

Racial Identity and Education in Social Networks,^{*†}

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Abstract

We investigate identity issues to explain differences in school performance between students of different races. Using a unique dataset of friendship relationships between students in the US, we show that friendship formation can be taken as a measure of racial identity. We then find that having a higher percentage of same-race friends is associated with higher test scores for white teenagers and with lower test scores for blacks. However, the higher is the education level of a black teenager's parents, the lower is this negative association, while for whites, it is the reverse. It is thus the combination of choice of friends and parents' education that seems to be an important factor in shaping differences in school performance between students of different races but also between students of the same race.

Key words: Minorities, school performance, oppositional identities.

JEL Classification: A14, I21, J15.

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1 Introduction

The educational experience of American school students is a multifaceted phenomenon that encompasses far more than academic achievement. Other important aspects of the educational experience include daily participation in school as well as students' feelings about their school. These latter factors are much less studied and thus understood by economists,¹ even though these aspects of the educational experience also have important consequences on drop out rates, delinquency activities and school performance. In particular, economists have been trying to explain school performance differences between blacks and whites (see, e.g., the survey by Neal, 2006) by putting forward the role of family inputs, school quality and neighborhood effects. Less research has been, however, devoted to explaining school performance differences within a race and looking at racial differences in attitudes, behavioral and cultural factors. If one controls for different characteristics of the parents (e.g. human capital), the neighborhood (e.g. segregation) and the school quality (e.g. teacher/student ratio, average test scores), one still finds different school performances for black and white students. The natural explanation for this is peer effects. For example, Hoxby (2000) finds that students are affected by the achievement level of their peers and that peer effects are stronger *intra*-race. We go further in this direction by looking at other "sociological aspects" in school performance. Our aim is to investigate the effects of racial identity (here choice of same-race friends) and parent's education on school performances between students of different races but also between students of the same race.

Racial identity is obviously a difficult and complex question. Akerlof and Kranton (2000, 2010) define it as a person's sense of self or self image. A person's sense of self or self image is then said to make his or her identity in that "his or her identity is bound to social categories; and individuals identify with people in some categories and differentiate themselves from those in others." (page 720).² In other words, self-image, or identity, is associated with the social environment; example of social categories include racial designations. Pursuing this idea, Akerlof and Kranton (2002) try to link together identity and schooling. A student's primary motivation is his or her identity and the quality of the school depends on how students fit in a school's social setting. In the context of schools, social categories could be, for example, "jock" and "nerd". In particular, it has been observed that African Americans tend to "choose" to adopt what are termed "oppositional" identities, that is, some actively reject the dominant (e.g., white) behavioral norms while others totally assimilate to it (see, in particular, Ainsworth-Darnell and Downey, 1998). Studies in the US and in the UK have found, for example, that African American students in poor areas may be ambivalent about learning standard English and performing well at school because this may

¹Sociologists have been more interested by such issues. See e.g. Coleman (1961) or more recently, Kirkpatrick Johnson et al. (2001). Akerlof and Kranton (2002, 2010) survey some of these issues from the noneconomic literature and propose to "translate" them into an economic model of students and schools.

²See also Bisin et al. (2010, 2011a, 2011b).

be regarded as “acting white” and adopting mainstream identities (Wilson, 1987; Delpit, 1995; Fordham and Ogbu, 1986; Ogbu, 1997; Austen-Smith and Fryer, 2005; Battu et al., 2007; Selod and Zenou, 2006; Currarini et al., 2009, 2010; De Martí and Zenou, 2009; Battu and Zenou, 2010; Fryer and Torelli, 2010). In some instances, oppositional identities produce significant economic and social conflicts.

In the present paper, we pursue this line of research by investigating the impact of “identity” on school performance for black and white students.

Our empirical investigation exploits a unique and very detailed data set of friendship networks in US schools (the National Longitudinal Study of Adolescent Health), which allows us to construct a novel and objective measure of individuals’ attachments to their culture of origin on the basis of the number of same-race friends nominated by each student as his/her best friends, as well as to obtain information on family background, school and neighborhood characteristics.³ This strategy, however, embeds an empirical challenge. Friends as well as school performance are choice variables. As a result, there may be unobservable factors affecting both the choice of friends and school performance. The richness of information of our data allows us to tackle this issue. Indeed, our dataset provides information on various aspects of the religious behaviors of the adolescent that allows us to select some religion-based variables, i.e. religious affiliation, religious service attendance and involvement in church youth groups, that provide plausible instruments for the number of same-race friends. Indeed, the religion affiliation and church attendance of adolescents (rather than of adults) are likely to reflect the transmission of identity from their parents rather than some unobservable traits, such as, for example, self-discipline, which also influences educational outcomes. Virtually all related research in sociology (see e.g. Ozorak, 1989; Hyde, 1990; Bao et al., 1999) documents an extremely high correlation between parents’ and children’s religious beliefs and participation. We reinforce our argument by providing some evidence on the age of religious conversions. Indeed, there is strong evidence that conversions are more likely to occur beyond adolescence (see e.g. the literature surveys by Snow and Machalek, 1984). This evidence confirms that our religion-based variables are an indication of a transmission of an identity rather than a personal choice from adolescents.

Our analysis proceeds as follows.

First, we investigate whether the choice of same-race friends is a good indicator of racial identity. To this end we use a technique that is well-established in economics for estimating consumers’ preferences: revealed preference theory (Mas-Colell et al., 1995). One infers preferences of the individual by careful observation of the choices that they make based on the opportunities that they have. We observe in our data that in *integrated schools* (where there are between 35 and 75 percent of black and white students), blacks tend to have “oppositional identities” since some have

³Facchini et al. (2015) consider a migrant’s friendship ties with natives as a measure of cultural assimilation in the host country.

mainly white friends while other have mainly black friends. On the contrary, white students tend to have mostly white friends. Even if they have the possibility of choosing friends from different races, some black and most white students prefer to have most of their friends of the same race, confirming the fact the choice of friends is an indicator of racial identity.

Second, we investigate the consequences of this choice on educational outcomes. Controlling for individual socio-demographic and family backgrounds, protective factors, residential neighborhood and school characteristics, we find that, having a higher percentage of same-race friends has a positive effect on white teenagers' test score while having a negative effect on blacks' test scores. When we investigate, however, the interaction between our indicator of racial identity and the most important driver of racial differences in school performance, i.e. parental education, we find significant effects. Indeed, the higher the education level of a black teenager's parent, the lower this negative effect is, while for whites, it is the reverse. It is thus the combination of the choice of friends and the parent's education that is potentially responsible for the difference in school performances between students of different races but also between students of the same race.

The paper unfolds as follows. In the next section, we describe our data and provide some descriptive evidence. In Section 3, using a revealed-preference approach, we determine whether choice of same-race friends is a good a measure of racial identity. Section 4 is devoted to the empirical strategy and the econometric issues. The empirical results are exposed in Section 5. Finally, Section 6 concludes.

2 Data and descriptive evidence

Our analysis is made possible by the use of a unique database on friendship networks from the National Longitudinal Survey of Adolescent Health (AddHealth). The AddHealth database has been designed to study the impact of the social environment (i.e. friends, family, neighborhood and school) on adolescents' behavior in the United States by collecting data on students in grades 7-12 from a nationally representative sample of roughly 130 private and public schools in years 1994-95. Every student attending the sampled schools on the interview day is asked to compile a questionnaire (in-school survey) containing questions on the respondents' characteristics and friendship. Friendship information is based on actual friend nominations. All students were asked to list their best friends (up to five for each sex), and it is possible to assemble the characteristics for each friend.^{4,5} We exploit this feature of the dataset to derive the percentage of same-race friends each

⁴Note that, when an individual identifies a best friend who does not belong to the sampled schools, the database provides no information about this friend. Fortunately, in the large majority of cases, best friends appear to be in the same school and thus are systematically included in the network.

⁵The limit in the number of nominations is not binding. Less than 1% of the students show a list of ten best friends. On average, white students declare to have 5.79 friends with a small dispersion around this mean value (standard deviation equal to 0.99). Blacks have on average a slightly lower rate of nominations (the average number

student actually nominates as best friends.⁶ This sample contains information on roughly 90,000 students. A subset of adolescents selected from the rosters of the sampled schools, about 20,000 individuals, is then asked to compile a longer questionnaire containing extremely detailed individual and household information (*in-home survey* and parental data). In particular, the in-home survey contains detailed questions about religious beliefs and practice of the adolescents, that will play an important role in our empirical analysis. The richness of information on individuals' behavior, family background, school and area of residence is essential in our context since students' percentage of same-race friends may proxy for unobservable individual, family, school or neighborhood characteristics.⁷ In other words, the in-home survey contains a lot of information that can be used to limit the potential endogeneity of the percentage of same-race friends. Those subjects are interviewed again in 1995–1996 (Wave II), in 2001–2002 (Wave III), and in 2007–2008 (Wave IV). For the purposes of this paper we focus on the Wave I, *in-home* sample. Our final sample consists of 6,496 white and 2,013 black students. This large reduction in sample size with respect to the original sample is mainly due to the network construction procedure - roughly 20 percent of the students do not nominate any friends and another 20 percent cannot be correctly linked.⁸ Missing values in variables account for the remaining discrepancy.

Regarding the definition of our target variables, the individual's school performance is measured using the available information on the grade achieved by each student in mathematics, history and social studies and science. They range from D or lower to A, the highest grade, and are re-coded 1 to 4. On the basis of these scores and adopting the standard approach in the sociological literature, a school performance index is calculated for each respondent. For each individual, we calculate an index of school performance using a standard principal component analysis. The final composite index is the first principal component.⁹

The other key variable is parent's education. This is the standard determinant of racial differences (see, e.g. Neal, 2006, and Patacchini and Zenou, 2009) and we analyze here the interaction with our measure of racial identity. The AddHealth dataset contains information about the schooling of the (biological or non-biological) parent who is living with the adolescent, distinguishing between “never went to school”, “not graduate from high school”, “high school graduate”, “graduated from college or a university”, “professional training beyond a four-year college” (coded 1 to

of best friends is equal of 4.98), but with a much higher variation (standard deviation equal to 2.11).

⁶Obviously we do not consider the absolute number of same-race friends but the percentage in total number of nominations to avoid problems arising from the presence of unobserved factors (such as wearing particular clothes or having special electronic gadgets) that might induce a teenager to be more popular among her/his same-race (or different race) peers regardless of ethnic preferences.

⁷For a detailed description of survey and data see the AddHealth website <http://www.cpc.unc.edu/projects/addhealth>.

⁸The representativeness of the sample is preserved. Summary statistics are available upon request.

⁹The index explains roughly 56 percent of the total variance and captures a general performance at school since it is positively and highly correlated with the scores in all subjects. Further details on this procedure are available upon request.

5). We use this information, considering only the education of the father if both parents are in the household.

We have a plethora of other control variables (on individual socio-demographic and family backgrounds, protective factors, residential neighborhood and school characteristics), which are described in the Appendix.

Table 1 reports descriptive statistics of our key variables. Differences of mean values between races are always statistically significant. It appears that whites are less open towards interracial contacts than blacks. The average white student has almost 85 percent of white friends whereas the average black has less than 60 percent black friends (with considerable variations around this average value). Looking at the inter-race differences in academic performance and parental education, not surprisingly, blacks perform on average worse at school than whites and have lower educated parents. In our econometric analysis, we have standardized all our target variables so that they have zero mean and variance one in the whole sample.¹⁰

[Insert Table 1 here]

3 Is the percentage of same-race friends a measure of racial identity?

We would like now to provide some evidence on the extent to which individuals choose their same-race friends accounting for the racial composition of those they could have potentially formed friendship with. If the racial choice of friends were chosen randomly, the percentage of same-race friends of student i of race j (refers to as student ij) should be equal to the share of same-race students in the total number of students in the school attended by the student ij . We thus construct for each individual i of race j the following *homophily* index proposed by Coleman (1958) in sociology:¹¹

$$I_{ij} = \frac{\text{Observed (percentage of same-race friends)} - \text{Expected (percentage of same-race friends)}}{\text{Expected (percentage of same-race friends)}}$$

where the expected percentage of same-race friends for individual ij is simply the share of same-race students in the school attended by the individual ij . It is rescaled to be between -1 (preference for

¹⁰It appears that white students score on average 0.29 standard deviations above the mean, whereas black students perform 0.35 standard deviations below the mean.

¹¹This index has recently been used in economics by, among others, Currarini et al. (2009). In this paper, they provide a theoretical model that can explain why white and black students tend to have more same-race friends than its percentage in the population (*inbreeding homophily*).

opposite-race friends or *heterophily*) to 1 (preference for same-race friends or *inbreeding homophily*). If, for example, $I_{ij} = 0$ (*baseline homophily*), then it means that the percentage of same-race friends of individual ij is exactly the share of same-race students in the school. As a result, an analysis of the distribution of students over the values of the index I_{ij} enables us to investigate the degree of sorting into friendship groups by race. Indeed, a large cluster around zero indicates that the percentage of same-race friends simply reflects the racial composition of the school, whereas groups of observations far from zero suggest that the race of friends is chosen, thus revealing racial preferences in making friends.

The evidence is presented for *segregated* and *integrated schools* separately (see Figures 1 and 2 respectively). The upper and lower panels of Figure 1 show the picture for blacks (left panel) and whites (right panel) students in black segregated schools, i.e. schools with less than 10 percent of black students, and in white segregated school, i.e. schools with less than 20 percent of white students, respectively.¹² Figure 2 has the same structure as Figure 1 and illustrates the evidence in integrated schools, i.e. schools with a percentage of black (white) students between 35 and 75 percent.¹³

We differentiate between integrated schools and segregated schools in order to disentangle between the *racial bias* and the *meeting bias* in friendship choice. These two biases were clearly identified in Currarini et al. (2009, 2010) where the two key sources of homophily were: (i) biases in individual preferences for which relationships they form, and (ii) biases in the rates at which individuals meet each other. In other words, it is important to understand if homophily (measured by the Coleman Index I_{ij}) is primarily due to the fact that individuals mainly want to interact with people of the same race because they are racially biased (i.e. prefer to be friends with same-race individuals) and/or because they do not have the opportunity to meet individuals of the other race. If, for example, you are a black student in a black segregated school where there are less than 10% black students, then it is going to be difficult to have most of your friends who are blacks because they are not that many blacks around (meeting bias). This would not be true in an integrated school where there are least 35% of black students.

[Insert Figures 1 and 2 here]

The graphs display the following features. Firstly, irrespective of the race and of the racial composition of the school, students tend to have friends of the same race. Indeed, the right tail of the curves is always higher than the left tail. However, in black segregated schools (Figure 1, upper panel) where there is a meeting bias, the spikes around zero denote that the choice of same-race

¹²These thresholds (10% and 20%) correspond roughly to the first quintiles of the distributions of schools by black and white percentage of students.

¹³The pictures show on the horizontal axes the values of the index I divided in ten intervals and on the vertical axes the percentage of students having a value of the index in each interval. A line has been drawn between the different points.

friends follows the racial composition of the school (with blacks having mostly white friends). This may indicate that, because of the meeting bias, blacks have many white friends because it is difficult to meet other black students. As a result, this is not an indication of racial preferences or identity choice; just meeting bias.

In integrated schools, the picture is different and this is where we find strong evidence supporting the use of same-race friends as a measure of racial identity. Indeed, even though there is no meeting bias (since there a lot of white and black kids around), roughly 40 percent of the white students are associated with values of the index I greater than 0.4, denoting a clear deviation from the assumption of random choice of friends by race. The picture for blacks is even more interesting. Less than 20 percent of black students in our sample show a percentage of same-race friends close to the racial composition of the school attended (i.e., $-0.2 < I < 0.2$). Blacks appear to be more heterogenous in their choice of friends than whites. The clear bimodality in the distribution (corresponding to values of I between -0.6 and -0.8 and between 0.6 and 0.8) reveals that there are two types of blacks: those who prefer to have mostly white friends and those choosing mostly black friends. This is a clear indication of oppositional identities for black students. In our data, integrated schools are more than 65 percent of the entire sample.

Cutler et al. (1999) find similar attitudes among blacks. They use the following question of the General Social Survey in the United States in 1982: “If you could find the housing that you would want and like, would you rather live in a neighborhood that is all black; mostly black; half black; half white; or mostly white?” On average, 67 percent of blacks choose either the third or fourth option, meaning that a large fraction of blacks would like to interact with whites (either because they like whites or because they anticipate the positive effects on labor market outcomes) but also 33 percent of them would like to interact mostly with blacks.

4 Empirical strategy and econometric issues

4.1 The empirical model

As stated in the Introduction, the aim of this paper is to investigate the relationship between the choice of same-race friends and educational outcomes for both black and white students. For that, we consider the following equation. For $i = 1, \dots, n$, $j = B, W$, $s = 1, \dots, S$, we have:

$$\begin{aligned}
 y_{ijs} = & \alpha_0 + \alpha_1 \tilde{x}_{ijs} + \alpha_2 k_{ijs} + \alpha_3 \bar{k}_{ijs} + \alpha_4 \tilde{x}_{ijs} k_{ijs} + \alpha_5 \tilde{x}_{ijs} \bar{k}_{ijs} \\
 & + \gamma_0 b_{ij} + \gamma_1 b_{ij} \tilde{x}_{ijs} + \gamma_2 b_{ij} k_{ijs} + \gamma_3 b_{ij} \bar{k}_{ijs} + \gamma_4 b_{ij} \tilde{x}_{ijs} k_{ijs} + \gamma_5 b_{ij} \tilde{x}_{ijs} \bar{k}_{ijs} \\
 & + \sum_{k=1}^K \beta_k v_{ijs}^k + \sum_{k=1}^K \theta_k b_{ij} v_{ijs}^k + \eta_s + \varepsilon_{ijs}
 \end{aligned} \tag{1}$$

where s denotes the school attended by individual i of race $j = B, W$ ¹⁴. The dependent variable, y_{ijs} , is the educational achievement of individual ijs (individual i of race j attending school s), \tilde{x}_{ijs} is the percentage of same-race friends of individual ijs , k_{ijs} denotes the human capital level of individual ijs 's parent, \bar{k}_{ijs} is the average human capital level of individual ijs 's best friends' parents, b_{ij} is a dummy variable taking value equal to one if individual i is black ($j = B$) and zero otherwise, v_{ijs}^k (for $k = 1, \dots, K$) is a set of K control variables containing an extensive number of individual, family and residential neighborhood characteristics, η_s denotes school fixed effects aiming at capturing school specific differences, and, finally, ε_{ijs} is a white noise error term. As can be seen from equation (1), we also look at the cross effects between race and friendship, race and parents' human capital, race and parents' human capital of best friends. A precise description of all the control variables is contained in the Appendix.

Observe that the control set includes *the percentage of blacks in each adolescent's residential neighborhood*, as an indicator of exposure of students to blacks (see the segregation literature, like e.g. Massey and Denton, 1993, or, more recently, Card and Rothstein, 2007), thus controlling for neighborhood segregation effects. It also includes the average friends' school performance to rule out the possibility that the percentage of same-race friends simply captures peer effects. In addition, the richness of the information provided by the AddHealth questionnaire on adolescents' behavior allows us to find proxies for typically unobserved individual characteristics that may contaminate our target coefficients. For instance, we attempt to capture racial differences in attitude towards school performance and parenting by including indicators of student's motivation in school performance and parental care. Similarly, we capture differences in leadership propensity adding indicators of self-esteem and of the level of physical development compared to the peers. Also, and most importantly, because the AddHealth survey interviews all adolescents within a school, we estimate our model conditional on *school fixed effects*. This strategy not only enables us to capture school level inputs (such as teachers and students quality and possibly the parents' residential choices) but also accounts for the racial composition of the school (i.e., the number of same-race students each student could have potentially formed friendship with) so that only the variation in the percentage of same-race friends (across students in the same school) would be exploited. Indeed, major sources of potential bias in a regression of students' school achievement and the percentage of same-race friends are school-specific factors influencing both school performance effort and the choice of peers. We address further concerns about a possible endogeneity of the percentage of same-race friends on school performance using an instrumental variable strategy. Our strategy is discussed in the following section.

¹⁴ B and W refer to Black and White respectively.

4.2 The empirical strategy

We start by assuming that the choice of friends is exogenous, thus testing directly the impact of “choice of same-race friends”, \tilde{x}_{ijs} , on educational outcomes of black and white teenagers, y_{ijs} .

The investigation of such a relationship is, however, a very difficult exercise from an empirical point of view. A central empirical concern is that the choice of friends may be endogenous to the choice of effort because of *omitted variables* and/or *reverse causality* issues. Such difficulties, as well as the scarce availability of detailed data on racial preferences and attitudes, are certainly the main reasons for the lack of research on these “sociological aspects” of school performance. Here, we attempt to tackle these issue using the standard 2SLS. We find some plausible instruments for \tilde{x}_{ij} using the detailed information provided in our data on the various aspects of religious behavior of adolescents, i.e. *religious affiliation*, *religious service attendance* and *involvement in church youth groups*. A valid instrument is a variable that directly affects the percentage of same-race friends without showing a direct influence on school performance effort (and without being determined by this variable). In principle, to establish the validity of such a strategy when dealing with the relationship between school performance and religion is delicate. We shall discuss below to what extent such a strategy is reasonable in our context because of the specific nature of our population, i.e. a population of adolescents rather than an adult population.

The Appendix gives a precise definition of our instrumental variables. Table 2 provides their descriptive statistics in our sample. Table 2 documents that, for instance, almost 40% of the black students in our sample are African methodists or follow the Islam or Holiness religions, whereas this percentage is less than 1% for whites. Apart from affiliation to a specific doctrine, all the rest of these variables are then standardized (similarly to all our target variables) so that they have zero mean and a variance equals to one in the whole sample.

[Insert Table 2 here]

Model (1) is estimated following the standard practice that considers the interactions between the endogenous and exogenous variables endogenous and estimate the model with 2SLS, by adding to the set of instruments the interactions between the instruments and the exogenous variables (see Wooldridge, 2002, pages 121-122). The first stage results help to investigate the potential of our religion-based variables as predictors of racial identity. Table 3 reports the estimates of the religion-related variables on the percentage of same-race friends separately for whites and blacks.^{15,16} Looking at the estimates, for blacks, all the religion-based variables are highly significant and show a considerable and positive impact in the development of the sense of black identity by

¹⁵The estimation, however, is run on the entire sample.

¹⁶Table 3 focusses on the first stage results about the relationship between \tilde{x}_{ij} and our instruments. Because we have 5 additional terms involving our endogenous variable \tilde{x}_{ij} , we have 6 first stage regressions. Given that we have

inducing black teenagers to choose more black best friends. For instance, a one standard deviation increase in religious group youth participation raises the share of black friends by almost 0.30 standard deviations. Therefore, variations in the religious behavior across black adolescents might be related to variations in the percentage of same-race friends, given that, e.g., a high participation in religious youth groups certainly increases the sense of black identity and the probability to meet same-race fellows. All of this is consistent with the results in the sociological literature (listed below) that show that participation in religious activities is a clear indication of black identity.

Racial differences in religious affiliation and participation in the United States are well-documented (Gallup and Castelli, 1989). It is also well-established that religion activities have an important impact of black's sense of identity. Indeed, the black church is the anchoring institution in the African American community (Lincoln and Mamiya, 1990; Myrdal, 1944). The church acts simultaneously as a school, a benevolent society, a political organization, a spiritual base, etc. As one of the few institutions owned and operated by African Americans, the church is often the center of activity in black community. In particular, the black church has a documented tradition of involvement in extra religious civic and political activities (Findlay, 1993; Harris, 1994). Black churches are significantly more likely than white congregations to participate in civil rights activities. Lincoln and Mamiya (1990) find that 90 percent of the clergy approved of their clerical peers' taking part in protest marches on civil right issues. Using the data from the 1979-1980 national Survey of Black Americans, Ellison (1993) shows that participation in church communities fosters positive self-perception of blackness through the interpersonal supportiveness and positive reflected appraisals of coreligionists. Using data from more than three years of ethnographic research in Groveland, an African American neighborhood in Chicago, Pattillo-McCoy (1999) finds that the black church provides a cultural blueprint for civic life in the neighborhood and shows the power of church rituals as cultural tools for facilitating local organizing and invigorating activism among African American. Using the same data base employed in this paper (AddHealth data), Smith et al. (2002) provide a detailed picture of the religious lives of adolescent in the US. Among their finding, they show that African-American adolescents have the highest rates of church attendance, and they tend to cluster in specific religious groups (e.g. African methodist, Holiness, Islam, Jehovah's witness, Baptist). In addition, the followers of some of these traditions (e.g. African methodist, Holiness) are for the large majority blacks.¹⁷

For whites, although the predicted power of the instruments is clearly lower than for blacks,

3 instruments, each of these regressions contains 18 instruments. All exogenous variables in levels (e.g. parents' education, best friends' parents' education, race) have been included in the specification. F-tests on the excluded instruments are always higher than the Stock and Yogo (2005)'s 10% critical values. Kleibergen-Paap rank tests always reject the hypothesis that the model matrix is not a full rank matrix at the 5% level.

¹⁷Moreover, by looking at the literature on the economics of cultural transmission (Bisin and Verdier, 2000, 2011), it is also quite natural to have religion as a way to transmit identity. In this literature, in fact, parents have to select some dimensions to focus on while trying to transmit own identity to children. Religion is one of those dimensions (Patacchini and Zenou, 2011).

we still find that most of the estimated coefficients are statistically significant. For instance, the correlation between percentage of same-race friends and being a follower of a religion where blacks typically cluster (mainly Islam in our sample of whites) is large and negative, thus signalling an increase of the percentage of black friends for those individuals. We also find that an increase in religious group youth participation raises substantially the share of white friends (almost by 0.20 in terms of standard deviations), which can be explained considering that it is only a minority of whites that follows religious traditions where blacks typically cluster.

[*Insert Table 3 here*]

Let us now turn to discuss the relationship between indicators of religious belief and participation and school achievement. The general consensus is that there is a positive correlation between educational outcomes and church attendance at the individual level (Freeman, 1986; Iannacone, 1998; Loury, 2004).¹⁸ The causality is obviously not clear since it is possible that church attendance is correlated with unobserved individual character traits, such as for example self-discipline, which influence educational outcomes. To the best of our knowledge, there is no study that analyzes the relationship between educational achievements and church attendance for students who are not yet educated and still studying in schools (our population). This is important because, for adults, participating in church activities is a voluntary choice that reflects some unobserved individual trait while, for teenagers, this decision is more exogenous and strongly correlated to their parents' beliefs. We argue that (some) religion-based variables can be used as instruments for racial identity because this is an important channel for adolescents through which religion affects their educational outcomes. Indeed, adolescents are more likely to go to church if their parents do so. As a result, church attendance for adolescents reflects the transmission of identity from their parents and not some unobservable traits. In sociology, evidence has accumulated showing that religion is significant in adolescent development, that the family is the primary agent of religious socialization, and virtually all research has identified parents as the most important source of religious influence (Ozorak, 1989; Hyde, 1990; Bao et al., 1999). In all these studies, the correlation between parents' and children's religious beliefs and participation is extremely high.¹⁹

Let us reinforce our argument by providing some evidence on the age of religious conversions. Indeed, we argued that the religious participation of adolescents below eighteen (our population) is a sign of identity rather than a religious choice. Religious conversion, which means that the

¹⁸For example, using the General Social Survey in the US, Glaeser and Sacerdote (2001) report that fifty percent of college graduates born after 1945 attend church more than "several times per year" and only thirty six percent of high school dropouts, born during the same period, attend church that often.

¹⁹Of course, for this to be true, we have to assume that unobserved individual character traits that makes a parent goes to church (such as self-discipline) are uncorrelated with those of the kid. In that case, church participation will affect school performance of a student only through identity, i.e. the choice of same-race friends.

adolescent is differentiating him/herself from the religion of his/her parents, is obviously a choice and thus may capture unobserved traits that are specific to the adolescent and that may affect school performance. There is strong evidence that conversions are more likely to occur beyond adolescence (see e.g. the literature survey by Snow and Machalek, 1984). For example, Kose (1996) presents the results of a research based on interviews with 70 native British converts to Islam. The average conversion age was found to be 29.7 years. This evidence again confirms that in our data our religion-based variables are an indication of a transmission of an identity rather than a personal choice from the adolescents.

Observe that the inclusion of parental education among the controls should account for the possible sorting of adolescents into denominations (if there is sorting of families into religious groups by parents' education attainment)²⁰ and the inclusion of school fixed effects should control for one of the most important channel through which religion may influence school performance, i.e. the access to different school qualities (e.g., public schools versus schools with religious affiliation). We also include among the controls a variable indicating how often parents pray.

Observe also that we use as controls (and not as instruments) the other available information on adolescents' religions beliefs, i.e. importance of religion and religious faith. If religious attendance of adolescents reflects the preferences of the parents and thus the transmission of identity, the degree of religious belief of adolescents is more likely to reflect their own unobservable traits, like self-discipline, which directly influence their educational attainment. In other words, adolescents may go to church on a regular basis to do like their parents but if they are extremely religious (the questions about intensity of faith is quite extreme since adolescents are asked the following: "Do you agree or disagree that the sacred scriptures of your religion are the word of God and are completely without any mistakes?"), this may reflect their own choice and their own preferences, which is likely to have a direct impact on their school performance.²¹

5 Estimation results

5.1 Exogenous choice of friends

Table 4 reports the OLS estimation results of Model (1) on our target variables, for both blacks and whites.²² Their estimated effects are all statistically significant for both whites and blacks, providing evidence of the importance of racial preferences (in choosing friends) and parental education in

²⁰Glaeser and Sacerdote (2001) show that more educated individuals sort into less fervent religious groups.

²¹Running an auxiliary regression of $\hat{\varepsilon}_{ijs}$ (second stage residuals) on the instruments and our extensive set of controls, we find small values of NR^2 , which imply that we cannot reject the null hypothesis that the instruments are uncorrelated with the errors ($NR^2 \sim \chi(k)$, with $k = n$. of over-identification restrictions under the null hypothesis). This test is known as Sargan or Hansen J test of overidentifying restrictions ($J = 0.17$).

²²The qualitative results on our target variables are robust to alternative sets of control variables. We present in Table 4 the results obtained using the more extensive set of controls.

shaping students' academic performance.²³ From (1), evaluating the impacts of \tilde{x}_{ijs} and k_{ijs} on y_{ijs} at the sample averages of the variables for the two groups, we find that:

$$\frac{\partial y_{iBs}}{\partial \tilde{x}_{iBs}} = (\hat{\alpha}_1 + \hat{\gamma}_1) + (\hat{\alpha}_4 + \hat{\gamma}_4) k_{iBs} + (\hat{\alpha}_5 + \hat{\gamma}_5) \bar{k}_{iBs} < 0 \quad (2)$$

for blacks and

$$\frac{\partial y_{iWs}}{\partial \tilde{x}_{iWs}} = \hat{\alpha}_1 + \hat{\alpha}_4 k_{iWs} + \hat{\alpha}_5 \bar{k}_{iWs} > 0 \quad (3)$$

for whites. This means that, for blacks, the higher their percentage of black friends, the lower their schooling performance while we have exactly the reverse for white students. In particular, for blacks having an identity that is closely tied to one's racial group seems to be associated with an school performance penalty. Observe that this implies that the inter-race difference in terms of schooling performance is an increasing function of racial identity (as measure by the percentage of same-race friends). In other words, looking across races, holding all the control variables constant, the more individuals conform to their group norm, the larger are the inter-race differences in terms of academic performance. Also, $\frac{\partial y_{ijs}}{\partial k_{ijs}} = (\hat{\alpha}_2 + \hat{\gamma}_2) + (\hat{\alpha}_4 + \hat{\gamma}_4) \tilde{x}_{ijs} > 0$ for blacks and $\frac{\partial y_{ijs}}{\partial k_{ijs}} = \hat{\alpha}_2 + \hat{\alpha}_4 \tilde{x}_{ijs} > 0$ for whites, confirming the important role of parental education.

[Insert Table 4 here]

Let us now investigate the cross effects. We are mainly interested in $\frac{\partial^2 y_{ijs}}{\partial \tilde{x}_{ijs} \partial k_{ijs}}$, i.e. in $\hat{\alpha}_4$ and $\hat{\alpha}_4 + \hat{\gamma}_4$ for whites and blacks respectively. Table 4 reveals that this estimated coefficient is statistically significant for both whites and blacks and that $\hat{\alpha}_4 > 0$ and $\hat{\alpha}_4 + \hat{\gamma}_4 < 0$. This shows that the impact of a student's racial identity on schooling is strongly influenced by the teenager's parental education. Specifically, we find that, for whites, the effect of same-race friends on schooling is an increasing function of parental education, i.e. the more the parents are educated, the higher the influence of racial identity on schooling. On the contrary, for blacks, the negative effect of racial identity on schooling is a decreasing function of parental education, i.e. the more the parents are educated, the lower (in absolute value) is the influence of same-race friends on schooling. One way to interpret this result is that the attachment of adolescents to their culture of origin is higher the less educated are the parents.

All these results provide suggestive evidence on the importance of racial preferences in explaining the inter-race achievement gap.

5.2 Endogenous choice of friends

The results of our instrumental variable school performance regressions with religion-based instruments are displayed in Table 5.

²³School fixed effects explain roughly 45% for whites and 40% for blacks of the variation in test scores.

Comparing these results with the ones contained in Table 4, it appears that the point estimates are reduced in magnitude. The reduction is substantial for blacks (all effects decrease by more than a half) and are much larger than for whites. This is not surprising given that our religion-based instruments are definitely better tailored to capture the sense of black rather than white identity. However, the impacts of our target variables remain statistically significant for both races.

In terms of magnitude of the effects, when they are calculated at the sample average of the variables for each race (expressions (2) and (3)), increasing the percentage of black friends of a black student by a standard deviation is associated with a decrease in his/her academic performance by roughly 7 percent of a standard deviation, whereas increasing the percentage of white friends of a white student by a standard deviation is associated with an increase of his/her academic performance by roughly 6 percent of a standard deviation. Looking at parental education, we find that black adolescents are more affected by differences in parental education than white adolescents when choosing their level of effort in schooling. Indeed, the effect of parental education on school performance in terms of standard deviations is roughly 9 percent for blacks and 8 for whites.²⁴

[Insert Table 5 here]

6 Conclusion

Friendships are complex social relationships. The study of interethnic and interracial interactions and relationships among youth, also called intergroup relations, has become a critical, complex, and challenging field in recent years, especially in sociology. This is obviously a crucial question since it deals with identity. There is a consensus in psychology and sociology that the first influences on a child's identity formation –how the child comes to see himself or herself as a member of one or several racial, cultural, and religious groups– occurs at home and in the context of family. Most significant at the earliest stages are parents and their values, specifically how they deal with issues of race, in deeds and in words. Also important is the community in which the child lives, and the messages the child encounters; later on, peers, teachers, school officials, and community leaders have significant influence.

In the present paper, we endeavour to investigate the relationship between youth racial friendships and school performance, accounting in particular for the influence of parental inputs. We find that choosing black friends is associated with lower test scores for blacks while choosing white friends is associated with higher test scores for both black and white teenagers. The negative association of black friends is mitigated by parents' education while the positive association of white

²⁴The analysis has also been performed by instrumenting the direct friends' school performance with the indirect friends' characteristics (see, e.g., Calvó-Armengol et al., 2009). Results remain qualitatively unchanged.

friends is amplified by parents' education. Our results are in line with that of Cutler et al. (1999), who show that segregation is good for white people but bad for black people.

The analysis of peer effects is, however, a complex issue and our analysis has obviously some limitations. In absence of experimental data, one can never be sure to have captured all the behavioral intricacies that lead individuals to associate with others. Nevertheless, by using an instrumental strategy and by taking advantage of the unusually large information on teenagers', schools' and neighborhoods' characteristics provided by our dataset, our analysis is one of the few attempts to overcome the empirical difficulties. As a result, although one needs to be cautious with this type of analysis, our results seem to reveal that extreme identities are associated with a penalty in terms of school performance.

Interestingly, using data from the National Educational Longitudinal Study, Cheng and Starks (2002) found that African American parents tend to hold higher educational aspirations for their children than do white parents, but the relative influence of African American fathers on students' school performance expectation are smaller than those of their white counterparts. Also, with the same data set, Ainsworth-Darnell and Downey (1998) found that African-American friendship groups were more proschool and more admiring of academic achievers than were friendship groups of other races. These findings may relate to those of Clark and Ayers (1988), who found that whites' friendships were matched more closely on academic achievement, while African Americans' friendships were matched more closely on achievement-oriented aspects of personality. Clearly, this issue is controversial and it is difficult to draw clear conclusion. In the present research, even if we could not disentangle all the elements of identity and its impact on school performance, we could however sort out some of its thicker threads.

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Appendix: Description of control and instrumental variables

Individual socio-demographic variables

Female: dummy variable taking value one if the respondent is female.

Student grade: grade of the respondent in the current year (used as a proxy for age).

Motivation in education : dummy taking value one if the respondent reports to try very hard to do his/her school work well, coded as 1 = I never try at all, 2 = I do not try very hard, 3 = I try hard enough, but not as hard as I could, 4 = I try very hard to do my best

Organized social participation: dummy taking value one if the respondent participate in any clubs, organizations, or teams at school in the school year.

Self esteem: response to the question: “Compared with other people your age, how intelligent are you”, coded as 1 = moderately below average, 2= slightly below average, 3= about average, 4= slightly above average, 5= moderately above average, 6= extremely above average.

Physical development: response to the question: “How advanced is your physical development compared to other boys your age”, coded as 1= I look younger than most, 2= I look younger than some, 3= I look about average, 4= I look older than some, 5= I look older than most.

Importance of religion: response to the question: “How important is religion to you?”, coded as 1= not important at all, 2=fairly unimportant, 3=fairly important, 4= very important.

Intensity of faith: dummy variable taking value one if the respondent “agrees” to the question: “Do you agree or disagree that the sacred scriptures of your religion are the word of God and are completely without any mistakes?”

Family background variables

Household size: number of people living in the household.

Mother working: dummy taking value one if the mother works for pay.

Two married parent family: dummy taking value one if the respondent lives in a household with two parents (both biological and non biological) that are married.

Parental intensity of faith: response to the question: “How often do you pray?”, coded as 1= at least once a day, 2= at least once a week, 3=at least once a month, 4= from time to time, but less than once a month, 5=never.

Protective factors

Parental care: dummy taking value one if the respondent reports that the (biological or non-biological) parent that is living with her/him or at least one of the parents if both are in the household cares very much about her/him.

School attachment: composite score of three items derived from the questions: “How much do you agree or disagree that a) you feel close to people at your school, b) you feel like you are part of your school, c) you are happy to be at your school”, all coded as 1= strongly agree, 2= agree, 3=neither agree nor disagree, 4= disagree, 5= strongly disagree. (Crombach-alpha =0.75).

Social exclusion: response to the question: “How much do you feel that adults care about you”, coded as 1= very much, 2= quite a bit, 3= somewhat, 4= very little, 5= not at all.

Friend involvement: response to the question: “During the past week, how many times did you just hang out with friends”, coded as 0= not at all, 1=1 or 2 times, 2=3 or 4 times, 3=5 or more times.

Residential neighborhood variables

Neighborhood quality: interviewer response to the question “How well kept are most of the buildings on the street”, coded as 1= very poorly kept (needs major repairs), 2= poorly kept (needs minor repairs), 3= fairly well kept (needs cosmetic work), 4= very well kept.

Residential building quality: interviewer response to the question “How well kept is the building in which the respondent lives”, coded as 1= very poorly kept (needs major repairs), 2= poorly kept (needs minor repairs), 3= fairly well kept (needs cosmetic work), 4= very well kept.

Neighborhood black population: percentage of black persons living in the respondent’s Census Tract.

Residential area type: interviewer’s description of the immediate area or street (one block, both sides) where the respondent lives, coded as 5-category dummies (rural - the reference group, suburban, urban - residential only, 3 or more commercial properties -mostly wholesale or industrial, other commercial area).

Instrumental variables

Religious affiliation: dummy taking value one if the respondent’s religion is African methodist, Holiness or Islam.

Religious practice: response to the question: “In the past 12 months, how often did you attend religious services”, coded as 1=never, 2=less than once a month, 3=once a month or more, but less than once a week, 4=once a week or more.

Religious youth group participation: response to the question: “Many churches, synagogues, and other places of worship have special activities for teenagers—such as youth groups, Bible classes, or choir. In the past 12 months, how often did you attend such youth activities?”, coded as 1=never, 2=less than once a month, 3=once a month or more, but less than once a week, 4=once a week or more.

Table 1: Race, academic achievement, friends, and parental education

Variable	Whites	Blacks
School performance index : y_{ijs}	2.51 (1.82)	1.77 (1.99)
Same-race best friends (share in total number of friends): \tilde{x}_{ijs}	0.84 (0.12)	0.58 (0.59)
Parental education: k_{ijs}	3.88 (2.05)	2.75 (1.54)
Average parental education of friends: \bar{k}_{ijs}	3.91 (1.53)	2.88 (1.01)
Race (shares in total sample)	0.72 (0.51)	0.16 (0.39)
N.Obs.	6,496	2,013

Notes:

- Mean values and standard errors (in parentheses) are reported
- t – tests for differences in means are performed.

All differences of mean values are statistically significant at the 1% level.

Table 2: Descriptive statistics of the instrumental variables

Variable	Whites	Blacks
Religious affiliation	0.006 (0.005)	0.36 (0.40)
Religious practice	2.99 (0.99)	3.31 (1.55)
Religious youth group participation	3.05 (1.09)	3.19 (0.94)
N.Obs.	6,496	2,013

Notes:

- Mean values and standard errors (in parentheses) are reported
- t – tests for differences in means are performed

All differences of mean values are statistically significant at the 1% level

Table 3: Racial identity and religion

Variable	Dep. var.: Same-race best friends \tilde{x}_{ijs}	
	Whites	Blacks
Religious affiliation	-0.3591** (0.1779)	0.4011*** (0.1155)
Religious practice	0.0891* (0.0525)	0.2055*** (0.0555)
Religious youth group participation	0.1780*** (0.0505)	0.2801*** (0.0606)
Individual socio-demographic variables	yes	yes
Family background variables	yes	yes
Protective factors	yes	yes
Residential neighborhood variables	yes	yes
School fixed effects	yes	yes
N.Obs.	6,496	2,013

Notes:

- Selected first stage results
- OLS estimates and standard errors in parentheses are reported
- Coefficients marked with one (two) [three] asterisks are significant at 10 (5) [1] percent level
- Control variables are detailed in the Appendix.

Table 4: Racial identity and education

Variable	Dep. var: School performance index (y_{ijs})	
	Whites	Blacks
Same-race best friends: \tilde{x}_{ijs}	0.0645*** (0.0251)	-0.1599*** (0.0350)
Own parental education: k_{ijs}	0.0880*** (0.0269)	0.1877*** (0.0596)
Friends' parental education: \bar{k}_{ijs}	0.0021** (0.0009)	0.1287*** (0.0434)
Same-race best friends \times own parental education: $\tilde{x}_{ijs} k_{ijs}$	0.0022*** (0.0007)	-0.0171** (0.0078)
Same-race best friends \times friends' parental education: $\tilde{x}_{ijs} \bar{k}_{ijs}$	0.0012** (0.0006)	-0.0102* (0.0043)
Individual socio-demographic variables	yes	yes
Family background variables	yes	yes
Protective factors	yes	yes
Residential neighborhood variables	yes	yes
School fixed effects	yes	yes
N.Obs.	6,496	2,013

Notes:

- Control variables are detailed in the Appendix
- OLS estimates and standard errors in parentheses are reported. R-squared equal to 0.42
- Coefficients marked with one (two) [three] asterisks are significant at 10 (5) [1] percent level

Table 5: Racial identity and education

Variable	Dep. var: School performance index (y_{ijs})	
	Whites	Blacks
Same-race best friends: \tilde{x}_{ijs}	0.0580** (0.0256)	-0.0715** (0.0348)
Own parental education: k_{ijs}	0.0769** (0.0339)	0.1250** (0.0612)
Friends' parental education: \bar{k}_{ijs}	0.0019** (0.0010)	0.0969** (0.0473)
Same-race best friends \times own parental education: $\tilde{x}_{ijs} k_{ijs}$	0.0016** (0.0008)	-0.0169** (0.0074)
Same-race best friends \times friends' parental education: $\tilde{x}_{ijs} \bar{k}_{ijs}$	0.0015* (0.0008)	-0.0094** (0.0045)
Degree of religious belief indicators	yes	yes
Individual socio-demographic variables	yes	yes
Family background variables	yes	yes
Protective factors	yes	yes
Residential neighborhood variables	yes	yes
School fixed effects	yes	yes
N.Obs.	6,496	2,013

Notes:

- Second stage results

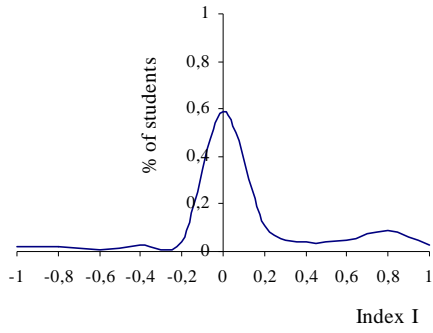
- IV estimates and standard errors in parentheses

Instruments for \tilde{x}_{ijs} : “Religious affiliation”, “Religious practice”, “Religious youth group participation”

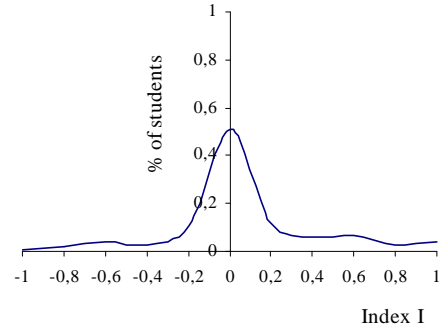
- Coefficients marked with one (two) [three] asterisks are significant at 10 (5) [1] percent level

- Control variables are detailed in the Appendix

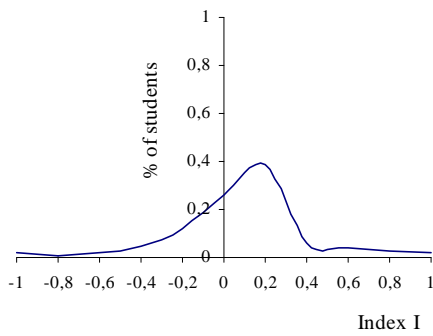
Figure 1. Distribution of students by homophily index in segregated schools



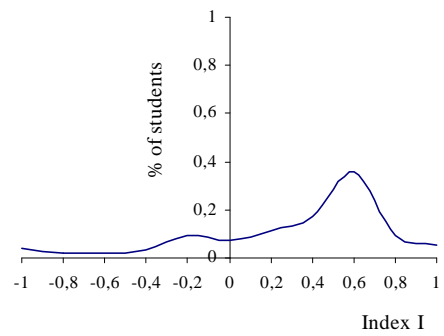
Blacks in black segregated schools



Whites in black segregated schools



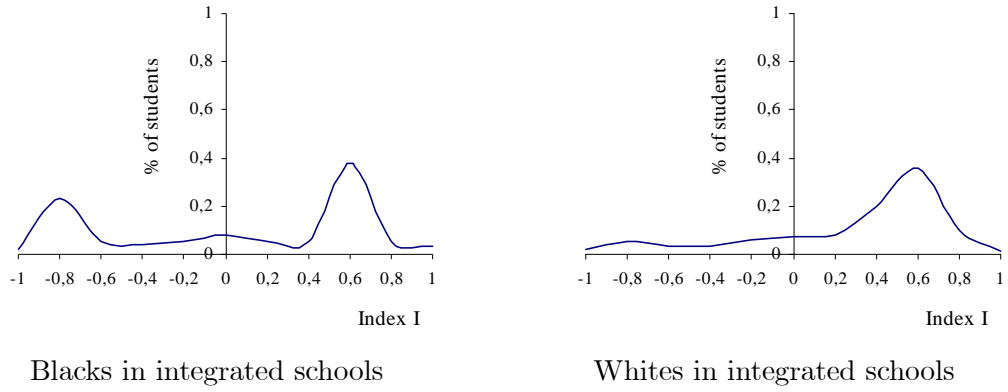
Blacks in white segregated schools



Whites in white segregated schools

Notes: AddHealth Wave I in-home sample

Figure 2. Distribution of students by homophily index in integrated schools



Notes: AddHealth Wave I in-home sample