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The Today and Tomorrow of Kids

Marco Castillo
Georgia Institute of Technology

Paul Ferraro
Georgia State University

Jeff Jordan
University of Georgia

Ragan Petrie
Georgia State University

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Abstract: We experimentally investigate the distribution of children's time preferences along gender and racial lines. We find that boys are more impatient than girls and black children are no more impatient than white children. However, this pattern hides the fact that black boys have the highest discount rates of all groups. Most importantly, we show that impatience has a direct effect on behavior. An increase of one standard deviation in the discount rate increases the probability that a child has at least 3 disciplinary referrals by 5 percent. Time preferences might play a large role in setting appropriate incentives for children.

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1 Introduction

According to the 2000 Georgia population census, only 14 percent of black men and 20 percent of black women between 25 and 35 years of age have a college degree. In comparison, 32 percent of white men and 36 percent of white women in the same age group hold a college degree. Despite massive subsidies for higher education in the state of Georgia,[1] a growing Black-White educational gap is apparent. While white women and men increased their percent of college educated by 11 points in this period, black women did it only by 6 points and black men by 4 points. A gender gap in educational achievement among Blacks is clear as well. Several authors have reported this increasing gap (Fryer and Levitt, 2005) and suggested possible explanations (Austen-Smith and Fryer, 2005; Fryer and Levitt, 2006, and the references therein).

A relatively unexplored explanation is that children deal with inter-temporal problems, such as investment in education, in different ways. If time preferences, or the perceived benefits of patience, vary across demographic groups, different educational paths may occur even if constraints to education are lifted.[2] Unfortunately, little is known about the nature of children's time preferences (an important exception is Bettinger and Slonim, 2007) and how they relate to their social environment. In this paper, we investigate experimentally if children's time preferences vary across observable characteristics, such as race and gender, and whether any observed differences relate to behavior. In particular (and in contrast to Bettinger and Slonim), we investigate if measured time preferences correlate with markers of potential educational failure.[3]

To elicit children's time preferences, we conduct a series of *artefactual* field experiments (Harrison and List, 2005). The experiments concentrate on the population of 8th grade students of two large middle schools in a district in the southern Atlanta Metropolitan Statistical Area (MSA). The sample represents roughly half of the total 8th grade population in the dis-

[1] HOPE scholarships are available to all Georgia students who earned a high school grade point average of at least a B.

[2] As suggested by Becker and Mulligan (1993), the evolution of time preferences can be considered endogenous. Observed differences in preferences cannot be taken as evidence of innate differences.

[3] Our research also differs from Bettinger and Slonim in that our sample represents broader socio-economic characteristics.

trict. The district was selected because it shares several characteristics with poor communities throughout the South. We conducted the experiments with populations of this age because the education literature recognizes that this age is critical in determining future education outcomes, such as the decision to drop out of school (Kaufman, Alt, and Chapman, 2004; Olson, 2006). In addition to the experiments, we collected data from the students' records to further analyze the determinants of behavior. Being able to access records allowed us to investigate the relationship between discount rates and discipline. Discipline incidents have been found to be a good predictor of high school drop-out rates and constitute an ideal test bed for the influence of time preference on behavior (Alexander, Entwisle, and Horsey, 1997; Rumberger, 1995).

Our study provides two main findings. First, we observe that black boys have significantly larger discount rates than any other demographic group. We find that black girls are comparable to white girls and that white boys are not significantly more impatient than any girls. This suggests that differences in discount rates are not strictly race related. This finding is robust to alternative measures of patience and regression analysis that controls for socio-economic background and school performance. While differences in discount rates might mask difference in risk preferences (Andersen, Harrison, Lau and Rutstrom, 2008) or the existence of field substitutes for lending or borrowing (Harrison, Lau and Williams, 2003; Cubitt and Read, 2007), we find these explanations unlikely. The estimated difference in discount rates among black boys and girls is large. Explaining this difference would require that black boys are substantially more risk averse than black girls, or that black boys have access to high-return investment opportunities not available to black girls.

Our second main finding is that discount rates predict the likelihood that a child has above average disciplinary referrals. We show that an extra standard deviation in a child's discount rate is associated with a 5% increase in the probability of having at least 3 disciplinary referrals in a year (the average is 1.8). This result is important because it suggests that time preferences have a separate impact on behavior apart from socio-economic background and performance. Interestingly, we find evidence suggesting that this relationship is not due to reverse causality. In our sample, black girls are more likely to receive disciplinary referrals than white girls. However, black girls are no more impatient than white girls. Preferences seem to precede behavior.

Several authors have pointed out that non-cognitive factors can affect school and labor market outcomes (see Bowles, Gintis and Osborne, 2001; Heckman, Stixrud and Urzua, 2006; Segal, 2006a; and the references within). Our results indicate that time preferences are an important component of the economic decisions of children and that experimental methods are a simple and direct way to measure them. Importantly, experimental methods have the advantage of using real stakes and being standardized. Standardized, salient, incentives are important because, as shown by Segal (2006b), ability tests can be biased when subjects differ in their motivation. Experiments potentially provide a direct measure of underlying preferences that are less likely to be biased by the returns to education, as discipline or effort might be, or by measurement problems, as self-reported personality tests might.

The paper is organized as follows. Section 2 discusses the sample. Section 3 describes the experimental design. Section 4 discusses the distribution of preferences and its relationship with behavior. Section 5 concludes.

2 Sample Selection

The setting for our study is Spalding County, Georgia, located on the southern end of the Atlanta MSA. Although part of the vibrant metropolitan area of Atlanta, demographic data on Spalding County resembles less the exponential growth of the Atlanta area and more the persistently poor counties of southern Georgia. In Spalding County, the child poverty rate is 21.7% (17.1% in Georgia) and per capita income is $16,791 ($21,154 in Georgia).

Thirty-two percent of the population over 25 in Spalding County have not completed high school in 2000 - over 50% higher than for Georgia. Only 8% of adults completed a Bachelor's degree or higher (24% in Georgia). The high school dropout rate in school year 2000-01 was 15.6 per 100 enrolled, more than double the state average of 6.4. Less than half (46.8%) of the class of 2001 that entered in ninth grade, graduated (71.1% rate in Georgia). By 2004 the official non-completion rate was 46 percent.

Our experiment was conducted at Cowan Road and Taylor Street Middle Schools, two of four middle schools in the Spalding County School District. Whereas Bettinger and Slonim (2007) focused on free and reduced-price lunch students ranging from five to sixteen years of age (n=191), we focus on a broader range of socio-economic backgrounds but a narrower age range (n=581). At the time of the experiment, 95% of our subjects were 13 or 14

years old (mean=13.90, SD=0.53), while the remaining 5% were 15 years old. We chose this age group because, nationally, 35% of students lost in the high school pipeline are lost at the end of 9th grade and in Georgia, students can make the decision to drop out of school at the age of 16. Thus, we wanted to elicit discount rates in the period prior to when this important decision would be made.

3 Experimental Design

In the economics literature, several methods have been used to estimate discount rates among adults. Three are revealed preference methods: 1) econometric estimation from observations of the use of financial instruments (e.g., Ausubel 1991) or of the purchase of durable consumer goods (e.g., Gately, 1980; Hartman and Doane, 1986; Hausman 1979; Ruderman et al., 1986); 2) natural experiments in which individuals are forced to choose among alternative payoffs with differential time dimensions (e.g., Warner and Pleeter (2001), who took advantage of data generated from an early retirement program in the U.S. military to estimate discount rates for enlisted men and officers); and 3) controlled experiments in which subjects are offered real monetary payoffs that vary in their timing (Holcomb and Nelson, 1992; Pender, 1996; Coller and Williams; 1999; Harrison et al., 2002; Eckel et al., 2003; Meier and Sprenger, 2006; Bettinger and Slonim, 2007). Stated preference methods, in which discount rates are elicited by asking individuals to make hypothetical choices in the revealed preference settings described above, are also used (Thaler, 1981; Loewenstein, 1988; Benzion et al., 1989; Shelley, 1993; Curtis 2002; Bradford et al. 2004).

Given the potential sources of bias inherent in stated preference methods, and the difficulty in observing the consumption and investment decisions of children, we use a controlled experiment. Psychologists, and more recently, economists, have used experiments to study time preferences among children. However, these studies look at the factors that affect "patience," which is defined as a binary choice to forgo short-term benefits for larger and longer-term rewards. None of the studies explicitly define and characterize discount rates. To do this, we adopt the front-end delay method used by Harrison et al. (2002). In our experiment, subjects are asked, orally and in writing, to make twenty decisions in total. For each decision, subjects are asked if they would prefer \$49 one month from now or \$49+\$X seven months from

now. The amount of money, $X, is strictly positive and increases over the twenty decisions. The decision sheet that the subject sees is shown in Table 1. Subjects did not see the last column indicating the implied annual discount rate. For example, in the first decision, a subject is asked if she would prefer $49 one month from now or $50.83 seven months from now. And, in the ninth decision, a subject is asked if she would prefer $49 one month from now or $67.61 seven months from now. Subjects are asked to make one choice for each of the twenty decisions on the decision sheet. Based on discussions with teachers and students at other schools, we determined that the range of $50 to $99 would be considered by adolescents to be "large" payoffs, but not so large as to potentially cause problems with their parents.

Table 1. Subject Decision Sheet

Decision	Paid One Month From Now	Paid Seven Months From Now	Implied Annual Discount Rate
1	$49.00	$50.83	7.35%
2	$49.00	$52.71	14.7%
3	$49.00	$54.66	22.05%
4	$49.00	$56.66	29.40%
5	$49.00	$58.72	36.75%
6	$49.00	$60.85	44.10%
7	$49.00	$63.04	51.45%
8	$49.00	$65.29	58.80%
9	$49.00	$67.61	66.15%
10	$49.00	$70.00	73.50%
11	$49.00	$72.46	80.25%
12	$49.00	$74.99	88.20%
13	$49.00	$77.59	95.55%
14	$49.00	$80.27	102.90%
15	$49.00	$83.03	110.25%
16	$49.00	$85.86	117.60%
17	$49.00	$88.78	124.95%
18	$49.00	$91.77	132.30%
19	$49.00	$94.85	139.65%
20	$49.00	$98.02	147.00%

Harrison et al.'s (2002) decision sheet includes the implied annual interest rate and annual effective interest rate associated with each delayed payment

option. However, our discussions with teachers at the study site and with similar aged students at other schools led us to believe that students do not price field investments in terms of interest rates. Thus information on rates would simply confuse students. Coller and Williams (1999) and Harrison et al. (2002) also argue that one should elicit the market rates of interest that subjects face so that one can control for arbitrage opportunities (field censoring) in the econometric analysis. Because our subjects are children, we feel comfortable assuming that they do not incorporate credit market options into their experimental decision task. If subjects were to have access to credit markets, and these interest rates were binding in the experiment, our estimates would be lower bounds on the true discount rates.

Economic theories of discounting predict that an individual faced with the decision sheet in Table 1 would either choose (a) \$49 for all decisions, (b) the higher payment for all decisions, or (c) \$49 for a certain number of decisions starting with Decision 1 and then switch to the higher payment for the remaining decisions. In other words, if an individual chose to receive \$Y in seven months rather than \$49 in one month, then the individual will prefer any amount \$Z $>$ \$Y in seven months rather than \$49 in one month. Following Harrison et al. (2002), we call these individuals "consistent" decision-makers.[4]

However, in experiments using decision sheets like the one in Table 1, some individuals are "inconsistent" decision-makers: they choose \$Y in seven months rather than \$49 in one month, but then choose \$49 in one month rather than \$Z $>$ \$Y in seven months. Harrison et al. (2002) and Meier and Sprenger (2006) found that 4% and 11%, respectively, of their adult subjects were inconsistent in their choices. Bettinger and Slonim (2007), whose subjects were between 5 and 16 years old, found that 34% of their sample were inconsistent decision-makers. We return to the issue of inconsistent decision-makers in Section 4.

In each room, subjects are assigned a unique identification code. This code is private, and subjects do not know the identification codes of other subjects. Subjects make their decisions by circling one amount, either \$49 or \$49+\$X, on their decision sheet. After subjects make their decisions, each subject puts her decision sheet in an envelope and the envelopes are collected.

One decision out of the twenty decisions is randomly chosen for payment. This is done by taking 20 index cards with the numbers 1-20 written on

[4]Bettinger and Slonim (2007) call them "rational."

them, shuffling them in front of the subjects, and asking a subject to choose one card. The number on the card is the decision number to be paid for each of the three subjects in each classroom who are chosen to receive payment. So, for example, if decision 15 is chosen for payment and one of the winning subjects circled \$83.03, the subject would receive \$83.03 in seven months. If another subject circled \$49, that subject would receive \$49 in one month.

After determining the decision to be paid, all the envelopes are shuffled in front of the subjects, and three envelopes per classroom are chosen for payment. The identification codes of those chosen to receive payment are written on the blackboard. Because identification codes are kept private by each subject, no other subject knows which subjects have been chosen to receive payment. Subjects who are chosen to receive payment are paid with a Wal-Mart gift card by the school principal on the specific date for the decision chosen. The school principal keeps the Wal-Mart gift cards in her office and the names of the subjects who are chosen for payment. Within a week of the experiment, the winning subjects stop by the principal's office to verify the gift card. On or within a week of the payment date, the subjects go privately to the principal's office to pick up their gift cards.[5] For the subjects chosen to be paid, their names and the amount of payment are kept private. Subjects know all of these procedures before making their decisions.

In our experiment, 581 8th grade students participated (ages 13 to 15). Seventy-two students were randomly chosen to be paid, and the average payment was \$68.22 (SD = \$19.51), with a total payout of \$4,933.56. Twenty-nine received gift cards of \$49 one month after the experiment. Seven months after the experiment, one student received \$52.71, one received \$56.66, three received \$63.04, five received \$67.61, two received \$70, four received \$72.46, five received \$74.99, two received \$83.03, three received \$85.86, three received \$91.77 and fourteen received the highest payment of \$98.02. The experiments were conducted in two sets. The first set was on September 19, 2006 at Cowan Road Middle School, and the second set was on August 31, 2007 at Cowan Road and Taylor Street Middle Schools. Subject characteristics are presented in more detail in the next section.

[5]Children were informed that, should they move before the payment date, their Wal-mart card would be forwarded to their new address. One winning subject transferred to another school district prior to the date of payment. The principal found the student and gave him/her the Wal-Mart gift card.

4 Results

4.1 Instrument Check

Table 2 shows descriptive statistics for the population of students in the experiment. Forty-seven percent of the subjects are male and 40.2% are Black. Almost 60% of the children receive free or reduced price lunch and 21.5% are part of a special education program. According to their 7th grade aptitude test, 21.1% of the children do not satisfy the math requirement for their grade and 13.7% do not satisfy the reading requirements.

Table 2 also shows the proportion of kids that make at least one inconsistent decision in the experiment. Sixty-seven percent of the subjects make consistent decisions and less than 10 percent make five or more inconsistent decisions. The distribution of inconsistent behavior is not distributed randomly. Black subjects are more likely to behave inconsistently. Gifted children are the least likely to make inconsistent decisions, and children with reading deficiencies are the most likely to make inconsistent decisions, followed by children with math deficiencies.

Table 2. Descriptive Statistics

Variable	Mean (s.e.)	%Inconsistent Choices (s.e.)	Number
Age (years)	13.8 (0.2)		563
Male	47.5%	0.31 (0.03)	274
Female	52.6%	0.35 (0.03)	303
Black	40.2%	0.45 (0.03)	232
White	54.4%	0.26 (0.03)	314
Black Males	17.0%	0.42 (0.05)	98
Black Females	23.2%	0.47 (0.04)	134
White Males	28.9%	0.25 (0.03)	167
White Females	25.5%	0.27 (0.04)	147
Free & Reduced Lunch	59.8%	0.39 (0.03)	345
Special Education	21.5%	0.40 (0.04)	124
Gifted	10.8%	0.16 (0.05)	62
Poor Math	21.1%	0.45 (0.05)	115
Poor Reading	13.7%	0.48 (0.06)	75
7th Grade Discipline (number)	1.8 (0.1)		547

Note: Four subjects are missing basic demographic data on sex and race.
Additional subjects are missing data on age and test scores
(because they were not in the school system between testing and the experiment).

Table 3 presents the distribution of discount rates for all the subjects and only for subjects that answered consistently. Discount rates are put in ranges to make the presentation clearer. The discount rate of inconsistent subjects is estimated by finding the distribution of choices that is consistent and minimizes the total amount of money that would have to be spent to adjust their behavior.[6] As Table 3 makes clear, our procedure does not alter the basic features of the distribution of discount rates. In comparison with Harrison et al.'s (2002) experiment, our results suggests that children are more impatient than adults.

[6]Let x_{ij} be the amount of money child i chooses from menu j and let X be the set of all possible consistent patterns of behavior. Our estimates for inconsistent children are based on the $\widehat{x}$ such that $\widehat{x} = \arg\min_{x \in X} \sum_j |x_{ij} - x_j|$.

Table 3. Distribution of Preferences

Discount Rate ($d.r.$)	Frequency (*Percent*) Full Sample	Consistent
$d.r. \leq 20$	69 (*11.9*)	55 (*14.2*)
$20 < d.r. \leq 40$	51 (*8.8*)	31 (*8.0*)
$40 < d.r. \leq 60$	97 (*16.7*)	79 (*20.4*)
$60 < d.r. \leq 80$	84 (*14.5*)	67 (*17.3*)
$80 < d.r. \leq 100$	74 (*12.7*)	49 (*12.6*)
$100 < d.r. \leq 120$	34 (*5.9*)	20 (*5.2*)
$120 < d.r. \leq 140$	65 (*11.2*)	28 (*7.2*)
$d.r. > 140$	107 (*18.4*)	59 (*15.2*)
Total	581	388

4.2 Distribution of Preferences

Our first research question is whether *measured* time preferences relate to the socio-economic characteristics of children. Table 4 summarizes the main results on the distribution of preferences of children. Table A1 in the Appendix shows that these results also hold using regression analysis.

Table 4 shows that boys have larger discount rates than girls. Overall, the discount rates of boys are 16 points larger among children that answered consistently (13 points in the full sample). The same is true if preferences are measured by the number of impatient decisions. Table 4 shows, however, that the result that boys are more impatient than girls is race dependent. While the discount rates of white boys are larger than those of white girls, these differences are not statistically different.

The discount rates of black boys are between 22.5% and 33.9% larger than those of black girls. Black boys make between 3 and 4 more impatient decisions than black girls. As Table 4 shows, the difference in time preferences cannot be explained by lack of understanding of the instrument. The differences tend to be larger when the analysis is restricted to children making consistent choices.

The experiments reveal that there are no statistically significant differences between races in general. However, the experiments show that black boys possess larger discount rates than white boys. The discount rates of black boys are between 14 and 17 points larger than that of white boys.

Also, the socio-economic background, as measured by qualifying for free

or reduced lunch, does not explain differences in discount rates. That is, the fact that black boys are more impatient cannot be attributed to their economic condition. Black girls, who share the same economic background as black boys,[7] tend to be as or more patient than white girls. Ability, however, seems to play a role in the measurement of discount rates. Children with math deficiencies have larger discount rates, as do children with reading deficiencies. Given the small number of children with reading deficiencies in our sample, we suspect that reading deficiencies capture other characteristics related to patience.

That black boys consistently have larger discount rates than any other demographic group is puzzling. As Table 4 shows, this cannot be explained by either sex, race or income. Indeed, the distribution of discount rates of black boys (see Table A2 in the appendix) suggests that impatience is not distributed uniformly across black boys. In particular, 33% of black boys have discount rates above 140%. In comparison, only 14.3% of white girls, 19.4% of black girls and 14.4% of white boys have discount rates above 140%. The differences are even clearer if we concentrate on children that answered consistently. In this subsample, 13.1% of white girls, 9.9% of black girls, 12.8% of white boys and 35.1% of black boys have discount rates above 140%. This suggests that there is a large group of black boys that behave extremely impatiently.

Andersen, Harrison, Lau and Rutström (2008) argue that differences in discount rates can instead reflect differences in risk preferences. In particular, relatively more risk averse subjects will appear more impatient. Our experiments do not collect independent data on risk preferences. However, assuming that subjects possess constant relative risk aversion preferences, it can be shown that black boys would require a 0.15 larger coefficient of risk aversion than black girls to account for the differences in discount rates.[8] Previous research on risk preferences of 9th grade students in Dallas, Texas shows no difference in the distribution of risk preferences between black boys and black girls.[9] Bettinger and Slonim (2007) collected independent data on

[7]The probability that a black boy or a black girl qualify for free or reduced meals is not statistically different (p-value = .673)

[8]To put this number in context, a person with 0.15 larger coefficient of relative risk aversion would be willing to receive between $30 and $110 less for a lottery ticket that pays $1000 and $0 with equal probability.

[9]This result was confirmed through personal communication with Catherine Eckel (University of Texas-Dallas).

risk preferences and find that it has no effect on time preferences.

Alternatively, these differences in discount rates are possible if only black boys have more profitable alternatives to invest money than what is offered in the experiment. Given that the differences in discount rates are largely explained by the over representation of discount rates above 140% among black boys, this explanation would suggest exceedingly large potential gains in the field.

An open question is what explains the large differences in the time preferences of children. Table A3 presents additional regressions of discount rates on a series of personal and household characteristics. The regressions use information collected from a short take-home questionnaire given to the parents of the 2007 experimental participants. The 2006 experimental participants had already graduated from middle school and could not be contacted. Of the 380 children, 141 returned a questionnaire. This represent a 37% response rate, and the results should be taken as preliminary. Column 4 in Table A3 shows that while the parents of children with poor math or reading skills are less likely to respond to the questionnaire, column 3 shows that the time preferences of children of non-responding households are no different from those of responding households. Importantly, Table A3 shows that the fact that black boys are significantly more impatient holds after controlling for household structure, family size, marital status of parents and employment conditions. This suggests that environmental variables might be important in the evolution of the preferences of children. Importantly, we find that children with at least one parent having completed college have significantly smaller discount rates than children in households without a college-graduate parent. This correlation could be due to a variety of factors, including an income effect or an expectation of the child's educational achievement.

Table 4. Mean of Discount Rates and Impatient Decisions

	Discount Rates						Impatient Decisions					
	Full Sample			Consistent			Full Sample			Consistent		
	No	Yes	t-test(p-value)	No	Yes	t-test(p-value)	No	Yes	t-test(p-value)	No	Yes	t-test(p-value)
Male	74.2	87.5	-3.31 (.001)	65.5	81.7	-3.41 (.001)	8.7	10.4	-3.52 (.001)	8.4	10.6	-3.40 (.001)
- Only Blacks	74.3	96.8	-3.35 (.001)	59.8	93.7	-3.86 (.000)	8.4	11.3	-3.75 (.000)	7.6	12.2	-3.86 (.000)
- Only Whites	76.2	82.2	-1.13 (.257)	70.0	75.7	-0.94 (.350)	9.2	9.9	-1.06 (.288)	9.0	9.8	-0.93 (.355)
Black	78.3	83.8	-1.32 (.189)	72.7	74.9	-0.40 (.689)	9.5	9.6	-0.31 (.756)	9.4	9.7	-0.41 (.686)
- Only Boys	82.3	96.8	-2.40 (.018)	76.6	93.7	-2.14 (.035)	9.9	11.3	-1.87 (.063)	9.9	11.3	-1.87 (.063)
- Only Girls	74.1	74.3	-0.03 (.983)	68.7	59.8	1.33 (.185)	9.0	8.4	0.96 (.337)	9.0	8.4	0.96 (.337)
Gifted	81.6	71.4	1.72 (.089)	74.9	64.2	1.68 (.098)	9.6	8.9	0.89 (.377)	9.7	8.2	1.67 (.099)
Special Education	80.3	81.2	-0.17 (.865)	73.6	73.0	0.08 (.935)	9.6	9.4	0.34 (.731)	9.5	9.4	0.08 (.988)
Poor Reader	82.5	71.2	1.73 (.087)	75.5	59.3	1.74 (.089)	9.8	8.2	2.12 (.036)	9.8	7.7	1.74 (.089)
Poor Math	80.9	80.4	0.08 (.937)	74.3	69.9	0.57 (.567)	9.6	9.4	0.36 (.722)	9.6	9.0	0.57 (.569)
Poor Reader&Math	81.4	74.7	0.78 (.438)	74.3	64.1	0.71 (.483)	9.6	8.7	0.98 (.334)	9.6	8.3	0.71 (.484)
Free & Reduced Lunch	78.4	81.9	-0.86 (.389)	73.9	73.1	0.18 (.858)	9.6	9.5	0.23 (.819)	9.6	9.4	0.19 (.852)

Note: Each row conditions on one or two covariates and compares discount rates for those who possess that covariate (Yes) or not (No)

4.3 Economic Consequences of Time Preferences

As argued by Bowles, Gintis and Osborne (2001) and Heckman, Stixrud and Urzua (2006), non-cognitive abilities have influence in educational and labor market outcomes. In this section, we investigate our second research question, if measured discount rates affect the likelihood a child receives a disciplinary referral. The number of discipline acts incurred by a child has been found to be a good predictor of the child's decision to drop out of school and of lower average lifetime earnings (Segal, 2006a; Neild, Balfanz and Herzog, 2007; Viadero, 2006).

Our measure of discipline is based on the number of disciplinary referrals during seventh grade. A disciplinary referral happens when a student is sent to the administrative office (by a teacher, administrator or bus driver) and the behavior is entered into the student's data file (i.e. reprimand, detention, suspension, etc.). This does not include referrals to the office that do not result in a recorded entry in the student's data file. On average, a child receives a referral 1.8 times during seventh grade. However, the distribution is highly concentrated. Seventy-five percent of the children have no disciplinary referrals at all. Moreover, the distribution of disciplinary referrals depends on the gender and race of the child. A black boy is disciplined 3.3 times while a white boy is disciplined 1.8 times on average. A black girl is disciplined 2 times while a white girl is disciplined only 0.7 times. In what follows, we will analyze disciplinary referrals using an indicator variable that equals 1 if a child has 3 discipline referrals or more. The analysis is similar if we use other indicator functions or use negative binomial regressions to account for the nature of the data.

Table 5 presents the estimates of a linear probability model with heteroskedastic corrected standard errors for disciplinary referrals for different sub-populations.[10] For completeness, the table includes the subsample of subjects that made decisions consistently. Table 5 shows that for the subsample of consistent subjects discount rates predict disciplinary referrals, controlling for covariates. Our estimation indicates that an increase of one standard deviation in the discount rate increases the probability of having more than 2 disciplinary referrals by 5% ($48.5 \times 0.0011 = 0.05$).[11] This effect is half the size of the impact that qualifying for free or reduced lunch has

[10]The qualitative results are similar if a probit is used instead.

[11]The overall mean discount rate for consistent subjects in Table 5 is 74.3 (standard deviation 48.5).

and it is comparable to that of being gifted (but in the opposite direction). The estimates using the full sample and estimated discount rates suggest that these results are subject to measurement problems. Regressions using subsamples of the data offer additional evidence of the relationship between discount rates and discipline.

Regressions using only the data for boys confirm that discount rates matter. The estimate using the subsample of consistent children show that an increase of one standard deviation in the discount rate increase the likelihood of having more than 2 discipline referrals by 11% ($48.08 \times 0.0023 = 0.11$). The impact is 6% ($47.31 \times 0.0012 = 0.06$) in the full sample of consistent and inconsistent boys. One might suspect that our measure of discount rates confounds the effect of race in the regression for boys. However, this is not the case. The regression for the sub-population of white children shows that discount rates have a separate impact from either gender or ability. The estimates show that an additional standard deviation in the discount rate increases the probability of having more than two disciplinary referrals between 8% ($45.87 \times 0.0018 = 0.08$) and 5% ($46.31 \times 0.0011 = 0.05$).

A major concern is whether the relationship between discount rates and disciplinary referrals is causal. It is possible that disciplinary referrals are correlated with unequal treatment that in turn affects the expectations of those being punished. The regression using girls' responses gives us evidence against a reverse causality argument. As noted above, black girls are disciplined significantly more frequently than white girls. However, there is no evidence that black girls have larger discount rates than white girls. If punishment produces impatience we would expect the opposite. This differential treatment of black girls seems to explain the lack of importance of discount rates in explaining disciplinary referrals among black children as well. Overall, the results show that discount rates matter for behavior.[12]

[12]Discipline data might reflect unequal treatment towards black boys. To address this hypothesis, in the future, we will collect data on schools with only Black teachers.

Table 5. Linear Probability Model on Probability of Having 3 or More Discipline Referrals

			Boys		Girls		Whites		Blacks	
	Consistent	Full	Consistent	Full	Consistent	Full	Consistent	Full	Consistent	Full
Discount Rate	.0011**	.0003	.0023***	.0012*	.00002	-.0003	.0018***	.0011**	.0002	-.0005
	.0005	.0004	.0007	.0006	.0006	.0005	.0005	.0004	.0009	.0006
Male	.1646***	.1602***					.1595***	.1441***	.0669	.1458**
	.0473	.0413					.0481	.0412	.0908	.0670
Black	.1082	.0967*	-.0117	.0572	.1106*	.1112**				
	.0662	.0506	.0895	.0740	.0650	.0518				
Black Male	-.1083	-.0211								
	.0991	.0770								
Other	-.1340**	-.1326***	.2130	.2974	-.1493**	-.1500***				
	.0553	.0451	.2046	.2049	.0663	.0538				
Other Male	.4253**	.4757**								
	.2062	.2071								
Gifted	-.0873**	-.0870**	-.2052***	-.1920***	-.0135	-.0199	-.1070***	-.1041***	.0380	-.0044
	.0404	.0356	.0606	.0483	.0524	.0461	.0344	.0294	.1422	.1132
Special Education	.0616	.0513	.0683	.0726	-.0111	.0023	.1054	.0997	.0071	-.0180
	.0736	.0556	.0941	.0744	.1151	.0828	.0857	.0655	.1179	.0924
Reading Poor	.2668**	.1205	.3197**	.1925	.1654	-.0016	.3516***	.2777**	.1623	.0428
	.1176	.0885	.1437	.1206	.1806	.1212	.1320	.1308	.1927	.1105
Math Poor	.1181	.0865	-.1036	-.0389	.4853***	.2735***	-.2305**	-.1801**	.3920***	.3267***
	.0922	.0668	.0947	.0798	.1289	.1016	.1007	.0752	.1238	.0941
Reading and Math Poor	-.3503**	-.1726	-.0244	-.0574	-.8491***	-.2763	-.0541	-.1339	-.4509*	-.1907
	.1733	.1267	.2096	.1740	.2218	.1738	.2081	.1786	.2555	.1709
Free & Reduced Meal	.1063**	.1135***	.1034	.1095	.0853	.1109**	.0910	.0908*	.2510**	.2809***
	.0503	.0411	.0836	.0704	.0534	.0438	.0588	.0507	.1132	.0735
Cowan	.1170***	.0759**	.1836***	.1246**	.0566	.0203	.2046***	.1491***	-.0379	-.0014
	.0441	.0362	.0701	.0579	.0493	.0446	.04704	.0404	.0969	.0703
Constant	-.1061**	-.0377	-.0474	.0335	-.0019	.0309	-.1892***	-.1107**	.0068	-.0037
	.0529	.0441	.0859	.0745	.0554	.0460	.0523	.0470	.1361	.1007
N	356	528	177	254	179	274	212	284	120	214
R^2	.1854	.1430	.2023	.1341	.2786	.1513	.2562	.1746	.1599	.1426

* Standard errors listed below coefficients. p-value < .1, ** p-value < .05, *** p-value < .01

5 Conclusions

We investigate the distribution of time preferences of children. We collected data from 581 students in the 8th grade from a district in the southern MSA of Atlanta, Georgia. We find that black boys stand out in terms of their discount rates. Black boys have the largest discount rates compared to any other demographic group. Neither race, socio-economic background nor academic performance are able to explain the difference in time preferences among black boys.[13] Importantly, we find a high degree of heterogeneity in children's preferences but more so among black boys. The difference in discount rates of black boys is explained by their overrepresentation among children with extremely high discount rates.

Our research shows that time preferences matter and predict the occurrence of disciplinary referrals. One standard deviation in the discount rate increases the probability of receiving at least 3 disciplinary referrals in a year by 5%. Importantly, we do not find evidence that disciplinary actions increase a child's discount rates. Black girls are punished more frequently, but they are no more impatient than white girls. To our knowledge, this is the first experimental work on time preferences among children that provides evidence of a relationship between preferences and outcomes.

Our research shows that experimental methods are important not only in detecting differences in the population, but perhaps as a starting point to improve our understanding of divergent life paths.

[13] Bettinger and Slonim (2006) collected rich data on time preferences on a sample that included children of different ages. Their results, as ours, show that there is no difference in time preferences based on race. Regression analysis shows that a dummy variable for black children is not significant even if the dummy for black boys is removed. They do not report within race differences in behavior.

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7. Appendix

Table A1. Regression Analysis of Discount Rates

Variable	Interval Regressions[a] Discount Rates		Count Regressions[b] Impatient Decisions	
Male	5.883	6.220	0.067	0.092
	5.612	5.457	0.069	0.067
Black	-9.188	-7.369	-0.029	0.009
	6.350	6.171	0.086	0.086
Black Male	21.456**	18.144**	0.246**	0.198*
	8.641	8.384	0.108	0.108
Other	2.901	10.377	-0.035	0.062
	14.687	14.135	0.210	0.216
Other Male	36.297	32.148	0.329	0.284
	25.156	24.311	0.266	0.262
Gifted	0.582	-1.984	-0.068	-0.133
	7.206	7.252	0.094	0.096
Special Education	0.739	0.178	-0.044	-0.082
	5.867	5.777	0.072	0.076
Reading Poor	-20.273**	-15.721*	-0.264*	-0.277**
	8.741	8.618	0.137	0.130
Math Poor	-9.260	-13.159**	-0.018	-0.051
	6.685	6.638	0.086	0.090
Reading & Math Poor	12.687	11.259	0.127	0.113
	12.705	12.251	0.190	0.180
Free & Reduced Meal	-8.017	-6.237	-0.054	-0.028
	5.150	5.014	0.068	0.066
Constant	65.806***	53.286***	2.264***	1.907***
	4.865	12.482	0.059	0.173
Experimenter Dummies	*No*	*Yes*	*No*	*Yes*
Room Dummies	*No*	*Yes*	*No*	*Yes*
N	545	545	545	545
log Likelihood	-1714.4	-1686.7	-1733.8	-1715.0

Standard errors below coefficients, * p-value < .1, ** p-value < .05, *** p-value < .01

[a] Interval regression that permits censoring at final decision, [b]Negative binomial regression.

Table A2. Distribution of Preferences by Sex and Race

Discount Rate ($d.r.$)	Women (*Percent*)		Men (*Percent*)	
	White	Black	White	Black
$d.r. \leq 20$	22 (*15.0*)	29 (*21.6*)	17 (*10.2*)	14 (*14.3*)
$20 < d.r. \leq 40$	12 (*8.2*)	7 (*5.2*)	9 (*5.4*)	1 (*1.0*)
$40 < d.r. \leq 60$	25 (*17.0*)	25 (*18.7*)	30 (*18.0*)	8 (*8.2*)
$60 < d.r. \leq 80$	24 (*16.3*)	12 (*9.0*)	30 (*18.0*)	12 (*12.2*)
$80 < d.r. \leq 100$	18 (*12.2*)	17 (*12.7*)	25 (*15.0*)	10 (*10.2*)
$100 < d.r. \leq 120$	9 (*6.1*)	5 (*3.7*)	8 (*4.8*)	9 (*9.2*)
$120 < d.r. \leq 140$	16 (*10.9*)	13 (*9.7*)	24 (*14.4*)	11 (*11.2*)
$d.r. > 140$	21 (*14.3*)	26 (*19.4*)	24 (*14.4*)	33 (*33.7*)
Total	147	134	167	98

Table A3. Time Preferences and Family Background

	Interval Regressions			OLS
	Discount Rates			Responded
Variable	(1)	(2)	(3)	
Male	6.845	1.778	2.429	0.017
	8.859	9.022	6.407	0.059
Gifted	5.382	5.986	7.490	0.085
	9.925	9.726	7.561	0.064
Special Education	-5.145	-0.882	4.207	-0.093
	11.025	10.436	10.436	0.060
Reading Poor	6.836	11.087	-1.606	-0.230*
	14.139	12.233	18.393	0.133
Math Poor	0.889	-3.691	-16.662**	-0.211***
	20.517	19.267	8.459	0.056
Reading & Math Poor	-28.169	-31.259	5.427	0.287*
	31.519	29.179	23.256	0.161
Black	-22.907**	-21.196**	-13.546*	-0.068
	10.675	10.681	7.705	0.066
Black Male	25.391*	29.129**	23.724**	0.012
	14.481	14.669	11.337	0.091
Other	-22.298	-21.340	-19.099	0.098
	26.074	26.744	14.215	0.148
Other Male			90.207***	-0.393**
			30.066	0.158
Intact Household	3.546	-1.861		
	10.839	9.232		
Married Parents	6.254	13.565		
	12.429	10.588		
One Parent(s) has a College Degree	-17.802**	-17.703**		
	7.249	7.142		
Child Support	-10.635	-8.178		
	9.987	9.915		
Employed	5.607	5.184		
	8.164	8.164		
Owned Household	3.898	8.803		
	8.913	9.570		
Household Members	0.899	3.537		
	3.901	3.658		
Cowan	-23.695***			-0.482***
	8.154			0.047
Responded			-6.481	
			6.008	
Constant	66.310***	10.930	50.355***	0.759***
	2317.175	18.955	7.831	0.051
Room & Experimenter Dummies	No	Yes	Yes	No
N	153	153	353	353
Log-Likehood	-458.25	-445.06	-1087.4603	0.336+

Standard errors below coefficients, * p-value < .1, ** p-value < .05, *** p-value < .01