual state regulation, but must also satisfy the criteria outlined under Title IX of the Elementary and Secondary Education Act (US Department of Education, (2004)). The most salient features of Title IX are that students must either not speak English as a native language or come from an environment where non-English languages are dominant, and also face substantial difficulty in engaging with others on the basis of their English ability.

[5]Department of Justice and Department of Education, (2015*c*) contains a full enumeration of the responsibilities school districts have. It further includes requirements such as ensuring equal access to various school programs etc.

[6]Students with disabilities served under IDEA face substantially different suspension policy.

mapped to its relevant location using census data as well.

Finally, data attached to specific outcomes are discussed under their relevant section.

archive.org transcript data Appendix Table A.10 Panel A contains the list of word stubs for Hispanic countries. Panel B contains a list of common words relating to education. Panel C contains a list of telenovelas with good role models that aired before 2015.

Geocoding Geocoding by ArcGIS is successful over 99.9% of the time. Schools not successfully geocoded are dropped from the sample.

Distance for counties are computed by minimum distances

Appendix B Additional figures and tables

Table A.1: Influence of Spanish Language Television on Migration Between Counties - Origin Sample

	IHS(# Hispanic Migrants)		
Panel A: Origin County Inside Contour	(1)	(2)	(3)
Dummy: Destination Outside TV Contour	-0.387^{***}	-0.286^{***}	-0.280^{***}
	(0.048)	(0.044)	(0.044)
TV Dummy × Distance to Origin	-0.003^{**}	-0.004^{***}	-0.004^{***}
	(0.001)	(0.001)	(0.001)
TV Dummy × Distance to Destination	0.001	-0.002^{*}	-0.002
	(0.001)	(0.001)	(0.001)
Distance from Contour to Origin (KM)	0.001	0.003^{*}	0.003
	(0.002)	(0.002)	(0.002)
Distance from Contour to Destination (KM)	-0.001	0.002	0.002
	(0.001)	(0.001)	(0.001)
Origin Log(Population)	0.146^{***}	0.161^{***}	0.150^{***}
	(0.020)	(0.017)	(0.021)
Destination Log(Population)	0.150^{***}	0.136^{***}	0.125^{***}
	(0.014)	(0.013)	(0.016)
Origin % Hispanic		0.792^{***}	0.881^{***}
		(0.103)	(0.141)
Destination % Hispanic		1.485^{***}	1.573^{***}
		(0.122)	(0.141)
Origin Log(Income)			0.093
			(0.094)
Destination Log(Income)			0.090
			(0.078)
Observations	8,479	8,479	8,479
Panel B: Origin County Outside Contour			
Dummy: Destination Inside TV Contour	-0.078	-0.123	-0.120
	(0.108)	(0.096)	(0.096)
TV Dummy × Distance to Origin	-0.003^{*}	-0.004^{***}	-0.004^{***}
	(0.002)	(0.001)	(0.001)
TV Dummy × Distance to Destination	-0.004^{***}	-0.002	-0.002
	(0.001)	(0.001)	(0.001)
Distance from Contour to Origin (KM)	-0.0003	0.001	0.001
	(0.001)	(0.001)	(0.001)
Distance from Contour to Destination (KM)	-0.001^{***}	-0.001^{***}	-0.001^{***}
	(0.0002)	(0.0003)	(0.0003)
Origin Log(Population)	0.164^{***}	0.131^{***}	0.094^{***}
	(0.017)	(0.021)	(0.026)
Destination Log(Population)	0.150^{***}	0.128^{***}	0.125^{***}
	(0.023)	(0.020)	(0.021)
Origin % Hispanic		1.328^{***}	1.611^{***}
		(0.295)	(0.329)
Destination % Hispanic		1.485^{***}	1.481^{***}
		(0.293)	(0.318)
Origin Log(Income)			0.407^{**}
			(0.193)
Destination Log(Income)			0.003
			(0.087)
Observations	4,062	4,062	4,062
Origin F.E.	Yes	Yes	Yes

Notes: The table presents coefficient estimates from regressions at the county-county level, only keeping origin counties within 100 KM of a contour boundary. The dependent variables are inverse hyperbolic sine transformed counts of Hispanic migrants from the origin county to the destination county. The key dependent variable of interest is the TV Dummy, which tracks whether the destination county is inside or outside the TV contour. This is interacted with the distance to the boundary for both the origin and destination county. County controls include log income, log population, and percentage county Hispanic for both origin and destination county. All regressions also contain origin county fixed effects. Standard errors are given in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table A.2: Influence of Spanish Language Television on Migration Between Counties - Destination Sample

	IHS(# Hispanic Migrants)		
Panel A: Destination County Inside Contour	(1)	(2)	(3)
Dummy: Origin Outside TV Contour	-0.410^{***}	-0.356^{***}	-0.349^{***}
	(0.088)	(0.082)	(0.081)
TV Dummy × Distance to Destination	-0.007^{***}	-0.008^{***}	-0.008^{***}
	(0.003)	(0.003)	(0.003)
TV Dummy × Distance to Origin	-0.002	-0.004^{**}	-0.004^{*}
	(0.002)	(0.002)	(0.002)
Distance from Contor to Destination (KM)	0.002	0.004^{**}	0.004^{**}
	(0.002)	(0.002)	(0.002)
Distance from Contour to Origin (KM)	0.001	0.004	0.003
	(0.002)	(0.002)	(0.002)
Destination Log(Population)	0.179^{***}	0.181^{***}	0.175^{***}
	(0.019)	(0.016)	(0.019)
Origin Log(Population)	0.115^{***}	0.117^{***}	0.102^{***}
	(0.018)	(0.017)	(0.020)
Destination % Hispanic		1.384^{***}	1.428^{***}
		(0.183)	(0.205)
Origin % Hispanic		0.813^{***}	0.949^{***}
		(0.182)	(0.203)
Destination Log(Income)			0.041
			(0.099)
Origin Log(Income)			0.138
			(0.109)
Observations	4,338	4,338	4,338
Panel B: Origin County Outside Contour			
Dummy: Origin Inside TV Contour	-0.140	-0.194	-0.193
	(0.152)	(0.144)	(0.144)
TV Dummy × Distance to Destination	-0.004^{*}	-0.007^{***}	-0.007^{***}
	(0.002)	(0.002)	(0.002)
TV Dummy × Distance to Origin	-0.007^{**}	-0.004	-0.004
	(0.003)	(0.003)	(0.003)
Distance from Contor to Destination (KM)	-0.0003	0.002	0.002
	(0.002)	(0.001)	(0.001)
Distance from Contour to Origin (KM)	-0.001^{***}	-0.002^{***}	-0.002^{***}
	(0.0004)	(0.0004)	(0.0004)
Destination Log(Population)	0.253^{***}	0.169^{***}	0.153^{***}
	(0.041)	(0.023)	(0.030)
Origin Log(Population)	0.182^{***}	0.181^{***}	0.181^{***}
	(0.035)	(0.030)	(0.034)
Destination % Hispanic		2.324^{***}	2.471^{***}
		(0.389)	(0.411)
Origin % Hispanic		1.276^{**}	1.253^{**}
		(0.602)	(0.584)
Destination Log(Income)			0.181
			(0.196)
Origin Log(Income)			-0.015
			(0.192)
Observations	1,659	1,659	1,659
Destination F.E.	Yes	Yes	Yes

Notes: The table presents coefficient estimates from regressions at the county-county level, only keeping destination counties within 100 KM of a contour boundary. The dependent variables are inverse hyperbolic sine transformed counts of Hispanic migrants from the origin county to the destination county. The key dependent variable of interest is the TV Dummy, which tracks whether the destination county is inside or outside the TV contour. This is interacted with the distance to the boundary for both the origin and destination county. County controls include log income, log population, and percentage county Hispanic for both origin and destination county. All regressions also contain destination county fixed effects. Standard errors are given in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table A.3: Effect of TV contour regulation on TV watched by ethnicity — parents and foreign born residents

	Minutes of TV watched			
	(1)	(2)	(3)	(4)
Panel A: TV watched with parents				
TV dummy × Hispanic	0.481*	0.507**	0.523**	0.522**
	(0.251)	(0.239)	(0.231)	(0.230)
TV dummy	-0.318**	-0.336**	-0.327**	-0.328**
	(0.144)	(0.140)	(0.138)	(0.139)
N	91,315	91,315	91,315	91,315
Panel B: TV watched by foreign born residents				
TV dummy × Hispanic	12.248*	11.822*	11.268	
	(6.955)	(6.957)	(6.989)	
TV dummy	0.910	0.950	2.695	
	(4.581)	(4.581)	(4.743)	
N	8,929	8,929	8,929	
Indiv. demographic	Yes	Yes	Yes	Yes
County log(pop)	Yes	Yes	Yes	Yes
County % Hispanic	No	Yes	Yes	Yes
County log(income)	No	No	Yes	Yes
Foreign born × Hispanic	No	No	No	Yes

Notes: The table presents coefficient estimates from regressions at the individual level. Panel A uses the number of minutes of TV watched with parents as the outcome, while Panel B uses the total number of minutes of TTV watched and restricts the sample to those who were born in a foreign country. TV dummy is an indicator variable for a person living in a county with access to Spanish language television based on the FCC regulation OET Bulletin 69, which is interacted with an indicator for whether the individual is Hispanic. Columns 1-4 include individual demographic controls for sex, age, and age squared, as well as the mean log(income) of the county. Columns 2-4 control for the percentage of the county that is Hispanic. Columns 3-4 control for the county's log(population). Column 4 controls for whether the individual is foreign born interacted with a Hispanic dummy. Standard errors are clustered at the county level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table A.4: Magnitude of the Hispanic achievement gap and SLTV effect size

	Asian-Hispanic gap	Gap after SLTV	White-Hispanic gap
	(1)	(2)	(3)
SAT/ACTs taken	46.8%	38.3%	36.6 %
Calculus taken	53.6%	41.0%	15.0%
APs passed	72.3%	69.6%	17.8%
Gifted students	60.5%	51.0%	56.6%
Advanced math taken	45.3%	31.7%	25.8%
Biology taken	5.6%	-18.9%	-6.2%
Physics taken	43.7%	26.2%	25.4%
Chemistry taken	27.7%	6.7%	9.9%

Notes: The table presents the achievement gap in percentage terms between Asians and Hispanics in column 1, and between whites and Hispanics in column 3. Column 2 presents the achievement gap using regression coefficients from Table 3, Column 1 for SAT/ACTs taken, calculus taken, and APs passed, and coefficients from Appendix Table A.6 for the remaining outcomes.

Table A.5: Effect of Spanish language TV on Hispanic academic achievement

	(1)	(2)	(3)
Panel A: IHS(Hispanic SAT/ACTs taken)			
TV dummy	0.036***	0.038***	0.034***
	(0.013)	(0.012)	(0.012)
N	21,610	21,610	21,610
Panel B: IHS(Hispanic calculus taken)			
TV dummy	0.068***	0.076***	0.075***
	(0.012)	(0.012)	(0.011)
N	11,460	11,460	11,460
Panel C: IHS(Hispanic APs passed)			
TV dummy	0.038***	0.048***	0.047***
	(0.009)	(0.009)	(0.009)
N	3,757	3,757	3,757
County controls	Yes	Yes	Yes
School size controls	No	Yes	Yes
School type controls	No	No	Yes

Notes: The table presents coefficient estimates from regressions at the school level, only keeping schools within 100 KM of a Spanish language TV contour boundary. The dependent variable are inverse hyperbolic sine transformed counts of the number of Hispanic students taking the SAT or ACT in Panel A, the number of Hispanic students enrolled in calculus in Panel B, and the number of Advanced Placement tests passed by Hispanic students in Panel C. TV dummy is an indicator variable for a school with access to Spanish language television. Table 3 Columns 1-3 include county level controls for log(income), log(population), and percentage of the county that is Hispanic, as well as school level controls for the number of Hispanic and Asian students enrolled. Columns 2-3 control for the number of teachers and total number of students at the school. Column 3 controls for indicators denoting whether the school contains a primary, middle, and high school division. School district fixed effects are always included. Standard errors are robust. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table A.6: Effect of Spanish language TV on Hispanic vs. Asian academic achievement

	(1)	(2)	(3)
Panel A: IHS(gifted students)			
TV dummy × Hispanic	0.2389***	0.2389***	0.2389***
	(0.0284)	(0.0284)	(0.0284)
N	52,130	52,130	52,130
Panel B: IHS(advanced math courses)			
TV dummy × Hispanic	0.2501***	0.2501***	0.2501***
	(0.0362)	(0.0362)	(0.0362)
N	14,354	14,354	14,354
Panel C: IHS(biology courses)			
TV dummy × Hispanic	0.2596***	0.2596***	0.2596***
	(0.0272)	(0.0272)	(0.0272)
N	19,008	19,008	19,008
Panel D: IHS(physics courses)			
TV dummy × Hispanic	0.3114***	0.3114***	0.3114***
	(0.0345)	(0.0345)	(0.0345)
N	13,952	13,952	13,952
Panel E: IHS(chemistry courses)			
TV dummy × Hispanic	0.2896***	0.2896***	0.2896***
	(0.0273)	(0.0273)	(0.0273)
N	16,472	16,472	16,472
School district FE	Yes	Yes	Yes
# Hispanic, Asian students	Yes	Yes	Yes
School size controls	No	Yes	Yes
School type controls	No	No	Yes

Notes: The table presents coefficient estimates from regressions at the school-ethnicity level, only keeping schools within 100 KM of a Spanish language TV contour boundary. The dependent variable are inverse hyperbolic sine transformed counts of the number of gifted students in Panel A, the number of students enrolled in an advanced math course in Panel B, the number of students enrolled in a biology course in Panel C, the number of students enrolled in a physics course in Panel D, and the number of students enrolled in a chemistry course in Panel E. TV dummy is an indicator variable for a school with access to Spanish language television, which is interacted with an indicator for whether the demographic is Hispanic (the omitted group are Asians). Columns 1-3 control for the number of Hispanic and Asian students enrolled. Columns 2-3 control for the number of teachers and total number of students at the school. Column 3 controls for indicators denoting whether the school contains a primary, middle, and high school division. School district fixed effects are always included. Standard errors are clustered at the state level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table A.7: Effect of Spanish language TV on Hispanic vs. Asian academic achievement: robustness and evaluating alternative hypotheses

	(1)	(2)	(3)
Panel A.1.1: Baseline — IHS(SAT/ACTs taken)			
TV dummy × Hispanic	0.1598***	0.1598***	0.1598***
	(0.0264)	(0.0264)	(0.0264)
Panel A.1.2: Baseline — IHS(calculus taken)			
TV dummy × Hispanic	0.2718***	0.2718***	0.2718***
	(0.0369)	(0.0369)	(0.0369)
Panel A.1.3: Baseline — IHS(APs passed)			
TV dummy × Hispanic	0.0964***	0.0966***	0.0972***
	(0.0346)	(0.0353)	(0.0360)
Panel A.2.1: Within 50 KM of contour boundary IHS(SAT/ACTs taken)			
TV dummy × Hispanic	0.1481***	0.1481***	0.1481***
	(0.0251)	(0.0252)	(0.0252)
Panel A.2.2: Within 50 KM of contour boundary IHS(calculus taken)			
TV dummy × Hispanic	0.2756***	0.2756***	0.2756***
	(0.0338)	(0.0338)	(0.0338)
Panel A.2.3: Within 50 KM of contour boundary IHS(APs passed)			
TV dummy × Hispanic	0.1039***	0.1050***	0.1056***
	(0.0398)	(0.0403)	(0.0408)
Panel A.3.1: Within 33 KM of contour boundary IHS(SAT/ACTs taken)			
TV dummy × Hispanic	0.1326***	0.1326***	0.1326***
	(0.0260)	(0.0260)	(0.0260)
Panel A.3.2: Within 33 KM of contour boundary IHS(calculus taken)			
TV dummy × Hispanic	0.2625***	0.2625***	0.2625***
	(0.0393)	(0.0393)	(0.0393)
Panel A.3.3: Within 33 KM of contour boundary IHS(APs passed)			
TV dummy × Hispanic	0.1257***	0.1285***	0.1295***
	(0.0459)	(0.0467)	(0.0475)
Panel A.4.1: Between 25-100 KM of contour boundary IHS(SAT/ACTs taken)			

TV dummy × Hispanic	0.2195***	0.2195***	0.2195***
	(0.0328)	(0.0328)	(0.0328)
Panel A.4.2: Between 25-100 KM of contour boundary IHS(calculus taken)			
TV dummy × Hispanic	0.3213***	0.3213***	0.3213***
	(0.0443)	(0.0443)	(0.0443)
Panel A.4.3: Between 25-100 KM of contour boundary IHS(APs passed)			
TV dummy × Hispanic	0.0807**	0.0805**	0.0819**
	(0.0383)	(0.0384)	(0.0386)
Panel A.5.1: Control for distance, distance^2 IHS(SAT/ACTs taken)			
TV dummy × Hispanic	0.1598***	0.1598***	0.1598***
	(0.0210)	(0.0210)	(0.0210)
Panel A.5.2: Control for distance, distance^2 IHS(calculus taken)			
TV dummy × Hispanic	0.2718***	0.2718***	0.2718***
	(0.0277)	(0.0277)	(0.0277)
Panel A.5.3: Control for distance, distance^2 IHS(APs passed)			
TV dummy × Hispanic	0.0962***	0.0961***	0.0967***
	(0.0287)	(0.0289)	(0.0291)
Panel B.1.1: Functional form log(SAT/ACTs taken +1)			
TV dummy × Hispanic	0.1501***	0.1501***	0.1501***
	(0.0191)	(0.0191)	(0.0191)
Panel B.1.2: Functional form log(calculus taken +1)			
TV dummy × Hispanic	0.2413***	0.2413***	0.2413***
	(0.0250)	(0.0250)	(0.0251)
Panel B.1.3: Functional form log(APs passed +1)			
TV dummy × Hispanic	0.0931***	0.0928***	0.0934***
	(0.0280)	(0.0282)	(0.0284)
Panel B.2.1: Functional form SAT/ACTs taken			
TV dummy × Hispanic	11.07***	11.07***	11.07***
	(1.566)	(1.567)	(1.567)
Panel B.2.2: Functional form			

Calculus taken			
TV dummy × Hispanic	7.192***	7.192***	7.192***
	(1.544)	(1.544)	(1.544)
Panel B.2.3: Functional form APs passed			
TV dummy × Hispanic	4.676*	4.671*	4.710*
	(2.550)	(2.544)	(2.559)
Panel B.3.1: Functional form Standardized SAT/ACTs taken			
TV dummy × Hispanic	0.1559***	0.1559***	0.1559***
	(0.0221)	(0.0221)	(0.0221)
Panel B.3.2: Functional form Standardized calculus taken			
TV dummy × Hispanic	0.1662***	0.1662***	0.1662***
	(0.0357)	(0.0357)	(0.0357)
Panel B.3.3: Functional form Standardized APs passed			
TV dummy × Hispanic	0.0624*	0.0623*	0.0628*
	(0.0340)	(0.0339)	(0.0341)
Panel C.1.1: Weight by school size IHS(SAT/ACTs taken)			
TV dummy × Hispanic	0.2379***	0.2379***	0.2379***
	(0.0311)	(0.0311)	(0.0311)
Panel C.1.2: Weight by school size IHS(calculus taken)			
TV dummy × Hispanic	0.2615***	0.2615***	0.2615***
	(0.0312)	(0.0312)	(0.0312)
Panel C.1.3: Weight by school size IHS(APs passed)			
TV dummy × Hispanic	0.1097***	0.1093***	0.1106***
	(0.0328)	(0.0329)	(0.0333)
Panel C.2.1: Weight by school-demographic size IHS(SAT/ACTs taken)			
TV dummy × Hispanic	0.0772**	0.0765*	0.0784**
	(0.0390)	(0.0398)	(0.0395)
Panel C.2.2: Weight by school-demographic size IHS(calculus taken)			
TV dummy × Hispanic	0.0736*	0.0739*	0.0787*
	(0.0410)	(0.0412)	(0.0411)
Panel C.2.3: Weight by school-demographic size			

IHS(APs passed)			
TV dummy × Hispanic	0.0641 (0.0397)	0.0631 (0.0399)	0.0647 (0.0403)
Panel D.1.1: Drop bilingual stations IHS(SAT/ACTs taken)			
TV dummy × Hispanic	0.1653*** (0.0234)	0.1653*** (0.0234)	0.1653*** (0.0234)
Panel D.1.2: Drop bilingual stations IHS(calculus taken)			
TV dummy × Hispanic	0.2826*** (0.0300)	0.2826*** (0.0300)	0.2826*** (0.0300)
Panel D.1.3: Drop bilingual stations IHS(APs passed)			
TV dummy × Hispanic	0.1134*** (0.0302)	0.1137*** (0.0303)	0.1152*** (0.0306)
Panel E.1.1: Control station characteristics IHS(SAT/ACTs taken)			
TV dummy × Hispanic	0.1598*** (0.0210)	0.1598*** (0.0210)	0.1598*** (0.0210)
Panel E.1.2: Control station characteristics IHS(calculus taken)			
TV dummy × Hispanic	0.2718*** (0.0277)	0.2718*** (0.0277)	0.2718*** (0.0277)
Panel E.1.3: Control station characteristics IHS(APs passed)			
TV dummy × Hispanic	0.0964*** (0.0288)	0.0966*** (0.0290)	0.0972*** (0.0293)
Panel E.2.1: Drop stations built after 1997 IHS(SAT/ACTs taken)			
TV dummy × Hispanic	0.1706*** (0.0219)	0.1706*** (0.0219)	0.1706*** (0.0219)
Panel E.2.2: Drop stations built after 1997 IHS(calculus taken)			
TV dummy × Hispanic	0.2803*** (0.0281)	0.2803*** (0.0281)	0.2803*** (0.0281)
Panel E.2.3: Drop stations built after 1997 IHS(APs passed)			
TV dummy × Hispanic	0.1020*** (0.0293)	0.1020*** (0.0294)	0.1025*** (0.0296)
Panel F.1.1: Correcting for spatial autocorrelation, arbitrary			

spatial clusters — IHS(SAT/ACTs taken)			
TV dummy × Hispanic	0.160***	0.160***	0.160***
	(0.034)	(0.034)	(0.034)
Panel F.1.2: Correcting for spatial autocorrelation, arbitrary spatial clusters — IHS(calculus taken)			
TV dummy × Hispanic	0.272***	0.272***	0.272***
	(0.054)	(0.054)	(0.054)
Panel F.1.3: Correcting for spatial autocorrelation, arbitrary spatial clusters — IHS(APs passed)			
TV dummy × Hispanic	0.096***	0.097***	0.097***
	(0.041)	(0.041)	(0.042)
Panel F.2.1: Correcting for spatial autocorrelation, Bartlett kernel IHS(SAT/ACTs taken)			
TV dummy × Hispanic	0.160***	0.160***	0.160***
	(0.030)	(0.030)	(0.030)
Panel F.2.2: Correcting for spatial autocorrelation, Bartlett kernel IHS(calculus taken)			
TV dummy × Hispanic	0.272***	0.272***	0.272***
	(0.043)	(0.043)	(0.043)
Panel F.2.3: Correcting for spatial autocorrelation, Bartlett kernel IHS(APs passed)			
TV dummy × Hispanic	0.096***	0.097***	0.097***
	(0.037)	(0.037)	(0.038)
Panel F.3.1: Two-way cluster, school district and TV network level IHS(SAT/ACTs taken)			
TV dummy × Hispanic	0.1598***	0.1598***	0.1598***
	(0.0146)	(0.0146)	(0.0146)
Panel F.3.2: Two-way cluster, school district and TV network level IHS(calculus taken)			
TV dummy × Hispanic	0.2718***	0.2718***	0.2718***
	(0.0211)	(0.0211)	(0.0211)
Panel F.3.3: Two-way cluster, school district and TV network level IHS(APs passed)			
TV dummy × Hispanic	0.0964**	0.0966**	0.0972**
	(0.0190)	(0.0197)	(0.0198)
Panel F.4.1: Clustering at the TV station level IHS(SAT/ACTs taken)			
TV dummy × Hispanic	0.1598***	0.1598***	0.1598***
	(0.0377)	(0.0377)	(0.0377)
Panel F.4.2: Clustering at the TV station level			

IHS(calculus taken)			
TV dummy × Hispanic	0.2718***	0.2718***	0.2718***
	(0.0407)	(0.0408)	(0.0408)
Panel F.4.3: Clustering at the TV station level IHS(APs passed)			
TV dummy × Hispanic	0.0964**	0.0966**	0.0972**
	(0.0348)	(0.0354)	(0.0359)
Panel F.5.1: Robust errors IHS(SAT/ACTs taken)			
TV dummy × Hispanic	0.1598***	0.1598***	0.1598***
	(0.0210)	(0.0210)	(0.0210)
Panel F.5.2: Robust errors IHS(calculus taken)			
TV dummy × Hispanic	0.2718***	0.2718***	0.2718***
	(0.0277)	(0.0277)	(0.0277)
Panel F.5.3: Robust errors IHS(APs passed)			
TV dummy × Hispanic	0.0964**	0.0966**	0.0972**
	(0.0288)	(0.0289)	(0.0291)
Panel G.1.1: Comparing Hispanic and white students IHS(SAT/ACTs taken)			
TV dummy × Hispanic	0.4360***	0.4360***	0.4360***
	(0.0353)	(0.0353)	(0.0353)
Panel G.1.2: Comparing Hispanic and white students IHS(calculus taken)			
TV dummy × Hispanic	0.5322***	0.5322***	0.5322***
	(0.0336)	(0.0336)	(0.0336)
Panel G.1.3: Comparing Hispanic and white students IHS(APs passed)			
TV dummy × Hispanic	0.2505***	0.2561***	0.2565***
	(0.0333)	(0.0333)	(0.0337)
School district FE	Yes	Yes	Yes
# Hispanic, Asian students	Yes	Yes	Yes
School size controls	No	Yes	Yes
School type controls	No	No	Yes

The table presents coefficient estimates from regressions at the school-ethnicity level, only keeping schools within 100 KM of a Spanish language TV contour boundary. The dependent variable are inverse hyperbolic sine transformed counts of the number of students taking the SAT or ACT in Panel A, the number of students enrolled in calculus in Panel B, and the number of Advanced Placement tests passed in Panel C. TV dummy is an indicator variable for a school with access to Spanish language television, which is interacted with an indicator for whether the demographic is Hispanic (the omitted group are Asians). Columns 1-3 control for the number of Hispanic and Asian students enrolled. Columns 2-3 control for the number of teachers and total number of students at the school. Column 3 controls for indicators denoting whether the school contains a primary, middle, and high school division. School district fixed effects are always includeE. Standard errors are clustered at the school district level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table A.8: Effect of Spanish language TV on Hispanic student retention

	(1)	(2)	(3)
Panel A: IHS(Hispanic students retained)			
TV dummy	-0.0251	-0.0211	-0.0216
	(0.0155)	(0.0152)	(0.0151)
N	5,968	5,968	5,968
County controls	Yes	Yes	Yes
School size controls	No	Yes	Yes
School type controls	No	No	Yes

Notes: The table presents coefficient estimates from regressions at the school level, only keeping schools within 100 KM of a Spanish language TV contour boundary. The dependent variable is the inverse hyperbolic sine transformed count of the number of high school Hispanic students retained from the prior year. TV dummy is an indicator variable for a school with access to Spanish language television. Columns 1-3 include county level controls for log(income), log(population), and percentage of the county that is Hispanic, as well as school level controls for the number of Hispanic and Asian students enrolled. Columns 2-3 control for the number of teachers and total number of students at the school. Column 3 controls for indicators denoting whether the school contains a primary, middle, and high school division. Standard errors are clustered at the school district level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table A.9: Effect of TV contour regulation on time spent on child's education by ethnicity

	Minutes spent on child's education			
	(1)	(2)	(3)	(4)
Panel A: Total TV watched				
TV dummy × Hispanic	0.060	0.105	0.178	0.179
	(0.334)	(0.340)	(0.330)	(0.328)
TV dummy	0.194	0.164	0.205	0.202
	(0.205)	(0.208)	(0.224)	(0.225)
Indiv. demographic	Yes	Yes	Yes	Yes
County log(income)	Yes	Yes	Yes	Yes
County % Hispanic	No	Yes	Yes	Yes
County log(pop.)	No	No	Yes	Yes
Foreign born × Hispanic	No	No	No	Yes

Notes: The table presents coefficient estimates from regressions at the individual level, only keeping those living in a county within 100 KM of a Spanish language TV contour boundary. The dependent variable is the number of minutes spent on household children's education (e.g. helping with homework or talking with teachers). TV dummy is an indicator variable for a person living in a county with access to Spanish language television based on the FCC regulation OET Bulletin 69, which is interacted with an indicator for whether the individual is Hispanic. Columns 1-4 include demographic controls for sex, age, and age squared, as well as the mean log(income) of the county. Columns 2-4 control for the percentage of the county that is Hispanic. Columns 3-4 control for the county's log(population). Column 4 controls for whether the individual is foreign born interacted with a Hispanic dummy. Standard errors are robust. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table A.10: TV transcript keywords

Panel A: Hispanic references	mexic, bolivia, chile, argentin, venezuela, beliz, costa rica, salvador, guatemala hondur, nicaragua, panama, colombia, ecuador, guyana, paragua, peru urugu, cuba, dominican, puerto, latin
Panel B: Education references	educación , enseñanza, colegio, escuela, universidad, estudio, estudiar, estudiante alumna, alumno, profesora, profesor, maestro, maestra, clase, rango, grado aprender, mates, matematicas
Panel C: Role model references	Vivan los niños, Alegrijes y rebujos, Aventuras en El tiempo, amigos por siempre Misión S.O.S., Carrusel y El abuelo y Yo, El Juego de la Vida, De pocas pulgas luz Clarita, Serafín, 31 minutos, Bizbirije, Odisea Burbujas, El Tesoro del Saber Topo Gigio, Once Niñas y Niños

Notes: Television transcripts are classified as containing a reference name if any keyword (or program title in Panel C) in the panel is exactly matched within the word, ignoring case. Panel A contains the list of word stubs for Hispanic countries. Panel B contains a list of common words relating to education. Panel C contains a list of telenovelas with good role models for children that aired before 2015.