Human Capital and the Lifetime Costs of Impatience*

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Abstract

In this paper, we examine the role of impatience in the formation of human capital – arguably the most important investment decision individuals make during their lifetimes. We pay particular attention to a set of investment behaviors that cannot be explained solely by variation in exponential discount rates. Using data from the NLSY and a straightforward measure of impatience, we find that impatient people more frequently invest in dynamically inconsistent ways such as starting an educational program but failing to complete it or dropping out of college with one year or less remaining. The cumulative investment differences result in the impatient earning 13 percent less and expressing significantly more regret as this cohort reaches middle age.

JEL: D03, D91, I21, J24

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1 Introduction

For most individuals, choosing how much human capital to acquire represents the most important investment decision they make during their lifetimes. These decisions are made earlier in life than are other investment choices, and they have permanent consequences. Mincer's (1958) seminal treatment of these choices implies that preferences (i.e. patience) and the investment return jointly determine an individual's optimal education level, a framework that has become the foundation of the human capital investment literature (Heckman, Lochner and Todd 2006). Yet to our knowledge, this paper represents the first systematic empirical investigation of the importance of impatience in human capital formation.[1]

Given that most models of human capital investment use exponential discount rates, this lack of empirical analysis is perhaps understandable; it would hardly be surprising to find individuals with different preferences making different choices. Yet, in a variety of other investment contexts, evidence increasingly suggests that individual-level variation in time preferences is as much a matter of form as degree. Multiple studies have found patterns of investment implying that a sizable fraction of the population hold time-inconsistent or quasi-hyperbolic preferences.[2] Importantly, when investors have time-inconsistent preferences, it is possible to improve their welfare by imposing constraints or incentives designed to increase investment.[3]

Several important studies suggest, although they do not show directly, that human capital investments are influenced by these types of preferences. A systematic evaluation of an early childhood intervention designed to improve a variety of children's skills – including delaying gratification – revealed dramatic benefits for later life outcomes including educational attainment (Heckman, Moon, Pinto, Savelyev and Yavitz 2010b). Similarly, a seminal paper in the personality psychology literature found that children who were able to wait twenty minutes for a larger reward experienced more success in later life across a number of different metrics (Mischel,

[1] Golsteyn, Grönqvist and Lindahl (forthcoming) examine the relationship between time preferences and human capital investment in the Swedish context, although their analysis does not focus on time-inconsistency.

[2] See DellaVigna (2009) for a comprehensive survey and Becker, Deckers, Dohmen, Falk and Kosse (2012) for a careful exploration of the relationship between economic preferences and psychological measures of personality.

[3] In contrast, if students were free from commitment problems, policymakers may instead want to focus on ensuring that credit constraints do not prevent beneficial investment (Carneiro and Heckman 2002).

Shoda and Rodriguez 1989). Further, a variety of experiments designed explicitly to affect student investment have found results consistent with hyperbolic discounting (Fryer 2010, Levitt, List, Neckermann and Sadoff 2012). Additionally, Oreopoulos (2007) finds compelling evidence that a high school completion mandate increased self-reported happiness among affected cohorts, which implies that some dropouts in unaffected cohorts later regretted their choices.

In this paper, we make a distinct contribution to this literature by using nationally representative data to examine directly whether impatient individuals' human capital investment patterns are more likely to exhibit dynamic inconsistency than are their patient counterparts'. We then track the labor market consequences of these investment differences for roughly twenty years. Our analysis is motivated by introducing quasi-hyperbolic discounting to the standard Mincerian model of human capital investment. This augmented framework reveals the key insight that guides our empirical analysis: A time-inconsistent impatient investor will be more likely to fail to complete educational investments that are personally optimal. Crucially, differences in exponential discount rates cannot explain differential dropout behavior and would instead lead to differences in planned investment and initial enrollment.

We examine this hypothesis empirically using data from the National Longitudinal Survey of Youth (NLSY). We identify individuals as impatient if, during any of the 1980-1985 waves of the survey, their interviewers classify them as "impatient or restless" in their post-interview assessments.[4] The use of this variable to identify individuals with different time preferences was introduced in DellaVigna and Paserman's (2005) analysis of the role of impatience in job search. They find that impatient respondents have longer unemployment spells, which is consistent only with short-run impatience because lower exponential discount rates would lead to lower reservation wages and shorter unemployment durations. We provide additional descriptive analysis that strongly supports this interpretation. We find that those identified as impatient are significantly less likely to have a bank account, more likely to smoke, more likely to drink to excess, less likely to complete military commitments, and more likely to leave the survey in which they had previously agreed to participate. The choices the impatient make across this variety of domains suggest that any observed

[4]The alternatives are "friendly/interested", "cooperative/not interested", and "hostile". The "hostile" response has little predictive power for the outcomes we study, and point estimates suggest that individuals classified as "hostile" using a similar definition actually obtain more human capital than do the non-hostile.

differences in completed schooling may also result from time-inconsistent preferences rather than from differences in individually optimal education levels.

A direct analysis of the educational investment patterns of these two groups supports a similar conclusion. The impatient are over 50 percent more likely to drop out of high school despite expressing a desire and an expectation to finish. Additionally, among those who signal that their personal value of a college degree exceeds the cost, as measured either by directly expressing a desire or expectation to attain a degree or by initially enrolling, the impatient are significantly less likely to achieve their goal. Although each of these results is consistent with the interpretation that individuals identified as impatient hold time-inconsistent preferences, dropout behavior can occur for a number of reasons beyond non-standard preferences, such as financial difficulties or learning new information about the costs and benefits of degree receipt.

Thus, we spend a substantial portion of the paper investigating whether these alternatives are sufficient to explain the entirety of the observed differences in dropout behavior between patient and impatient individuals. First, we directly examine the reasons that survey respondents provide for leaving school and find that, among dropouts, the impatient are no more likely to report academic or financial difficulties.

We then focus on the college dropout decision and the timing of differential dropout behavior to help distinguish among possible interpretations. The impatient are far more likely than their patient counterparts to drop out immediately upon enrollment, with one year or less of completed college education. Although this result is predicted by a dynamic inconsistency framework, it could also reflect other differences between the patient and impatient, especially the possibility that the impatient may be more likely to learn that completing a college degree will be more difficult than expected.[5]

In contrast, after three years of college, there is little remaining uncertainty about one's ability to complete the required coursework. Importantly, we also find a large gap in dropout behavior at precisely this juncture. Among those who have completed three years of college, the impatient are nearly 70 percent more likely not to finish their degree. This is a key result because this behavior is inconsistent with alternative interpretations wherein the dropout gap results from the impatient experiencing greater information shocks upon enrollment.

[5]Stinebrickner and Stinebrickner (2012) show that a substantial amount of this type of learning takes place, and it is certainly possible that this learning occurs more frequently among the impatient.

Further, when we control for academic readiness for college as proxied by AFQT scores, we find that doing so attenuates the "immediate" dropout gap somewhat but has a relatively small influence on the "late" dropout gap, which remains large and statistically significant.[6] Thus, although some of the dropout gap may reflect differential ability or differences in new information, the timing of the differential dropout behavior is difficult to explain without time-inconsistency. Finally, we find that the impatient also experience a higher return to degree completion, suggesting that they behave as if they require a larger payoff to overcome their greater short-run costs of investment. If, instead, the higher dropout rate among the impatient reflected better non-college labor market alternatives, such as entrepreneurship, we would expect to see smaller completion earnings premiums among this group.

In the end, we find that there are a number of possible interpretations for many of the seemingly suboptimal investment behaviors to which the impatient are more prone. Taken as a whole, however, the evidence supports the view that much of this behavior derives from dynamically inconsistent preferences, as this parsimonious explanation correctly predicts each behavior we examine. This novel interpretation therefore provides an additional explanation for dropout behavior beyond the labor market supply and demand factors examined in previous work (Card and Lemieux 2001).

Throughout our analysis, we are careful to condition on multiple additional family background characteristics in order to isolate the role of impatience. We demonstrate that impatience varies substantially across individuals, even after controlling for other important determinants of human capital accumulation, such as socioeconomic background. Further, we perform supplementary analysis using the National Longitudinal Study of Adolescent Health (Add Health) to establish that these types of interviewer assessments do not simply capture youth with ADHD or other attention difficulties who are known to have higher costs of human capital formation (Currie and Stabile 2006).

Having established that the impatient are substantially more likely to exhibit preference reversals in educational investment, we turn to additional hypotheses suggested by the augmented conceptual framework. We find that the impatient express

[6] In the empirical section, we are careful to note that it is possible that differences in college readiness are the *result* of impatience-related differences in early investment. In this case, AFQT scores would be part of the mechanism through which impatience affects early dropout and adding them as a control would be inappropriate.

greater levels of regret in middle age — a clear yet understudied empirical prediction of models of dynamic inconsistency. The impatient are also more likely to finish with fewer years of education, and to churn through jobs without corresponding increases in earnings.

Finally, using the NLSY panel, we document the significant divergence between patient and impatient respondents' resulting labor market outcomes. As this cohort reaches middle age, the impatient have experienced a greater number of employment separations and on average have earned a cumulative total of $75,000 less than their patient counterparts, a difference of approximately 13 percent.

Our results provide the first direct evidence that impatient individuals are more likely to exhibit preference reversals as they invest in human capital. Thus, for many such investors, low educational attainment is a costly mistake. These empirical results, therefore, can help justify policy interventions designed to increase patience and self-control (see, for example Heckman et al.'s (2010b) analysis of the value of the Perry preschool program) as well as policies that provide short-run incentives to keep students enrolled through completion of their degree. Previous research has found evidence of dynamic inconsistency across a number of applications, although the costs of many of these suboptimal choices are substantially smaller than the costs identified in this study.[7] Choosing one's level of human capital effectively sets a budget constraint for each remaining period thereafter; failing to invest optimally early in life thus creates a lifetime of negative consequences.

The remainder of the paper is organized as follows: the next section provides a conceptual framework for understanding how impatience generally and dynamic inconsistency specifically interact with human capital investment decisions; Section 3 further discusses the data and presents the results; Section 4 concludes.

2 Conceptual Framework

In this section, we present a basic framework for understanding how impatience affects human capital investment decisions. Although this framework does not explicitly incorporate other factors that may affect the decision to complete a degree, we explore the implications of relaxing this assumption below. We discuss the investment decision

[7]For example, DellaVigna and Malmendier (2006) find that gym members paying on a monthly basis frequently pay more per visit than the per-visit cost.

by allowing for time-dependent preferences in the classic human capital investment model (Mincer 1958). The discussion below re-iterates the central finding of the behavioral literature: An economic agent with (β, δ) preferences will under-invest and over-consume relative to his ex ante optimum (Laibson 1997, DellaVigna 2009).[8]

2.1 Setup

We begin by considering an economic agent deciding whether to obtain a credential, e.g. an academic degree, in period 0. Given the sequential nature of education decisions, one can consider this decision as recurring repeatedly until an individual decides not to pursue further schooling. The investment is costly, with a direct utility of $-C$ in addition to foregone (non-credentialed) earnings in the investment period (period 1). In order to focus on the role of β vs. δ impatience, we begin with a simplified model in which credentialed income is $Y^C > Y^0$ with no real growth in earnings for either level of education, and we assume that acquiring the degree requires a single discrete time period investment.[9] In addition, in this framework there is no uncertainty and no learning between periods 0 and 1 about the costs or returns to schooling, a set of assumptions we discuss in detail below. Agents live for $T + 1$ periods, so investment in the credential pays off for T periods if acquired.[10]

2.2 Cutoff Return for Investment

We begin by describing when an individual would like to obtain the credential, or when ex ante benefits outweigh the ex ante costs. This analysis provides an important first step with an empirical analogue as the NLSY data provide multiple means of measuring an individual's desire for further schooling. Respondents are asked directly about the highest degree they would like to complete, revealing which credentials

[8]This particular representation of dynamic inconsistency is used for expositional simplicity. One could, of course, consider alternative economic models of self-control beyond quasi-hyperbolic discounting that would also generate the gap in dropout behavior. See, for instance, the dual-self model of Fudenberg and Levine (2006). For the key empirical implications, it is only necessary that the impatient are more likely to reverse their decisions than they would be if commitment were costless.

[9]The central finding that time-inconsistent impatience will predict more frequent dropout behavior is robust to an arbitrary specification of the returns to schooling. The precise formula for required returns for exponential discounters to invest will depend on the full return, including any increased return to experience.

[10]Note that in this setup, when the drop out decision is only made once, an increase in the number of periods required to obtain the credential is equivalent to a proportional decrease in T.

individuals anticipate will provide sufficient net benefit. Additionally, the enrollment decision frequently occurs prior to actually beginning the investment process. The panel nature of the data allows us to track enrollment decisions, which provides a behavior-based indicator that an individual desires the credential.

In the initial time period, the agent faces the choice between two future streams of utility:

$$\text{Obtain Credential: } \beta\delta(-C) + \beta\delta^2 \sum_{t=0}^{T-1} \delta^t Y^C \tag{1}$$

$$\text{Do Not Obtain Credential: } \beta\delta Y^0 + \beta\delta^2 \sum_{t=0}^{T-1} \delta^t Y^0 \tag{2}$$

Using the notation $r^c \equiv \frac{Y^C}{Y^0} - 1$ (the "return to the credential") and $I = 1 + \frac{C}{Y^0}$ (the "cost of investment" as a multiple of base annual earnings), the expressions in (1) and (2) can be rearranged to show that an individual will want to invest when

$$r^c > \frac{(1-\delta)I}{\delta(1-\delta^T)} \equiv r_0^{min}. \tag{3}$$

The optimal decision, therefore, is based on a cutoff rate of return that depends only on the long-run discount factor (δ) and the cost of investment. Individuals with $r^c > r_0^{min}$ find it optimal to invest, and others do not. Thus, individual differences in δ will result in ex ante differences in desired schooling. Note that the β term has disappeared entirely in this initial period analysis. This is a standard result: The presence of hyperbolic discounting does not affect the discount rate between two future periods.

2.3 The Role of Short-Run Impatience

In the next period, however, agents must decide whether to continue paying the cost of obtaining the credential or instead to drop out. It can easily be shown that people will continue to pay the cost of investment and actually receive the credential when

$$r^c > \frac{(1-\delta)I}{\beta\delta(1-\delta^T)} \equiv r_1^{min}. \tag{4}$$

Hyperbolic discounting, therefore, effectively alters the return an individual requires to follow through on his plan to obtain a worthwhile investment ($r_1^{min} \geq r_0^{min}$). Thus the optimal investment decision continues to be determined by a cutoff rule, although the cutoff will change from period 0 to period 1 for individuals with $\beta < 1$.

If students have rational expectations about the costs and benefits of investment, then there is effectively no learning between periods 0 and 1, and all exponential discounters ($\beta = 1$) will continue with their investment, as $r_0^{min} = r_1^{min}$. Under this assumption, the only group of students who drop out are hyperbolic discounters with sufficiently low β such that it is no longer worthwhile to attend school.

If, on the other hand, enrollment provides new information about either the costs or the benefits from the investment, then dropout behavior may occur even in the absence of time-inconsistent preferences. Conditional on a given change in relative costs and benefits, individuals with lower β will still experience greater dropout risk. Thus, although exponential discounters may experience a sufficiently large shock to their information set to lead them to drop out, hyperbolic discounters will be even more responsive to a given change in information.

It is also important to recognize that there are several types of students with dynamically inconsistent preferences ($\beta < 1$) who will nevertheless make investment choices that appear time-consistent. First, students with "mild" preferences for immediate utility may manage to complete their investment even though the perceived net benefit falls upon enrollment. Second, students with "severe" preferences for immediate consumption ($\beta << 1$) may fail to enroll if enrollment is costly, even if the perceived net benefit of the credential is large.

Finally, this framework has implicitly assumed that impatient individuals are naïve regarding the nature of their preferences. If individuals were "sophisticated" in anticipating the actions of their future impatient selves, they would seek out costly commitment devices to tie their hands in order to complete the investment they desire (Ashraf, Karlan and Yin 2006). Absent any available commitment device, these individuals may choose not to enroll in order to avoid a costly dropout decision later. In any of these cases, the sophisticates will invest in ways that are indistinguishable from students without a self-control problem. Thus, the existence of differential dropout behavior between the patient and the impatient suggests that many students fail to reach their personally optimal levels of schooling, but the magnitude of the gap likely understates the share of the population for whom dynamically inconsistent

preferences affect their investment process.

2.4 Empirical Implications

This augmented framework continues to imply that "impatient" people should begin their working careers with lower levels of education, regardless of the form of their impatience. Yet there are a number of measurable implications that are consistent only with low β, or short-run impatience, rather than with low δ, or a low exponential discount rate. For example, short-run impatience can explain dropping out of high school, despite expressing a desire and intention to receive a diploma. In fact, those with dynamically inconsistent preferences will be more likely to fail to meet their own educational aspirations and expectations more generally. To be clear, the failure to live up to expectations requires either naïveté (as outlined above) or overconfidence in addition to dynamically inconsistent preferences. If the impatient can accurately reason that they will fall short of their own goals, they may (correctly) expect to fail.

In addition, time-inconsistent investors will be more likely to drop out without completing a degree after initially enrolling in a higher education program, although time-inconsistency is not the only explanation for such behavior. Many students who begin an academic program may be misinformed about the costs and benefits (including costs related to their own academic ability), or not adequately risk averse, and may drop out upon starting the program and updating their beliefs. Further, the impatient may be more likely to experience adverse changes in financial circumstances that necessitate dropout behavior. In the empirical work, we directly address the possibility that these factors may be correlated with an individual's impatience as assessed by the interviewer. To the extent that the data allow, we examine each of these alternatives in detail, with the results continuing to support a role for time-inconsistency.

As additional evidence, we leverage the observation that only time-inconsistency in preferences can explain dropout behavior in the absence of new information. Therefore, most alternative reasons for dropping out will be largely resolved shortly after experiencing the costs of investment firsthand, and information-based dropout behavior should occur shortly after the information is obtained. In contrast, dropping out when very close to completing a degree cannot easily be reconciled with a learning model or a model of risk aversion because there is relatively little remaining uncer-

tainty about one's costs, returns, or ability. We therefore place particular emphasis on differential dropout behavior by the impatient among students who have completed all but one year of a four-year degree.

Determining the predictions for other types of human capital investment, including experience and different forms of tenure, proves more difficult than doing so for education. A simple re-labeling of the above framework suggests that, conditional on δ, we should find the (naïve) impatient and exponential discounters (β=1) equally likely to begin career paths that require an initial investment (long hours, low pay, low status, etc.) in exchange for a greater payoff in the future. Exponential discounters should continue along the investment path they have chosen. In contrast, hyperbolic discounters should be more likely to decide to switch to a position offering greater immediate utility.[11]

One might therefore expect the impatient to experience more job switches than their patient counterparts. There is, however, a competing force moving this prediction in the opposite direction. The short-run impatient are more susceptible to inertia and less likely to expend effort in the job search process (O'Donoghue and Rabin 1999, DellaVigna and Paserman 2005). Thus, they should be less likely to make upwardly mobile career moves. In the empirical work, therefore, we examine not only the total number of job changes, but also the fraction of those changes that result in an increase in earnings.

Finally, the short-run impatient should express greater levels of regret, as they have under-invested relative to their own optimum level. The presence of regret serves as an additional way of distinguishing between exponential and short-run impatience, as the short-run impatient will be more likely to be disappointed in their investment choices, which are more often suboptimal. The next section investigates the novel empirical predictions generated by allowing for dynamic inconsistency in human capital investment decisions.

[11] Additional empirical work focused more directly on the influence of time-inconsistency on job search and job switching can be found in Drago (2006), Paserman (2008), and van Huizen (2010).

3 Data and Results

3.1 The Impatience Measure

The data we use to address each of these hypotheses come from multiple waves (1979-2008) of the NLSY. The initial sampling frame provided a nationally representative sample of the cohort aged 14-22 in 1979. The survey was conducted annually until 1994 and biennially thereafter. In our main analysis, we follow DellaVigna and Paserman (2005) and classify a respondent as impatient if he is coded by his interviewer as "impatient/restless" in any of the annual surveys from 1980-1985.[12] Roughly ten percent of NLSY respondents are "impatient" according to this measure.[13] Although this measure was not designed specifically to measure time preferences, their analysis found that these post-interview assessments had strong predictive power for job search duration, another important intertemporal economic outcome.

Our primary empirical strategy compares investment choices between impatient and non-impatient NLSY respondents, conditional on a number of important controls for family background. We include flexible controls for age (in 1979), gender, race and ethnicity, parents' education (four categories for each parent), family income (categories for quartiles) and poverty status in 1979, whether the respondent lived with both parents at age 14, urbanicity and region in 1979, and the presence of reading materials in the home at age 14. Appendix Table A-1 provides summary statistics for these controls. This comprehensive list of covariates represents all available background characteristics in the NLSY and includes several important factors in a child's educational investment decision. Importantly, these additional explanatory variables reduce the influence of parental preferences for investment in education, family financial resources, and the local environment. We treat the remaining varia-

[12] DellaVigna and Paserman (2005) use additional survey questions to classify individuals as impatient, but many of these are reasonably considered outcomes of the types of investment that we study. Thus, they are not appropriate as components of our key explanatory variable.

[13] In the results that follow, the percent who are impatient varies somewhat from specification to specification, but it is consistently close to ten. This percentage is in line with what has been identified in previous work. For example, Fernandez-Villaverde and Mukherji (2006) find approximately 13 percent of individuals hold time-inconsistent preferences. In an extension to the main results (section 3.3), we analyze similar interviewer ratings from the Add Health. In this survey, which is also nationally representative but of a more recent cohort, roughly 25 percent of respondents are identified as impatient in one of the first four waves. Notably, the Add Health interviewers were asked whether the respondent *ever* seemed bored or impatient during the interview, whereas the NLSY interviewers were asked to rate the respondent's demeanor during the interview as a whole.

tion in impatience as exogenously given in interpreting the behavioral gaps as due to individual heterogeneity in time preferences.

These comparisons are made possible because impatience varies substantially across individuals, even after conditioning on all these background characteristics. Figure 1 presents the distribution of the predicted values from a probit of the impatience measure on this full set of controls. Appendix Table A-2 contains coefficient estimates from the probit regression that generated these predicted values, and it reveals that the impatient are more likely to be male and African-American and to come from families with more disadvantaged backgrounds (lower parental education and income, higher rates of single parenthood).[14] Although the predicted values are somewhat higher among the impatient group, there is considerable overlap in the two distributions, which provides the primary identification we use.

Prior to addressing human capital investment, we first examine whether these assessments are related to behaviors associated with dynamic inconsistency or self-control problems.[15] Table 1 provides the results of linear probability models examining differences in a number of such behaviors. Note that in this table and in those that follow, each specification includes the full set of baseline characteristics described above, although the coefficients on the covariates are suppressed for ease of exposition.[16] The reported regressions are unweighted, although the "patient mean" values are calculated using sampling weights.[17]

The first two columns show that impatient respondents are less likely to have accumulated savings in a bank account and more likely to have been a regular smoker. These respondents are also much more likely to have drunk alcohol to the point of a hangover, a canonical example of over-consumption that later leads to regret. Impatient respondents are also less likely to follow through with the commitments

[14] Appendix Table A-1 also provides the differences in the means of these covariates between the patient and impatient subsamples. Given these differences, we provide additional robustness checks in the appendix that indicate that the results are not driven by any particular gender and racial subgroup.

[15] Additional work identifying these types of links include Chabris, Laibson, Morris, Schuldt and Taubinsky (2008), the working paper version of Benjamin, Brown and Shapiro (2013), and Golsteyn et al. (forthcoming).

[16] The appendix contains an alternative version of each table with a more complete set of coefficients.

[17] These choices of unweighted regressions and weighted descriptives are as recommended in Solon, Haider and Wooldridge (2013). There are, however, no substantial differences between weighted and unweighted versions of the regressions. Appendix Table A-17 provides weighted versions of the key results for completeness.

they make. They are more likely to leave the survey in which they had previously agreed to participate, and notably, among those respondents who committed to a term of military service, the impatient are less likely to complete it (although this final gap cannot be statistically distinguished from zero). Together, these regressions suggest that this impatience measure identifies individuals who make a range of behavioral choices linked to time-inconsistent preferences.[18] These results are also consistent with related evidence among Austrian schoolchildren as reported in Sutter, Kocher, Rutzler and Trautmann (2013). The authors relate children's experiment-based measures of (dynamically inconsistent) impatience elicited from surveys to higher consumption of alcohol and cigarettes and lower levels of saving.

Finally, we note that the NLSY contains an additional survey question in the 2006 wave that provides a potential alternative measure of impatience. Respondents were told to imagine that they had won $1,000 and that they could receive the prize either immediately or after a one-month delay. They were then asked how much they would need to be compensated in order to delay the payment. There are multiple reasons why this hypothetical question is an inferior measure of impatience. First, the question is asked in 2006, when effectively all respondents have completed their educational investments. Additionally, these middle-aged adults likely have different levels of earnings and savings, and their stated willingness to wait for $1,000 likely conflates preferences with both liquidity and budget constraints. Further, given that the question asks only about the money immediately or in one month, the responses conflate differences in β and δ.[19] Finally, it is likely that most respondents did not correctly interpret the question, with more than half reporting requiring more than $100 to wait one month for $1,000 and many responses requiring more than twice the initial prize. Despite these concerns, we provide results based on this alternative measure in Appendix section A-2.2. These results are broadly consistent with the findings based on our preferred measure of impatience, although there is relatively little correlation between this more noisy measure of impatience and the assessment of the interviewer.

[18] There is also a positive correlation between this variable and BMI, although the coefficient is no longer statistically significant after including control variables.

[19] See Sutter et al. (2013) for a complete discussion of the types of survey questions needed to separately identify these two components.

3.2 Educational Investment Patterns Differ by Patience

Figure 2 shows unadjusted distributions of completed education (measured at ages 21 and 26) for the patient and impatient subsamples. The distributions show a substantial divergence in educational attainment between these two groups. Consistent with the impatient under-investing relative to their desired levels, there are large differences in dropout behavior. Impatient respondents are more likely to fail to finish high school (Panel A), and of those who have completed a high school degree and subsequently enrolled in college (Panel B), the impatient are less likely to finish a four-year college degree.

Table 2 examines the high school dropout decision in more depth. Portions of this analysis depend on questions about future educational choices asked in the first wave of the survey; therefore, we include only those individuals who are likely still constrained by compulsory schooling laws (under age 17 in 1979). The table reports coefficients from several linear regressions, with the dependent variable listed at the top of the column.[20] Here we consider a respondent to be a dropout if he has not received a regular high school diploma by age 21.[21] Each specification includes the rich set of family background characteristics used to generate Figure 1. Conditional on all of these covariates, impatient respondents are 10.2 percentage points more likely to drop out of high school. Compared to a dropout rate of 18.7 percentage points among the patient, this gap represents a 55 percent larger likelihood of dropping out.[22]

Although this difference in completion could represent either short- or long-run impatience, Oreopoulos (2007) presents calculations suggesting that the earnings gains from completing high school are large enough to require seemingly implausible levels

[20]Many of these regressions have binary variables as outcomes, and these regressions are thus linear probability models. In a model with only the impatience indicator, the functional form would be truly linear. As the majority of our controls are also dummy variables, we continue to report these linear probability models as our preferred specifications. For completeness, we have run each of these models as a logit, and these results are available from the authors upon request. The non-linear models yield qualitatively similar conclusions, including similar magnitudes for the differences in probabilities between the patient and impatient.

[21]The results are not sensitive to the definition of high school completion, including whether we classify GED recipients as having completed high school. See the data appendix for more details on variable construction.

[22]Overall, the impatient fall short of their own educational desires and expectations by roughly 0.1 years more than the patient (adjusted for the standard covariates). Given the strong prediction about dropout behavior from the conceptual framework, our empirical analysis focuses on those outcomes rather than on total educational attainment.

of δ. As direct evidence that this dropout gap results from dynamic inconsistency, columns (2) and (3) incorporate information about the respondent's desire for and expectations about completing high school. In the initial survey (1979, ages 14-16), respondents are asked what level of education they desire, and what level of education they actually expect to complete. Notably, nearly every individual in our sample expresses a desire to complete high school (98.7%), and a similarly high percentage (95.2%) state that they expect to complete high school. Thus, there is little scope for the dropout behavior shown in column (1) to derive from time-consistent investment. It is certainly possible that the answers to these questions are influenced by a social desirability bias and that a smaller percentage of the sample truly intended to complete high school. Nevertheless, given the tight link between these questions and the "initial period" investment problem considered in the conceptual framework, we continue to present results separately for respondents who indicated that dropping out was not their initial intention.

In the second column, the sample is limited to those who express a desire to complete high school (or a higher level of education) during the first survey. Dropouts in this sample have therefore changed their minds and decided not to complete an investment that initially appeared worth the cost. Importantly, if the greater dropout rates among the impatient resulted primarily from differences in δ rather than from differences in short-run impatience, the gap in column (2) should disappear. Individuals with lower exponential discount rates should plan to drop out and follow through on those plans. Instead, we find that essentially none of the dropout gap in column (1) derives from this time-consistent lower investment. Column (3) provides the results of a similar analysis, which instead limits the sample to students who expect to finish high school. The gap remains statistically significant and large, especially when measured relative to the patient mean (59.6 percent more likely to drop out among those who expect to finish).

There are two potential ways to interpret the analysis in columns (2) and (3). First, suppose that respondents are reluctant to state that they do not want to complete high school because they are trying to give the socially desirable answer to a question about educational values. Under this interpretation, the expectations question: "As things now stand, what is the highest grade or year you think you will actually complete?" allows the respondent to give a more truthful answer to a question with a more ambiguous "right" answer. If this interpretation is correct, this

question provides a better measure of the students' true educational preferences. This seems a particularly reasonable interpretation as nearly the entire sample expresses a desire to complete high school.

If, instead, the respondent answers both questions truthfully, any difference in the two columns would represent respondents' self-awareness of their inability to follow through on their desired investment. A sophisticated hyperbolic discounter may truthfully respond that he would like to complete high school but that he expects to drop out. Under this interpretation, the results would imply that relatively few of those subject to short-run impatient preferences fully recognize their dynamic inconsistency.

The final column of Table 2 completes this set of analyses by exploring the high school completion gap by the 2008 wave of the NLSY. In this specification, we code individuals who earned a high school degree or GED at any age as not having dropped out.[23] Although many individuals have returned to school at some point later in their lives, by age 40 the impatient remain over 70 percent more likely never to have earned a high school degree. This finding implies that these early investment decisions have permanent consequences for total human capital.

Table 3 uses a different sample to analyze college dropout behavior. This sample includes all respondents, regardless of age at the initial survey, who signal an initial interest in completing post-secondary education.[24] We examine three alternative measures of signaling: expressing a desire to complete a college degree, expecting to complete a college degree, or actually enrolling in college. As discussed in the previous section, enrollment is a behavior-based indication that an individual believes that the value to acquiring additional human capital outweighs the costs. All of the analysis continues to control for the same set of individual and family background characteristics.

In the first column, the dependent variable is an indicator for not completing a post-secondary degree of any type (either Associate's or Bachelor's degree) by age

[23]The impatient are significantly more likely to hold a GED (not shown). This result is consistent with time-inconsistent human capital investment patterns, as well as the previous finding that GED recipients have worse non-cognitive skills and engage in a variety of other present-oriented behaviors (Heckman, Humphries and Mader 2010a).

[24]We relax the age restriction because we have access to a behavior-based version of initial preferences for obtaining a college degree (enrollment). In Appendix Table A-5, we show that the results are even stronger when limiting the sample to those ages 14-18, i.e. to those who were young enough such that the desires and expectations questions were entirely forward looking.

26.[25] The sample is limited to those who, during the first interview, expressed a desire to complete at least two years of college. The impatient are more than six percentage points (roughly 13 percent) more likely to fail to live up to these desires. Conditioning on expecting to complete a college degree, in column (2), yields a similar result: The impatient are 13 percent more likely not to live up to their post-secondary expectations. In column (3) the sample is limited to those who are observed enrolling in post-secondary schooling prior to age 22. Again we find that the impatient are much less likely to complete any degree after enrolling, and are thus significantly more likely to be college dropouts.

Columns (4)-(6) of Table 3 perform an analogous analysis for those who signal an interest in completing a Bachelor's degree, either through expressing a desire or expectation to complete 16 years or more of education (columns 4 and 5, respectively), or through enrolling at a 4-year degree-granting institution (column 6). All three measures yield similar results, with impatient students significantly less likely to complete a Bachelor's degree, even conditional on ex ante indications of interest.

As demonstrated in Table 4 (and as suggested by Panel B of Figure 2) the impatient are also especially likely to drop out at points in the investment process that are inconsistent with the standard human capital investment model. First, the impatient are over 20 percent more likely to drop out with no more than a single year of college, conditional on starting (column 1). This type of nearly immediate reversal in investment is certainly predicted by a time-inconsistent investment framework. We note, however, that there are several alternative reasons that individuals drop out of college after completing very few courses. In particular, there are several sources of uncertainty a student faces when enrolling in college, including uncertainty over his own academic ability and other costs of investment (Stinebrickner and Stinebrickner 2012). If those identified as impatient experience larger information shocks, either because they are more likely to have substandard ability levels or because they are more overconfident, these differences, rather than impatience per se may explain their higher dropout rates shortly after enrollment. In fact, in the next section we find that a substantial portion of the impatience gap in nearly immediate dropout behavior can

[25] Complete data definitions are provided in the Data Appendix. Note that the NLSY provides two separate sets of questions that can be used to construct degree completion: highest grade completed and highest degree completed. In the main results, we code individuals as having completed a degree if either set of variables shows the respondent having completed the degree. The results are also robust to excluding individuals whose degree status is inconsistent between the two sets of questions.

be explained by differences in AFQT scores.

In contrast, by the time students have completed three years of post-secondary schooling there is relatively little new information to be learned about one's ability. Additionally, by completing those three years, students have revealed a sufficiently high level of academic readiness to complete even upper-level college courses. For this reason, the results in column (3) provide strong evidence that the impatient make time-inconsistent dropout decisions. They are nearly 70 percent more likely to complete exactly three years of college, among those who have completed at least three years.[26]

Again, each of these results is consistent with time-inconsistent preferences leading to sub-optimal investment in college, and the higher dropout rates after three years are difficult to reconcile with any alternative rational model of human capital investment. Given that the costs of the third year of college are quite similar to the fourth year and that the returns are substantially higher (sheepskin effects), it seems unlikely that *any* exponential discount rate can rationalize completing three years but failing to complete a fourth.[27] For completeness, we include column (2), which shows no difference in "dropout" behavior at exactly two years of post-secondary schooling, although interpreting this difference is complicated by the possibility that some of these students were seeking associate's degrees.

These results, however, leave open the possibility that the impatient are more likely to drop out because they face more financial difficulties in completing their education. Although all of the dropout results are conditional on parents' educational attainment, parental income quartiles, and poverty status (in 1979), it is possible that time-varying family income shocks are coincidentally more likely to affect the impatient. Column (4) of Table 4 therefore investigates the role of financial resources directly and finds that, in fact, the impatient are not more likely to drop out for financial reasons. The sample in column (4) is limited to those who have left school without

[26]Note that this variable is based on reported individuals' values of "highest degree completed" rather than the number of years of college attendance. See the data appendix for further details. These results are also robust to limiting the sample to students who ever enroll in a 4-year school prior to age 26, which suggests that the completed years of school accurately reflects coursework that would lead to a bachelor's degree.

[27]For example, given standard estimates of annual returns to school (on the order of 10 percent per year) and a post-schooling working career of roughly 40 years, even minimal sheepskin effects, such that the return to the final year is approximately 0.2 percentage points higher than the return to the junior year, will compel all those who completed their junior year to also complete their senior year.

completing a degree and who provided a reason for leaving.[28] The dependent variable is an indicator for whether the respondent reports leaving school due to financial difficulties. Although financial difficulties are a frequent source of dropout behavior (roughly 20 percent of both the patient and the impatient cite financial reasons for dropping out), the hypothesis that the patient and impatient are equally likely to leave for financial reasons cannot be rejected. Further, the point estimate suggests that there is effectively no difference in financial difficulty between patient and impatient dropouts. Similarly, in column (5) we test whether academic difficulties can explain the reasons for dropping out. The impatient appear to be slightly more likely to drop out for academic reasons, although we cannot reject that the dropout rates are the same, and very few students cite academic factors in the dropout decision.

Finally, recall that the conceptual framework suggested that the impatient should be more likely to reverse their preferences as they re-evaluate the relative costs and benefits of investing. This mechanism implies that the observed wage gap for any given educational credential should be larger among the impatient than among the patient because the impatient invest *as if* they require a greater return. To address this hypothesis, we estimated the college-no college log wage gap in 2004 in an interaction model that allows for differential returns for the patient and impatient subsamples (column 6). Conditional on the standard set of covariates, the return to a four-year degree among those who expect at least a four-year degree is 18.7 log points higher for the impatient than it is for the patient, and the difference is statistically significant at conventional levels. Importantly, this difference is at odds with alternative interpretations that would lead to lower returns to completion among the impatient. For example, the short-run impatient could be more entrepreneurial or risk-taking, which would increase their non-credentialed earnings relative to their patient counterparts. Alternatively, the gap would also be smaller if impatience were a proxy for ability and ability were complementary with schooling.

3.3 Potential Alternative Interpretations

In this subsection, we consider potential alternative interpretations of the differences in human capital investment presented thus far. First, the main results include controls for multiple background characteristics, but they do not include a fully interacted

[28] A complete cross-tab of the reasons for dropping out by impatient status is provided in Appendix Table A-16.

set of covariates. We provide additional analysis in the appendix (Appendix Table A-3) demonstrating that the estimated impatience gap in investment outcomes is fairly consistent among all race × gender groups.

One remaining potential concern with the interviewer assessments is that they are measured subsequent to some human capital decisions, especially among respondents who begin the survey at older ages. There is good evidence, however, that key aspects of an individual's personality and preferences crystallize early and are roughly fixed through adulthood (Cobb-Clark and Schurer 2011). Despite this finding, the main results are limited to only younger respondents for high school outcomes, and we have conducted sensitivity analysis that allows the impatience gap in investment behavior to differ by birth cohort. These results reveal that, if anything, the impatience gap is largest among younger cohorts for whom the measures are taken earlier in life.[29]

An additional concern is that these measures may reflect the value of a respondent's time, with the result that those who are already working are more likely to be perceived as impatient. Further, this measure may be influenced by interviewer bias based on the respondent's race or gender. We present a detailed sensitivity analysis of the key results in Appendix section A-2.2 in which we adjust the impatience measure to account for each of these possibilities. None of these potential confounding influences has any qualitative impact on the estimated investment gaps between the patient and the impatient, however, and we have presented the main results using the simpler measure for ease of interpretation.

Next, we consider the role of cognitive skills by taking advantage of the NLSY's inclusion of scores on the Armed Forces Qualifying Test (AFQT), which was administered as part of the 1980 survey wave.[30] Although this measure is sometimes equated with "innate ability" or IQ, a substantial literature instead suggests that a respondent's performance on this test measures his cumulative level of investment in cognitive human capital prior to the exam (Neal and Johnson 1996, Hansen, Heckman and Mullen 2004, Neal 2006, Cascio and Lewis 2006).[31] Compulsory attendance laws prevent meaningful variation in the level of early investment as measured by years of schooling. Consequently, the AFQT provides a potentially useful measure

[29]The results by age are available in Appendix Table A-4.

[30]The link between time inconsistency and cognitive ability has been established in multiple papers, including Benjamin et al. (2013).

[31]We follow Neal and Johnson (1996) in using age-adjusted AFQT scores, which are further adjusted to be mean 0 and standard deviation 1.

of early human capital attainment. As shown in the first column of Table 5, the impatient score roughly one quarter of a standard deviation lower than do similar patient respondents, confirming that the impatient have indeed invested less by the second wave of the survey.

For completeness, we present versions of some of the key earlier results that include the score as a control variable. In order to justify the use of this variable as a valid control, one must believe that the AFQT measures some attribute that is predetermined at the time that a respondent's degree of patience is crystallized. This assumption is incompatible with several findings from the literature demonstrating that additional schooling and other forms of investment affect an individual's score.[32] Nevertheless, the variation in the measured score likely derives both from innate ability and from investment (Dohmen, Falk, Huffman and Sunde 2010).

In general, the AFQT-adjusted impatience gaps are smaller in magnitude, although the gaps remain statistically significant at the five percent level for the results related to dropping out of high school (column 2, comparable to column 3 of Table 2) and at the ten percent level for the result of enrolling in college but failing to complete a degree (column 3, which mirrors column 3 from Table 3). Each of the gaps continues to have the predicted sign and large magnitudes when measured in percentage terms.

Columns (4)-(6) of Table 5 presents specifications comparable to columns (1), (3), and (6) of Table 4.[33] Notably, the impatience gap in dropout after one year or less is substantially smaller when controlling for AFQT. Again, this decrease in coefficients could reflect the fact that the impatient are more likely to learn that their costs to completing college are higher than they had previously anticipated. Given the discussion above, however, it is likely that part of this difference in coefficients reflects

[32]No measure in the NLSY is likely to capture this ideal control variable. In fact, several components of the ASVAB (e.g. General Science, Word Knowledge, Mathematics Knowledge) explicitly measure accumulated knowledge. All but one of the remaining components measure aspects of human capital that are produced through both investment and raw ability, e.g. Paragraph Comprehension and Arithmetic Reasoning. The final component, Coding Speed, although potentially unrelated to completed investment, has been associated with intrinsic motivation, and is therefore also far from an ideal control (Segal 2012).

[33]In the appendix, Tables A-18 and A-19, we provide full versions of Tables 3 and 4 with and without AFQT as a control to facilitate comparison of all of the college dropout results. A seemingly unrelated regression test of the null hypothesis that the key coefficients are the same with and without the AFQT control is rejected in all but the final column. The individual p-values are listed in the table.

the fact that initial investments (prior to the start of the survey) continue to affect future dropout risk. When those with time-inconsistent preferences suboptimally downweight the future value of cognitive skills in completing college, they will choose to acquire lower skill levels early on and find themselves underprepared for their desired levels of human capital. In any case, we note that, even controlling for AFQT, the impatient are 13.6 percent more likely to drop out after a year or less and that this difference is statistically significant at the ten percent level.

In contrast, adding a control for AFQT has relatively little effect on the impatience gap in dropping out after three or more years of college (column 5). This stability in coefficients is consistent with the idea that much of the learning about one's ability has already taken place prior to the point where students have completed all but their final year of the degree. Additionally, the larger wage return to completing a bachelor's degree experienced by the impatient is quite robust to controlling for AFQT score. We therefore conclude that the impatience gaps are not solely the result of differences in innate cognitive ability, although the "immediate" dropout gap likely derives in part from lower investment earlier in the educational process.

One remaining question is whether the "impatience and/or restlessness" noted by the interviewer captures ADHD, which has a significant detrimental effect on the production of human capital (Currie and Stabile 2006). Although young adults with ADHD may be considered to have biologically-based impulsive or time-inconsistent preferences, they have not been the focus of the economic literature concerned with failures of self-discipline. It is therefore worth determining whether the interviewer assessments represent a form of impatience other than ADHD. Unfortunately, the NLSY has not collected any information on whether an individual has been diagnosed with ADHD; so we cannot control directly for these diagnoses in our principal results.

We do, however, augment our main results with parallel findings from the Add Health study. Add Health is also a nationally representative longitudinal study of youth although it samples later birth cohorts than does the NLSY (grades 7-12 in the 1994-1995 school year). The data contain a question asked of the interviewer similar to the assessment we use for our impatience measure. Importantly, the most recent wave of the data (Wave IV) contains a question on whether the respondent has ever been diagnosed with ADHD.[34] We use this additional data source to replicate

[34]The exact wording of these questions are "Did the respondent ever seem bored or impatient during the interview?" and "Has a doctor, nurse, or other health care provider ever told you that

some of the main findings from the NLSY results and to determine whether adding a control for an ADHD diagnosis substantially alters the central findings. The results of this replication and extension are found in Table 6, with regression specifications similar to those found in Table 2, column (1).[35] The dependent variable is a dummy indicating whether the respondent is a high school dropout, and the key explanatory variable is a dummy indicating whether the respondent was rated by the interviewer as impatient during any of the first four waves of the survey.[36]

The first column confirms an essential finding from the NLSY: Individuals coded as impatient are more likely to drop out of high school. Dropout rates are 11.7 percent for the impatient and 8.6 percent for the patient.[37] In the second column, we include a control for whether a respondent has ever been diagnosed with ADHD or related attention problems. Although the coefficient on the diagnosis (+0.040) implies that individuals with ADHD are more likely to drop out of high school, the coefficient on the interviewer's assessment of impatience hardly changes (from +0.031 to +0.030). A similar pattern emerges in the final two columns, which add controls comparable to those in our main analysis. While underlying mental health conditions can explain some variation in educational attainment, our results suggest that the interviewer assessments provide an independent measure of impatience that predicts dynamically inconsistent choices.

3.4 Additional Results Consistent with β Impatience

In each of the previous specifications, the preference-reversing dropout results have supported a dynamic inconsistency interpretation of the type of impatience captured by the interviewer's assessments. Table 7 reports results testing additional empirical hypotheses predicted by this time-inconsistent interpretation.

The first column examines another implication of the conceptual framework: individuals with time-inconsistent preferences should express greater levels of regret. When asked to examine past choices, those with non-stable preferences will be more

you have or had: attention problems or ADD or ADHD?"

[35] Unfortunately, Add Health does not ask educational expectations questions in the early waves. Given that nearly all students desire and expect to complete high school in the NLSY sample, this specification provides a close approximation.

[36] We use the version of the high school dropout variable that is coded directly from the respondents' transcripts.

[37] The difference in overall dropout rates between the NLSY and Add Health can most easily be explained by a downward trend in dropout rates and the difference in cohorts sampled.

likely to express disappointment at their past mistakes. In contrast, those with stable exponential discount rates (even those with low levels of δ) should be more likely to say that they are satisfied with their previous choices. In 2006, the NLSY asked a number of questions related to self-esteem and self-worth, with respondents indicating their level of agreement with each survey item.

We construct a "regret index" based on respondents' answers to three questions closely related to regret, normalized to mean zero and standard deviation one.[38] This measure is designed to be consistent with the definition of regret traditionally used by psychologists, namely as "a backward looking emotion signaling an unfavorable evaluation of a decision" (Zeelenberg and Pieters 2007). On this measure, the impatient show about one tenth of one standard deviation more regret, conditional on the regular set of controls as well as three threshold-based measures of completed education.[39] Thus, at each level of completed schooling, the impatient are less satisfied.

As discussed in the conceptual framework, the linear and cumulative nature of the educational investment process allows for straightforward predictions about how an impatient individual should behave. It proves much more difficult to form clear predictions for how investments in work experience and firm tenure should differ for the impatient. Nevertheless, we examine job switching, overall experience, and firm tenure outcomes as these combine to create the second canonical type of human capital (Mincer 1958).[40] In columns 2 and 3, we find significant divergence in the career paths of the patient and the impatient. In column 2, we examine the number of job switches individuals make in their careers. Here, a job switch is defined as switching from one employer to another; an internal transfer or promotion will not be counted as a job switch. Thus, this measure counts the number of times in an individual's working career that his firm-specific tenure gets set back to zero. The impatient are substantially more prone to job churn: they average an extra one-third of an employer switch after completing their education. Importantly, these results are conditional on

[38]The three questions are "I am inclined to feel that I am a failure," "I feel I do not have much to be proud of," and "I am satisfied with myself," and responses are measured on a four point scale ranging from "strongly agree" to "strongly disagree." Our index is a standardized Cronbach's α-statistic based on the correlations among responses to these three questions.

[39]The magnitude of the effect is comparable in size to the impact of failing to complete high school (0.13) or, conditional on completing high school, failing to complete college (0.09).

[40]This analysis differs from the NLSY-based job search analysis conducted in DellaVigna and Paserman (2005), which focused primarily on job search during unemployment. For a more complete treatment of the role of time-inconsistency in on-the-job search see Drago (2006) and van Huizen (2010).

completed education, and thus are not simply the result of differences in educational investment leading to different career paths. These estimates are consistent with the impatient failing to account for the future benefits of firm tenure and instead responding to differences in near-term utility.

Recall, however, that the impatient should also be subject to inertia and thus less likely to seek out and find new employment opportunities that advance their careers. In column 3, we find that, in fact, the job switches among the impatient are less likely to come with a substantial (greater than ten percent) increase in wages. Topel and Ward (1992) estimate that the first ten years of young males' careers determine two-thirds of lifetime wage growth, with wage gains through job changes accounting for at least a third of early-career wage growth. That the impatient make job changes that do not lead to wage improvements is particularly damaging to their lifetime wage profile. Although there are potentially alternative explanations for each of the differences in behavior examined in Table 7, the impatience gap for each outcome is consistent with a short-run impatience interpretation.

3.5 Lifetime Labor Market Consequences

The results presented to this point have shown that the human capital investment decisions of the impatient deviate in significant ways from similar patient individuals. The final set of results provides a measure of how costly these deviations are for the lifetime earnings of the impatient. In most investment decisions, sub-optimal choices result in relatively small initial differences with the full cost only later materializing. The earnings consequences of under-investing in human capital follow exactly this pattern. As shown in Figure 3, the early-career differences in earnings are relatively small. This figure plots the impatience gap in annual earnings (constant 2000 dollars) from a set of age-by-age earnings regressions that include the full set of background characteristics and a complete set of birth year dummies.[41] The exact values of the coefficients and standard errors are reported in more detail in Appendix Table A-8. Initially, there is little difference between these groups' annual earnings, but by the time this cohort has reached middle age, the impatient consistently earn on the order of ten to fifteen percent less annually than do the patient.

The appropriate significance test here is an F-test of the null hypothesis that the

[41] We impute values for the biennially missing survey years (post-1994) based on the earnings before and after the missing year (linear interpolation).

sum of the annual differences is zero, rather than testing for a statistically significant difference at any particular age.[42] Comparing the sum of the differences in annual earnings between groups yields a p-value less than 0.0001. Appendix Figures A-1 and A-2 decompose the differences in earnings into hours worked and the hourly wage and show that the difference in earnings derives both from lower hourly wages (especially later in the career) and from fewer annual hours.[43]

The cumulative impact of the annual differences is substantial. By middle age (respondents are 39-46 in 2004), impatient respondents have earned more than $75,000 less on average than have patient respondents over their lifetimes, 13 percent less in percentage terms. To be clear, this cumulative difference in lifetime earnings reflects a number of factors beyond suboptimal educational investment. Additional calculations (adjusting this gap for completed schooling) suggest that roughly 40 percent of this earnings gap is attributable to differences in educational investment. The impatient, therefore, suffer economically meaningful losses as a result of their early-in-life underinvestment.

4 Conclusion

In this paper we have found that individuals identified as impatient by an interviewer accumulate significantly less human capital. Crucially, much of the divergence in human capital arises through time-inconsistent investment patterns. The increased likelihood of dropping out of high school or college despite an objective signal that one's personal value of completion exceeds the cost suggests that lower educational attainment among this group derives in part from present-biased preferences. Further, other patterns of behavior, such as expressing greater regret or churning through jobs without corresponding salary increases, provide additional evidence of time-dependent investment decisions.

These educational investment choices have a profound impact on post-educational income. By their mid-40s, the peak earning years of the life-cycle, the impatient earn

[42] Although these point estimates consistently find an advantage for the patient, the choice to examine cumulative differences would be especially important if the impatient had initially higher earnings levels.

[43] Much of the difference in hours derives from more frequent and longer-lasting spells of unemployment; specific results on the unemployment spells are available from the authors upon request. The p-values testing that the sum of the annual differences is zero are less than 0.0001 for both differences in hourly wages and annual hours.

10 to 15 percent less annually, comparable to the estimates for the returns to an additional year of school in the compulsory schooling literature.[44] In a cumulative sense, the impatient have earned 13 percent less than their patient counterparts over their lifetimes.

Finally, our findings are also consistent with a growing literature, both in economics and psychology, on the value of self-regulation and the role of "soft skills" in young people's development. The fact that many dropouts fail to complete their personally optimal level of schooling supports an expanded role for policies to encourage students to obtain additional schooling, although the coarse measure of impatience used in this study precludes a precise accounting of the share of individuals who might benefit. Programs designed to improve non-cognitive skills at early ages (Heckman et al. (2010b), for instance) or to provide immediate payoffs to encourage additional human capital investment (such as Fryer (2010)) are two promising potential approaches. Policies that are specifically designed to encourage completion, such as the University of Baltimore's Finish4Free program that pays the entire cost of a student's final semester if she graduates on time, may be especially effective.[45] More stringent constraints, such as longer compulsory schooling periods, may also have similar benefits (Oreopoulos 2007). Regardless of the design of policy, the results in this paper suggest that encouraging the delay of gratification during human capital formation is likely to have large and long-lasting payoffs.

[44] See, for example Angrist and Krueger (1991), Acemoglu and Angrist (2000), and Oreopoulos (2007).

[45] We thank an anonymous referee for making us aware of this policy.

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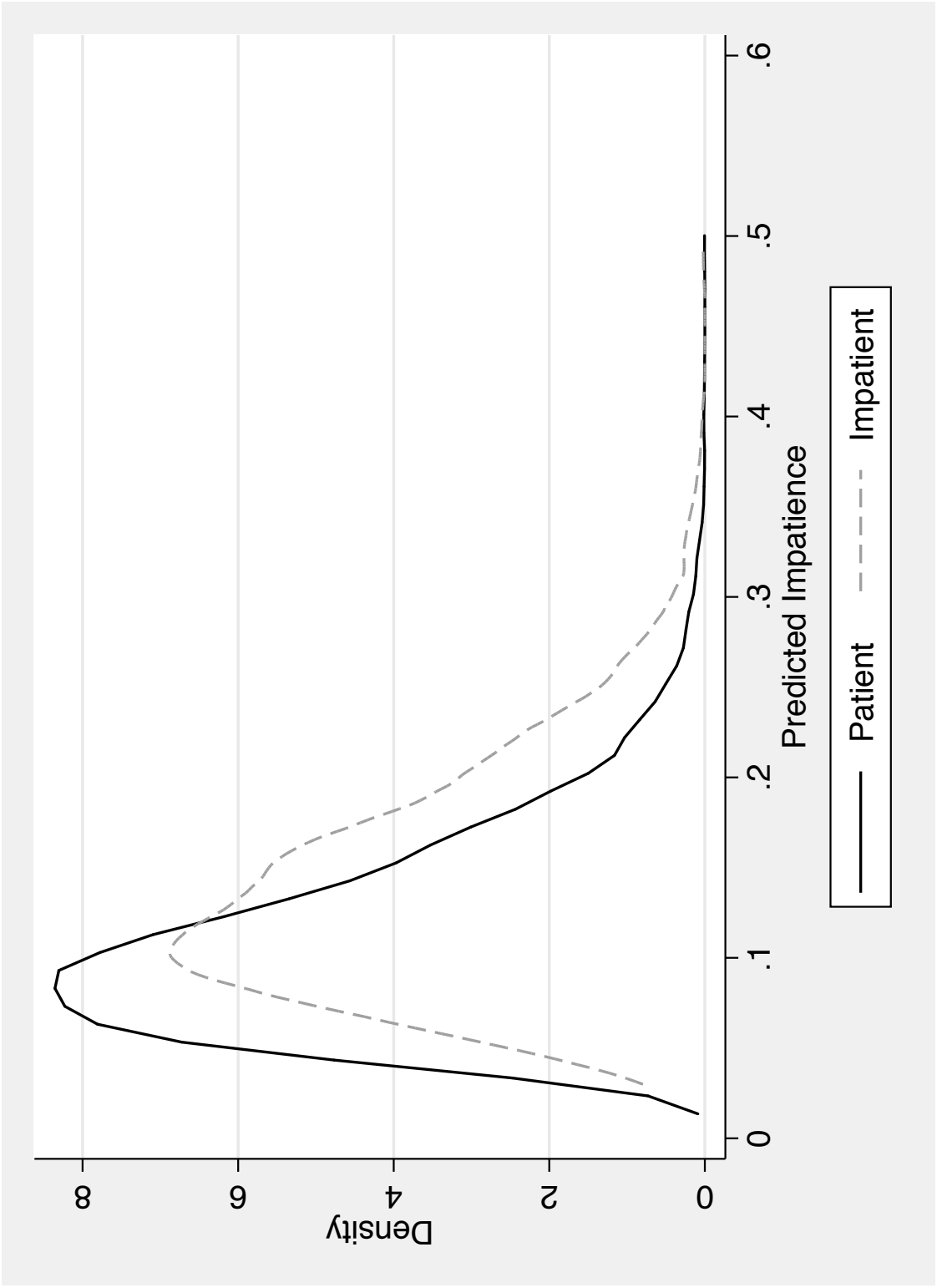
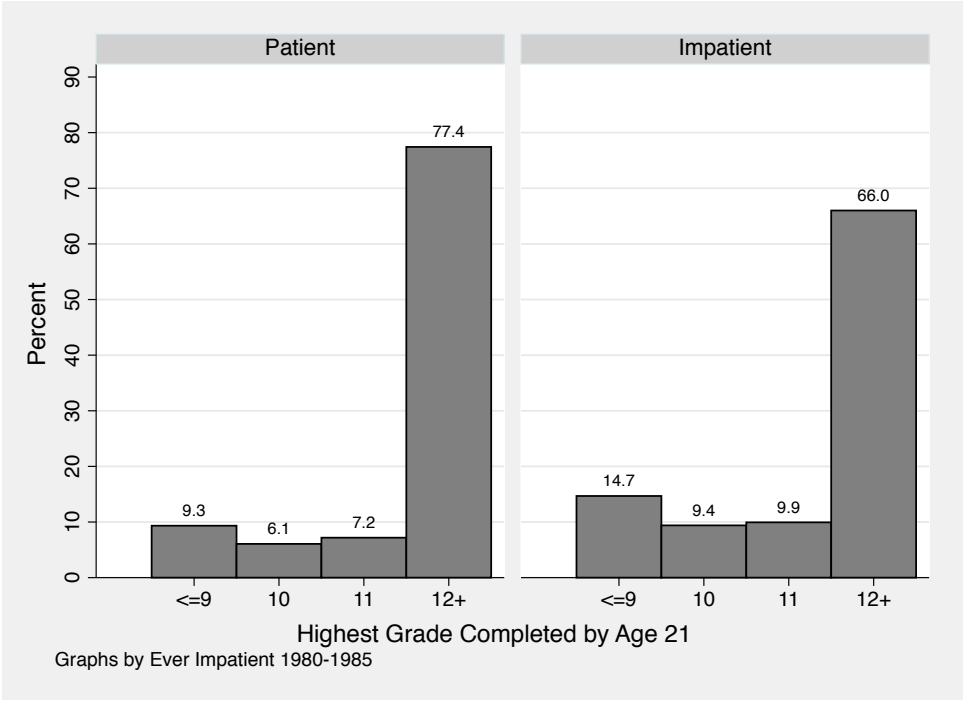
Figure 1: Common Support for Impatience - All Included Covariates



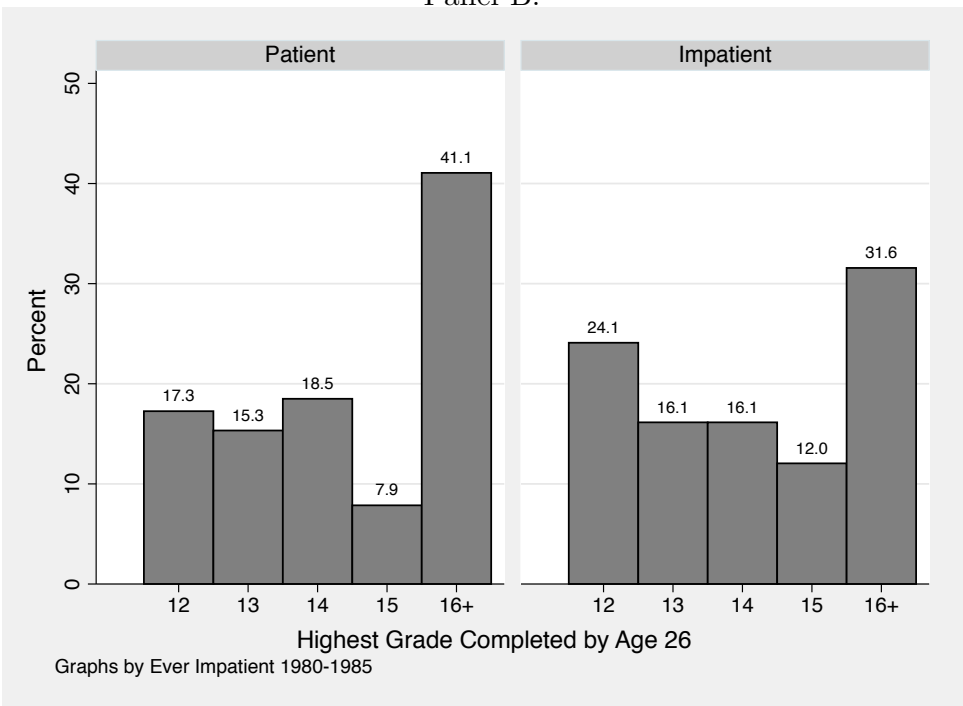
Source: Authors' calculations from NLSY79 1979-2008. Impatience measure described in text. Complete Probit results available in Appendix Table A-2.

Figure 2: Unadjusted Highest Grade Completed Distributions - Patient and Impatient

Panel A:



Panel B:



Source: Authors' calculations from NLSY79 1979-2008. Panel A includes all sample respondents. Panel B includes only those respondents who completed a high school degree prior to age 21 (those in the "12+" category in Panel A) and who subsequently enrolled in college. Impatience measure described in text.

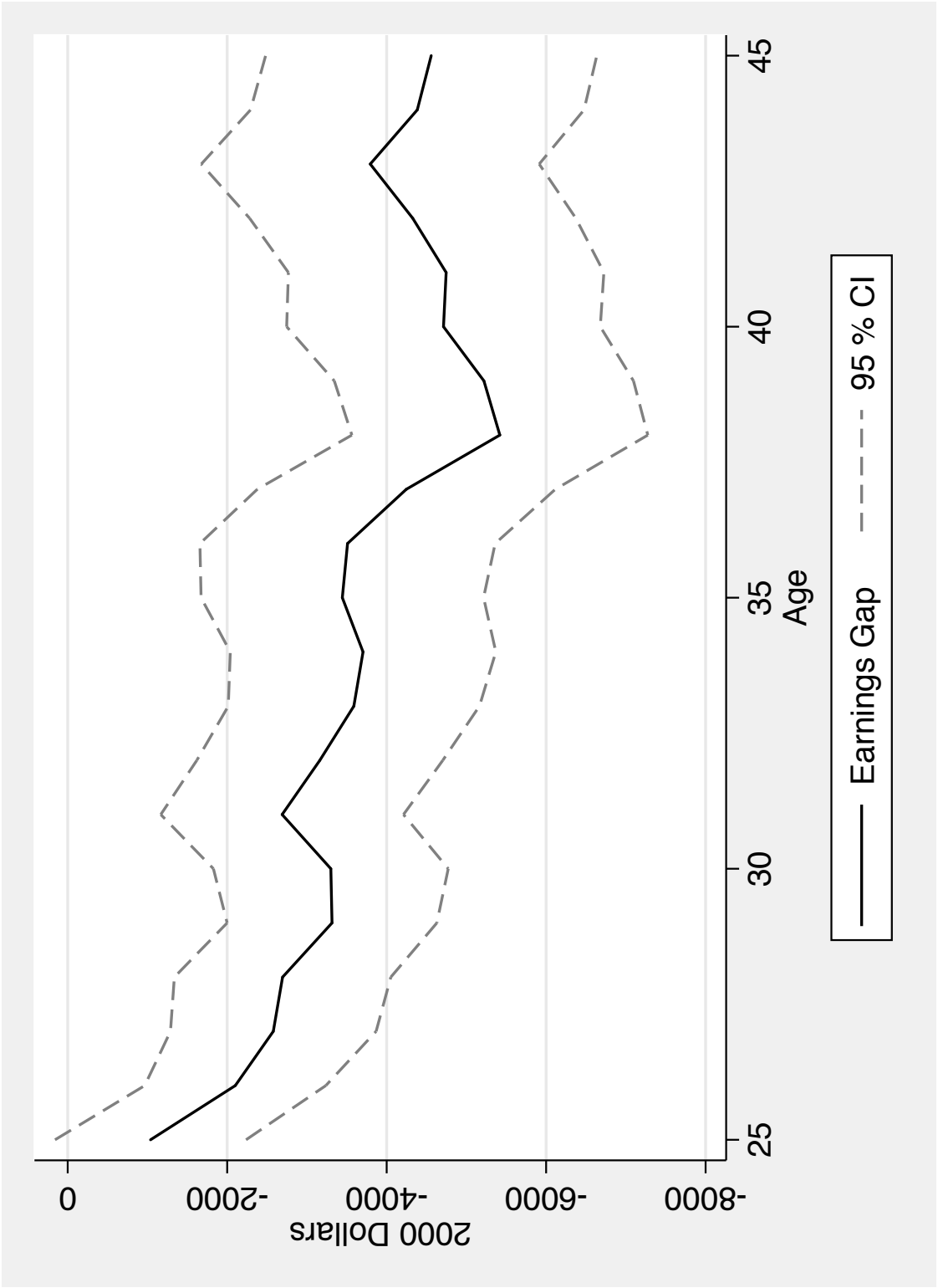


Figure 3: Annual Earnings Gap at each age, by Patience

Source: Authors' calculations from NLSY79 1979-2004. Impatience measure described in text. Sum of annual gaps is -$76,533, with a standard error of $4,025 (p-value < 0.001).

Table 1: Present-Biased Behaviors and Impatience

	(1)	(2)	(3)	(4)	(5)
Outcome	Bank Account	Ever Smoker	Hangovers	Never Attrit from NLSY	Early Military Exit
Impatient	-0.105***	0.057***	0.068**	-0.063***	0.074
	(0.015)	(0.019)	(0.033)	(0.015)	(0.063)
Patient Mean	0.722	0.498	0.239	0.786	0.382
Percent Diff	-14.5%	11.3%	28.2%	-8.0%	19.3%
Observations	10,046	7,268	10,038	10,046	621
R-squared	0.206	0.026	0.018	0.154	0.158

Data: NLSY 1979-2008. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Bank Account is measured in 1985; Ever a Smoker is measured in 1998; Number of hangovers in past 30 days is measured in 1983; Military Exit sample includes those who ended service between 1980-1985. Controls variables included are gender, race, mother's education (four categories), father's education (four categories), received magazines at age 14, received newspapers at age 14, had library card at age 14, two-headed household at age 14, family income quartile in 1979 (four categories), poverty status in 1979, urban dummy, region of country (four categories), and age (in 1979) dummies. These controls are included in all specifications in all tables, and the coefficients on the controls are provided in the appendix. For this and all subsequent tables, patient means are calculated using sampling weights and the regressions are unweighted.

Table 2: Impatience and Time-Inconsistent High School Dropout Behavior

	(1)	(2)	(3)	(4)
Sample	Under 17 in 1979	Wants to Finish HS	Expects to Finish HS	Under 17 in 1979
Outcome	No HS Diploma by 21	No HS Diploma by 21	No HS Diploma by 21	No HS Diploma by 2008
Impatient	0.103***	0.098***	0.099***	0.054**
	(0.032)	(0.032)	(0.033)	(0.026)
Patient Mean	0.184	0.179	0.162	0.076
Percent Diff	56.0%	54.7%	61.1%	71.1%
Observations	2,322	2,292	2,210	2,322
R-squared	0.148	0.142	0.126	0.106

Data: NLSY 1979-2008. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All analysis limited to those under 17 at age of first interview and who have non-missing values for high school completion at age 21 and in the 2008 survey. See data appendix for additional variable construction details. Includes a full set of demographic, geographic, and family background controls. See Table 1 for complete list of controls.

Table 3: Impatience and Time-Inconsistent College Dropout Behavior

	(1)	(2)	(3)	(4)	(5)	(6)
Sample	Desires College Degree	Expects College Degree	Enrolled In College	Desires Bachelor's Degree	Expects Bachelor's Degree	Enrolled In 4-year School
Outcome	No Degree	No Degree	No Degree	No Bachelor's Degree	No Bachelor's Degree	No Bachelor's Degree
Impatient	0.072***	0.068***	0.077***	0.072***	0.077***	0.055*
	(0.018)	(0.021)	(0.024)	(0.020)	(0.024)	(0.030)
Patient Mean	0.539	0.476	0.425	0.549	0.450	0.359
Percent Diff	13.4%	14.3%	18.1%	13.0%	17.1%	15.4%
Observations	6,089	5,143	4,658	4,880	3,739	3,091
R-squared	0.186	0.186	0.148	0.227	0.239	0.169

Data: NLSY 1979-2008. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Complete data definitions provided in Data Appendix. Enrolled by age 22. Completed degree by age 26. Includes a full set of demographic, geographic, and family background controls. See Table 1 for complete list of controls.

Table 4: Impatience and College Dropout Dynamics

	(1)	(2)	(3)	(4)	(5)	(6)
Sample	Enrolled in College	Ed>=14	Ed>=15	Gave reason for dropping out	Gave reason for dropping out	Enrolled in College
Outcome	<= 1 Year Credit, No Degree	14 Years, No Degree	No Bachelor's Degree	Dropped out due to financial difficulties	Dropped out due to academic difficulties	Log Hourly Wage (2004)
Impatient	0.071***	0.005	0.090***	0.003	0.007	-0.074
	(0.024)	(0.026)	(0.033)	(0.030)	(0.012)	(0.056)
Has Bachelor's Degree						0.289***
						(0.027)
Bachelor's*Impatient						0.187**
						(0.089)
Patient Mean	0.292	0.129	0.132	0.211	0.028	--
Percent Diff	24.3%	3.7%	68.0%	1.2%	24.5%	--
Observations	4,658	3,001	2,218	2,549	2,549	2,589
R-squared	0.124	0.060	0.091	0.033	0.016	0.175

Data: NLSY 1979-2008. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All analysis limited to sample who enrolled in college prior by age 22. Columns 4 and 5 samples: Provided reason for leaving school (did not receive degree). See data appendix for additional details. Includes a full set of demographic, geographic, and family background controls. See Table 1 for complete list of controls.

Table 5: Impatience and AFQT

	(1)	(2)	(3)	(4)	(5)	(6)
Sample	Full Sample	Under 17 in 1979	Enrolled In College	Enrolled in College	Ed>=15	Enrolled in College
Outcome	AFQT	No HS Diploma by 21	No Degree	<= 1 Year Credit, No Degree	No Bachelor's Degree	Log Hourly Wage (2004)
Impatient	-0.217***	0.071**	0.045*	0.040*	0.073**	-0.042
	(0.026)	(0.030)	(0.023)	(0.023)	(0.033)	(0.055)
Has Bachelor's						0.208***
						(0.027)
Bachelors*Impatient						0.173*
						(0.088)
AFQT	--	-0.168***	-0.202***	-0.190***	-0.115***	0.192***
	--	(0.011)	(0.010)	(0.010)	(0.016)	(0.020)
Patient Mean	0.324	0.184	0.425	0.292	0.132	--
Percent Diff, AFQT Control	--	38.6%	10.5%	13.6%	55.2%	--
p-value from H_0: AFQT control irrelevant	N/A	0.001	0.000	0.000	0.005	0.434
Observations	9,827	2,322	4,658	4,658	2,218	2,589
R-squared	0.426	0.228	0.211	0.187	0.116	0.205

Data: NLSY 1979-2008. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. AFQT is age-adjusted and standardized to be mean 0, variance 1. See text for details. Includes a full set of demographic, geographic, and family background controls. See Table 1 for complete list of controls. The p-value listed comes from a seemingly unrelated regression test of the null hypothesis that the key coefficient (impatient in columns 2-5 and the interaction in column 6) is the same whether or not AFQT is included as a control variable.

Table 6: Impatience, ADHD, and HS Dropout Behavior - Add Health Data

	(1)	(2)	(3)	(4)
Ever Impatient	0.031***	0.030***	0.022***	0.020***
	(0.006)	(0.006)	(0.006)	(0.006)
Ever ADHD (Wave IV)		0.040***		0.054***
		(0.015)		(0.015)
Controls	NO	NO	YES	YES
Patient mean	0.086	0.086	0.086	0.086
Percent diff	35.8%	34.7%	25.2%	23.8%
Observations	11,631	11,631	11,631	11,631
R-squared	0.002	0.003	0.051	0.052

Source: Authors' calculations from Waves I-IV of the National Longitudinal Study of Adolescent Health. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 7: Additional Results Consistent with β-Impatience

Outcome	(1) Regret Index	(2) Number of Job Switches	(3) Fraction Job Switches with > Wages
Impatient	0.090**	0.346**	-0.024**
	(0.035)	(0.149)	(0.011)
Patient Mean	-0.043	4.85	0.215
Percent Diff	--	7.1%	-11.1%
Observations	6,714	6,771	5,607
R-squared	0.030	0.126	0.050

Data: NLSY 1979-2008. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. These specifications also control for three completed education threshold dummies. See text for details regarding construction of regret index. Includes a full set of demographic, geographic, and family background controls. See Table 1 for complete list of controls.

Appendix - For Online Publication

This appendix provides additional information on the construction of the variables used in the analysis as well as additional results discussed in the main text but not included in the main tables.

A-1 Data coding

A-1.1 The sample

The sample includes all NLSY respondents who meet the following criteria:

1. Have a valid "ever impatient" variable
2. Have a valid measure of completed schooling at age 26

In each of the regressions, we include dummy variables for missing values of the additional controls so that all individuals who meet the above criteria as well as any additional sampling criteria listed in the table are included in the regression. The construction of these and other variables is described in the following subsection.

A-1.2 Creation of variables

This section details the construction of the key variables used in the analysis, paying particular attention to how the information collected at each wave is used to update the cumulative lifetime educational investment variables. Variables not listed here are coded in a standard way from survey responses to a single question.

Ever Impatient

This is a dichotomous variable created from the same question administered at multiple waves. At the conclusion of each survey, the interviewer is asked a number of questions about the interview, including the respondent's attitude. The interviewer is asked "In general, what was the respondent's attitude toward the interview?" The choices are:

1. Friendly, interested
2. Cooperative, not interested
3. Impatient, restless
4. Hostile

We code individuals as "impatient" in a single wave if they are coded as 3. We then aggregate over the interviews conducted in 1980-1985. Respondents who do not have a valid response (for non-interview attrition or other reasons) in at least five of the six interviews are coded as missing. Among those who have sufficient valid responses, individuals coded as impatient during at least one interview are coded as 1. Those who are never coded as impatient are coded as 0.

Regular High School Diploma by age 21

This is a dichotomous variable indicating whether an individual received a regular high school diploma (not a GED) prior to turning 22. It is constructed using questions on whether the respondent has a high school degree or equivalent, and whether that credential is a diploma or GED. It uses data from 1979-1985.

- Individuals age 22+ at initial interview: all coding uses 1979 wave data
  - Those without a high school diploma are coded as 0.
  - Those with a high school diploma are coded as 1 if and only if they received the diploma prior to the month in which they turned 22. This calculation is accomplished using the individual's birth month and year and the month and year the respondent reports receiving a high school diploma. Those with a high school diploma received after turning 22 are coded as 0.
- Individuals with age <= 21 at initial interview
  - Those with a high school diploma in 1979 are coded as 1.
  - Individuals who are not enrolled in school and do not have a high school diploma (including those with a GED) in 1979 are initially coded as 0.
  - Those currently enrolled in high school (or an earlier grade) in 1979 are initially coded as missing.
    - In subsequent waves, respondents are asked whether they now have a high school degree, and whether it is a diploma or GED. If the respondent is younger than 22 at the time of the interview, his value of the variable is updated as follows:
      - Those with a diploma are coded as 1.
      - Those without a diploma are coded as 0.
      - Those with a GED are coded as 0.
      - Those who are not interviewed are coded as missing.
    - This pattern continues for each wave until all respondents are older than 21.

*Note: The dependent variable reported in regression results uses the opposite of this variable, i.e. "**No** regular high school diploma by age 21".*

No High School Degree Ever

This is a dichotomous variable indicating whether an individual had obtained a high school degree or equivalent by the time of the 2008 survey. It is based on the "highest grade completed question" and the "highest degree received" question.

- Those who report a highest grade completed at or beyond the first year of college are coded as 1.
- Those who report that their highest degree received is "high school diploma or equivalent" or higher are coded as 1.
- Those whose highest grade completed is 12th grade or lower and who report that they have no degree are coded as 0.
- Those with a highest grade completed of exactly 12th grade and who report a highest degree of "other" are coded as 1.
- Respondents with a non-valid response to either question are coded as missing.

Respondent Desires High School Degree

This is a dichotomous variable indicating whether the respondent responds with a value greater than or equal to 12th grade in response to the question "What is the highest grade or year of regular school, that is, elementary school, high school, college, or graduate school that you would like to complete" in the 1979 survey wave. Individuals with non-valid responses are coded as missing.

Respondent Expects High School Degree

This is a dichotomous variable indicating whether the respondent responds with a value greater than or equal to 12th grade in response to the follow-up question "As things now stand, what is the highest grade or year you think you will actually complete?" in the 1979 survey wave. Individuals with non-valid responses are coded as missing.

Respondent Desires College Degree

This is a dichotomous variable indicating whether the respondent responds with a value greater than or equal to "second year of college" in response to the question "What is the highest grade or year of regular school, that is, elementary school, high school, college, or graduate school that you would like to complete" in the 1979 survey wave. Individuals with non-valid responses are coded as missing.

Respondent Expects College Degree

This is a dichotomous variable indicating whether the respondent responds with a value greater than or equal to"second year of college"grade in response to the follow-up question "As things now stand, what is the highest grade or year you think you will actually complete?" in the 1979 survey wave. Individuals with non-valid responses are coded as missing.

Respondent Desires Bachelor's Degree

This is a dichotomous variable indicating whether the respondent responds with a value greater than or equal to"fourth year of college" in response to the question "What is the highest grade or year of regular school, that is, elementary school, high school, college, or graduate school that you would like to complete?" in the 1979 survey wave. Individuals with non-valid responses are coded as missing.

Respondent Expects Bachelor's Degree

This is a dichotomous variable indicating whether the respondent responds with a value greater than or equal to "fourth year of college" grade in response to the follow-up question "As things now stand, what is the highest grade or year you think you will actually complete?" in the 1979 survey wave. Individuals with non-valid responses are coded as missing.

Respondent Enrolls in College by age 22

This is a dichotomous variable indicating whether the respondent enrolled in college by age 22. It is constructed using information on current school attendance, highest grade attended, and highest grade completed information from multiple waves from 1979-1987.

- In 1979, the following coding is used
  - Individuals who are currently attended college or who report having attended or completed at least the first year of college are coded as 1.
  - Individuals who are not currently attending college and who report highest grades attended and completed at high school or below are coded as 0.
- Beginning in 1980, and continuing through 1987. Respondents who are age 22 or younger at the time of the interview have their original values updated as follows
  - Any individual currently attending college is coded as 1.

  - Any individual who reports have attended or completed at least one year of college is coded as 1.
  - Any individual who has a non-interview wave is coded as missing. This coding is permanent, i.e. it cannot be overridden if the respondent re-enters the survey in a later year.

Respondent Enrolls in a 4-year school by age 22

This is a dichotomous variable based on a follow-up question to the enrollment questions asked in each year. An individual is coded as 1 if he enrolls/has enrolled in a 4-year institution in any survey year when he is younger than 23. An individual is coded as 0 if he never enrolls in college or enrolls only in a two-year institution. This variable is missing for all individuals who are coded as missing for "**Respondent Enrolls in College by age 22**."

Highest Grade Completed by 26

This is a categorical variable based on the "highest grade completed" variables in survey years 1979-1991. This measure begins with the 1979 value of highest grade completed, which is asked of all respondents. In subsequent years, the question is asked only of those who have been enrolled in school since the date of the last interview. Therefore, beginning with the 1980 survey wave and continuing through the 1991 wave, the value of this variable is updated to the value from the most recent wave under two conditions:

1. **The respondent is age 26 or younger at the time of the interview**
2. **The current value of "Highest Grade Completed" is no lower than the previous value.**

Individuals who have a non-interview year before they turn 26 are coded as missing, and this cannot be overwritten.

Observed Receiving Associate's Degree by 26

This is a dichotomous variable based on the "highest degree completed" variables in survey years 1979-1984 and 1988-1991.

- Beginning in 1979, respondents are coded as 0 if they do not currently possess an associate's degree (note: The question is asked differently in 1979 than in other years). They are coded as 1 if they currently possess an associate's degree.
- From 1980-1984, this variable is updated to 1 from 0 if the respondent reports receiving an associate's degree since the date of the last interview.

- In 1988, each respondent is asked to report his "highest degree ever received". Also reported is the year and month that degree was received.
  - Respondents ages 26 and younger in 1988 are recoded as having received an associates degree if their "highest degree ever received" is an associate's degree.
  - Respondents ages 27 and older in 1988 are recorded as having received an associate's degree if their "highest degree ever received" is an associate's degree and that degree was received prior to the month the respondent turned 27.
- Beginning in 1989, respondents who have completed any schooling or received any degree since the last interview are again asked to report their highest degree ever received. Respondents reporting an associate's degree with an interview age of 26 or younger are coded as having received a degree.
- For all respondents: a non-interview wave before the respondent turns 26 will result in this variable being missing. This is a permanent recoding.

Observed Receiving Bachelor's Degree by 26

This variable is coded in precisely the same way as "Received Associate's Degree by 26", replacing associate's degree with "bachelor's degree or higher" at all points.

No College Degree Completed by 26

This is a dichotomous variable equal to 1 if "Observed Receiving Associate's Degree by 26" and "Observed Receiving Bachelor's Degree by 26" are both 0 and "Highest Grade Completed by Age 26" is less than "4th year of college". It is equal to 0 if the respondent was observed receiving either degree or if his highest grade completed by age 26 was at least 4th year of college. A respondent missing any of the three constructed variables is coded as missing.

No Bachelor's Degree Completed by 26

This is a dichotomous variable that is defined using the same variables as comprise "No College Degree Completed by 26." Those who have received an associate's degree but not a bachelor's degree and who have a highest grade completed less than "4th year of college" are coded as 1. The other definitions are the same.

A-2 Additional Results

As referenced in the main text, Table A-1 provides descriptive statistics for each of our control variables. Table A-2 contains the results of the probit regression used to generate Figure 1. The remaining appendix tables are discussed in more detail below.

A-2.1 Heterogeneity Across Race, Gender, and Age

Table A-3 explores the heterogeneous role of impatience across demographic groups. We interact the impatience measure with dummy variables for race × gender categories. The baseline results without the interactions appear in the odd numbered columns, while the versions with the interaction terms are in the even columns. The table also includes the p-value from a test of the null hypothesis that all of the interaction terms are 0, i.e. that the impatience gaps are equal for all race and gender groups. We fail to reject each of these hypotheses and conclude that no single demographic group is driving our full sample results.[46]

As an additional specification check, we conduct a similar analysis in Table A-4 across age groups. Note that we include controls for age in all of our main results, but not a fully interacted set of age categories with our measure of impatience. As previously discussed, one might be concerned that the interviewer assessments are measured fairly late in some respondents' educational careers. In particular, suppose that interviewers' assessments of impatience were affected by the respondents' schooling level. If, for example, students with a college degree were perceived as more patient, this differential perception would represent an alternative explanation for the dropout results. Further, respondents who have already entered the workforce may have a higher opportunity cost of time and may therefore appear more impatient during the interview. Importantly, under either of these alternative interpretations, we should find that the results are strongest among the older age cohorts whose interviewer assessments occur later relative to education and work decisions.

Table A-4 explores the results interacted across age categories to address these concerns. The high school dropout results are broadly consistent across age groups, while the point estimates suggest that the college dropout and timing results are strongest among the youngest cohort. These results confirm that no particular age group drives the full-sample results, and show that, if anything, the results are stronger among the younger cohorts. As an additional check, we restrict the sample to only those aged 14-18 in 1979 and re-run the college dropout behavior results presented in Table 3 based on this subsample, displaying the results in Table A-5. The results are consistently stronger for the youngest cohort, who has yet to make college-level human capital decisions at the time of the earliest NLSY surveys, and thus their responses to questions

[46] We have performed similar analysis with the other included covariates, e.g. parents' education, and these stratified results also show that the aggregate results are not driven by a single demographic group. Results not shown in the tables are available from the authors upon request.

regarding desires and expectations for schooling are entirely forward looking.

A-2.2 Results Robust to Alternative Impatience Classifications

For robustness, we replicate several of our key results using alternative measures of impatience. Each entry in Table A-6 displays the coefficient from a separate regression. The rows represent six different definitions of impatience, with the first row our preferred measure used throughout the results section: ever impatient in one of the 1980-1985 surveys. The second row instead uses the fraction of times a respondent is coded as impatient. This measure moves beyond the binary coding and leverages the fact that some respondents are coded as impatient during multiple interviews. The results are quite consistent with the first definition, especially given that the mean of this new definition for the impatient is 0.23. The third row of the table adjusts the impatience measure from the second row for a number of controls related to the interview and interviewer. In these regressions, the impatience measure is the average difference between the true outcome and the predicted probability from a year-by-year probit model that fits "respondent coded as impatient" at each wave using interview length, interviewer gender, interviewer race, whether the interviewer and respondent are of the same race and/or gender, the respondent's labor force status, the size of the respondent's household (including any children), and the respondent's wage (as a proxy for opportunity cost of the survey time). These coefficients are essentially identical to the second row, reflecting the fact that interview and interviewer characteristics do not have much explanatory power in determining who is coded as impatient. Thus, the impatience measure does not appear to be contaminated by racial or gender-specific biases.

Expanding the fraction-of-interviews definition in the fourth row to include all 21 waves of the NLSY leads to a similar interpretation of the results. The means of this definition are 0.12 and 0.017 for those classified as impatient and patient, respectively, according to the original definition. The dependent variable in the fifth row of regressions uses the same set of controls as an adjustment to the fraction of all interviews coded as impatient. Again the impatience measure is robust to adjustments for interview and interviewer characteristics.

As a final robustness check, we use the answer to a hypothetical question asked in 2006 that was designed to elicit time preferences. Respondents were told to imagine that they had won a contest and were entitled to a $1,000 prize. They were then asked for the **smallest** increase in prize value that they would accept in order to delay receipt of that prize by one month. As discussed in the main text in Section 3.1, there are a number of conceptual reasons to prefer the measure based on interviewer ratings to one based on this question.

A further reason to avoid this measure is that the answers to this question do not, in general, produce estimated discount rates that are consistent with anything

approaching rational choices. For reference, note that the "correct" answer to this question is quite a low number. The monthly interest on $1,000 at 6 percent annually is only $5. Survey answers range from zero to values over $1,000. Previous researchers have truncated the answers to the range between $0 and $500 (Agarwal and Mazumder 2013). We follow this precedent, and we run a set of regressions that replace the interviewer-based measure of impatience with the dollar value the respondent reported.

The results of this estimation are provided in the final row of Table A-6. The sign of the coefficients match the results using the interviewer-based measure. More impatient individuals (those who require larger payments to delay the prize receipt) are more likely to exhibit time-inconsistent human capital investment behaviors. Interpreting the magnitude of the coefficient proves difficult, especially given the wide range of seemingly nonsensical reported values. Nevertheless, the difference between someone who reports $0 (a value given by 16 percent of the trimmed sample) and someone who reports $200 (roughly the mean of the trimmed sample) is an increased likelihood of dropping out of 2-3 percentage points.

We provide the estimated relationship between this alternative impatience measure and other outcomes in Table A-7. Column (5) shows that this alternative measure is predictive of lower wages, even after controlling for completed schooling.

A-2.3 Estimation of Lifetime Differences in Labor Market Outcomes

Table A-8 provides the estimation results used to produce Figure 3 (Earnings columns). It also provides coefficient estimates for Appendix Figures A-1 and A-2, which show the difference in earnings broken down into differences in hours and differences in wages. Each pair of columns provides coefficients from a single regression, which is run on data from all waves of the NLSY when respondents were between the ages of 25 and 45. The regression includes all of the controls used throughout the analysis as well as a full set of age dummies and the interaction of the age dummies with the impatience measure. The interaction terms therefore measure the gap in the outcome by impatience status at each age.

There is no strong prediction that any of these outcomes should differ between the patient and the impatient at any particular age. Therefore, we report in this table and in the associated figures, the p-value from a test of the null hypothesis that the sum of the interaction terms is zero. This test is more conservative than a test that the interaction terms are all equal to zero because it allows for the possibility that early-career earnings are actually higher for the impatient who are investing less in human capital. For each outcome, this null hypothesis is easily rejected at conventional significance levels.

A-2.4 Complete Set of Regression Results with Controls

Tables A-9 through A-15 provide more complete results (including coefficients for nearly all controls) for the specifications that appear in the main tables.

A-2.5 Reasons for Leaving School

Table A-16 shows the full set of responses provided by those individuals who left school at some point without completing a degree (and provided a reason for leaving), separately by impatient status. There is essentially no difference in financial difficulties across groups, although the impatient are slightly more likely to report poor grades (2.8 vs. 1.8 percent) or that they "didn't like school" (12.6 vs. 10.5 percent). A test of the null that the distribution of reasons is the same between the two groups cannot be rejected (p-value = 0.49).

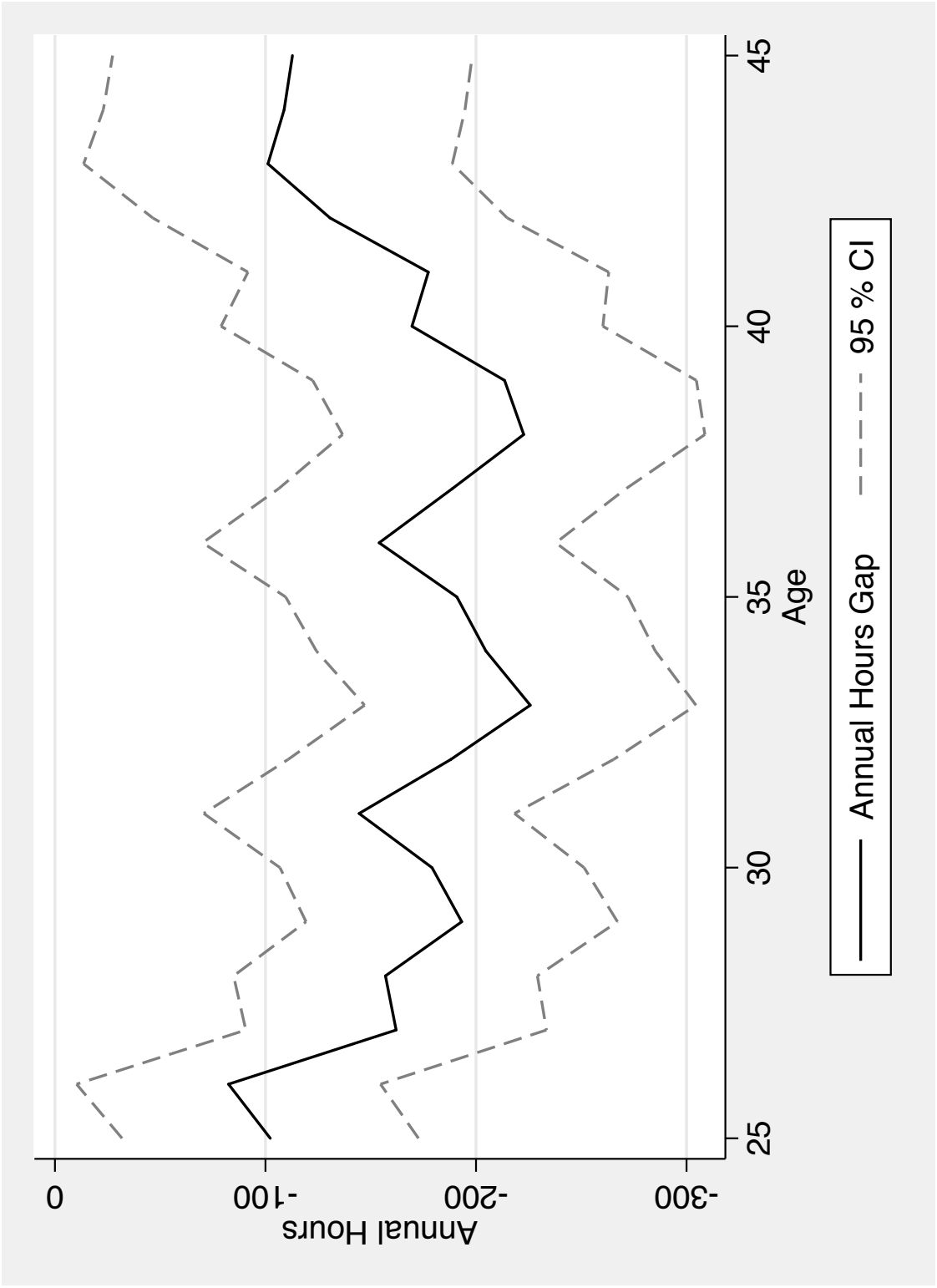
A-2.6 Weighted Results

Table A-17 provides weighted versions of the key results using 1979 sampling weights. These weighted regressions produce results that are qualitatively unchanged from the unweighted regressions presented in the main tables.

A-2.7 Comparison of College Dropout Results with and without AFQT

Tables A-18 through A-19 provide a complete set of college dropout results (Tables 3 and 4) with and without AFQT as a control.

Figure A-1: Annual Hours Gap at each age, by Patience



Source: Authors' calculations from NLSY79 1979-2004. Impatience measure described in text.The sum of annual gaps is 3,409 hours with a standard error of 188 (p-value < 0.001).

Figure A-2: Annual Hourly Wage Gap at each age, by Patience

Source: Authors' calculations from NLSY79 1979-2004. Impatience measure described in text. The (non-hours-weighted) sum of annual wage gaps is 11.42 with a standard error of 2.00 (p-value < 0.001).

Table A-1: Summary Statistics - Covariates

		Full Sample		Patient	Impatient	Difference
Variable	Obs	Mean	Std. Dev.	Mean	Mean	p-value
Age in 1979	10046	17.82	2.34	17.82	17.86	0.707
Mother's highest grade completed	9457	11.65	2.77	11.69	11.30	0.001
Father's highest grade completed	8661	11.90	3.60	11.97	11.33	0.000
Male	10046	0.49	0.50	0.48	0.64	0.000
African-American	10046	0.14	0.35	0.13	0.21	0.000
Family income in 1979	8125	47677	36766	48264	42357	0.000
Poverty status in 1979	9545	0.15	0.35	0.14	0.20	0.000
Urbanicity in 1979	9420	0.78	0.41	0.78	0.81	0.091
Lived with both parents at age 14?	10035	0.75	0.43	0.76	0.70	0.000
Access to magazines at age 14?	9979	0.67	0.47	0.68	0.59	0.000
Access to newspapers at age 14?	10007	0.84	0.37	0.84	0.79	0.000
Had a library card at age 14?	10004	0.75	0.43	0.76	0.71	0.007
Ever impatient 1980-1985?	10046	0.10	0.30	1.00	0.00	n/a

Source: NLSY 1979-2008. Observations weighted using sample weights. Sample includes those eligible for inclusion in the regressions.

Table A-2: Predictors of Impatience - Probit Coefficients

Variable	(1) Impatience
Male	0.331***
	(0.034)
African-American	0.172***
	(0.041)
Other race	0.084
	(0.075)
Mother HS Dropout	-0.005
	(0.043)
Mother Some College	0.010
	(0.066)
Mother College Grad	0.035
	(0.077)
Father HS Dropout	0.099**
	(0.045)
Father Some College	0.070
	(0.070)
Father College Grad	-0.112*
	(0.067)
Library card at 14	-0.033
	(0.040)
Magazines at 14	-0.071*
	(0.039)
Newspapers at 14	-0.027
	(0.043)
Urban in 1979	0.109**
	(0.044)
Live with both parents at 14	-0.096**
	(0.039)
Family Income - 1st Quartile	-0.094*
	(0.056)
Family Income - 3rd Quartile	-0.064
	(0.056)
Family Income - 4th Quartile	-0.068
	(0.061)
Poverty Status 1979	0.146***
	(0.051)
Age (in 1979) fixed effects	Y
Observations	10,046
Pseudo R-squared	0.04

Data: NLSY 1979-2008. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Includes a full set of demographic, geographic, and family background controls. See Table 1 for complete list of controls.

Table A-3: Key Results by Race and Gender

Sample	(1) Under 17 in 1979	(2) Under 17 in 1979	(3) Enrolled In College	(4) Enrolled In College	(5) Enrolled in College	(6) Enrolled in College	(7) Ed>=15	(8) Ed>=15
Outcome	No HS Diploma by 21	No HS Diploma by 21	No Degree	No Degree	<= 1 Year Credit, No Degree	<= 1 Year Credit, No Degree	No Bachelor's Degree	No Bachelor's Degree
Impatient	0.102***	0.022	0.077***	0.080*	0.071***	0.031	0.090***	0.086
	(0.032)	(0.072)	(0.024)	(0.046)	(0.024)	(0.044)	(0.033)	(0.063)
Impatient*Black Male		0.081		0.006		0.019		0.155
		(0.105)		(0.073)		(0.073)		(0.112)
Impatient*Black Female		0.174*		-0.061		0.036		0.000
		(0.104)		(0.076)		(0.076)		(0.118)
Impatient*Non-Black Male		0.083		0.015		0.080		-0.050
		(0.086)		(0.060)		(0.057)		(0.077)
p-value from H_0: All interaction terms = 0	--	0.424	--	0.759	--	0.540	--	0.257
Observations	2,322	2,322	4,658	4,658	4,658	4,658	2,218	2,218
R-squared	0.148	0.151	0.148	0.148	0.124	0.125	0.091	0.094

Data: NLSY 1979-2008. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Includes a full set of demographic, geographic, and family background controls. See Table 1 for complete list of controls.

Table A-4: Key Results by Age at Survey Entry

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Sample	Full Sample	Full Sample	Enrolled In College	Enrolled In College	Enrolled in College	Enrolled in College	Ed>=15	Ed>=15
Outcome	No HS Diploma by 21	No HS Diploma by 21	No Degree	No Degree	<= 1 Year Credit, No Degree	<= 1 Year Credit, No Degree	No Bachelor's Degree	No Bachelor's Degree
Impatient	0.072***	0.090***	0.077***	0.160***	0.071***	0.141***	0.090***	0.165**
	(0.015)	(0.026)	(0.024)	(0.042)	(0.024)	(0.044)	(0.033)	(0.066)
Impatient*Age 17-18		-0.020		-0.128*		-0.140**		-0.020
		(0.038)		(0.067)		(0.067)		(0.097)
Impatient*Age 19-20		-0.047		-0.104*		-0.042		-0.155*
		(0.037)		(0.061)		(0.061)		(0.087)
Impatient*Age 21-22		-0.007		-0.128*		-0.142**		-0.130
		(0.046)		(0.068)		(0.069)		(0.095)
p-value from H0: All interaction terms = 0	--	0.629	--	0.131	--	0.079	--	0.212
Observations	9,370	9,370	4,658	4,658	4,658	4,658	2,218	2,218
R-squared	0.178	0.178	0.148	0.149	0.124	0.126	0.091	0.094

Data: NLSY 1979-2008. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. See Table 1 for complete list of controls.

Table A-5: Key Results - Age 14-18 in 1979 Subsample

	(1) Under 17 in 1979 No HS Diploma by 21	(2) Enrolled In College No Degree	(3) Enrolled in College <= 1 Year Credit, No Degree	(4) Ed>=15 No Bachelor's Degree	(5) Enrolled in College Log Hourly Wage (2004)
Impatient	0.103***	0.099***	0.076**	0.157***	-0.057
	(0.032)	(0.033)	(0.034)	(0.049)	(0.078)
Has Bachelor's Degree					0.312***
					(0.033)
Bachelor's*Impatient					0.163
					(0.115)
Male	0.022	0.015	0.002	-0.015	0.263***
	(0.017)	(0.019)	(0.018)	(0.021)	(0.031)
African-American	-0.098***	0.041	-0.033	0.080**	-0.080**
	(0.023)	(0.025)	(0.024)	(0.034)	(0.038)
Other race	-0.019	0.001	-0.017	-0.068	-0.055
	(0.040)	(0.045)	(0.045)	(0.057)	(0.084)
Mother HS Dropout	0.094***	0.018	0.028	0.044	0.014
	(0.023)	(0.026)	(0.027)	(0.039)	(0.043)
Mother Some College	-0.054**	-0.044	-0.056**	0.033	0.062
	(0.024)	(0.029)	(0.027)	(0.031)	(0.046)
Mother College Grad	-0.027	-0.110***	-0.112***	-0.026	-0.017
	(0.027)	(0.032)	(0.027)	(0.027)	(0.051)
Father HS Dropout	0.057**	0.022	0.038	0.048	-0.078*
	(0.023)	(0.028)	(0.028)	(0.038)	(0.044)
Father Some College	-0.015	-0.086**	-0.088***	0.018	-0.016
	(0.029)	(0.034)	(0.031)	(0.037)	(0.048)
Father College Grad	-0.047*	-0.138***	-0.122***	-0.019	0.009
	(0.026)	(0.030)	(0.027)	(0.029)	(0.046)
Library card at 14	-0.015	-0.022	-0.011	-0.043	0.101***
	(0.020)	(0.025)	(0.024)	(0.030)	(0.038)
Magazines at 14	-0.082***	-0.033	-0.032	-0.024	0.059
	(0.021)	(0.024)	(0.024)	(0.033)	(0.036)
Newspapers at 14	-0.046**	-0.053**	-0.048*	-0.037	0.017
	(0.023)	(0.027)	(0.028)	(0.039)	(0.041)
Urban in 1979	0.017	0.054**	0.034	0.069***	0.078**
	(0.021)	(0.024)	(0.024)	(0.025)	(0.037)
Live with both parents at 14	-0.106***	-0.073***	-0.074***	-0.009	0.007
	(0.022)	(0.024)	(0.024)	(0.032)	(0.038)
Family Income - 1st Quartile	0.014	-0.027	0.003	-0.068	0.027
	(0.040)	(0.042)	(0.045)	(0.069)	(0.070)
Family Income - 3rd Quartile	-0.008	-0.019	-0.026	-0.011	0.008
	(0.032)	(0.036)	(0.036)	(0.053)	(0.057)
Family Income - 4th Quartile	-0.013	-0.065*	-0.039	-0.088*	0.038
	(0.034)	(0.037)	(0.036)	(0.051)	(0.059)
Poverty Status 1979	0.101***	0.009	0.002	0.005	0.032
	(0.035)	(0.038)	(0.038)	(0.053)	(0.062)
Age (in 1979) fixed effects	Y	Y	Y	Y	Y
Region (in 1979) fixed effects	Y	Y	Y	Y	Y
Patient mean	0.184	0.416	0.294	0.128	--
Percent diff	56.0%	23.7%	25.9%	122.7%	--
Observations	2,322	2,609	2,609	1,248	1,652
R-squared	0.148	0.123	0.099	0.110	0.180

Table A-6: Alternative Definitions of Impatience

	(1)	(2)	(3)	(4)
Sample	Under 17 in 1979	Expects to Finish HS	Enrolled In College	Expects College Degree
	No HS Diploma by 21	No HS Diploma by 21	No Degree	No Degree
Ever impatient in 1980-1985	0.102***	0.099***	0.077***	0.068***
	(0.032)	(0.033)	(0.024)	(0.021)
Fraction interviews impatient in 1980-1985	0.541***	0.534***	0.340***	0.302***
	(0.121)	(0.126)	(0.106)	(0.093)
Average impatience residuals, 1980-1985	0.518***	0.514***	0.327***	0.284***
	(0.123)	(0.128)	(0.107)	(0.094)
Fraction interviews impatient in full sample	1.275***	1.248***	0.780***	0.705***
	(0.212)	(0.218)	(0.176)	(0.149)
Average impatience residuals in Full Sample	1.196***	1.178***	0.631***	0.565***
	(0.213)	(0.220)	(0.177)	(0.150)
Payment required to wait one month for $1000 (in $100s)	0.020***	0.018***	0.017***	0.024***
	(0.006)	(0.006)	(0.006)	(0.006)
Patient mean	0.187	0.166	0.425	0.476
Observations	2,331	2,219	4,658	5,143

Data: NLSY 1979-2008. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Includes a full set of demographic, geographic, and family background controls. See Table 1 for complete list of controls. Each value is the coefficient from a separate regression. Residuals are from a regression (for each year) of impatience on: interview length (missing in 1992 and 1993), interviewer race, interviewer gender, interviewer same race, interviewer same gender, labor force status, hourly wage, and family size.

Table A-7: Alternative Impatience Measure - 2006 Hypothetical Question

Sample	(1) Expects to Finish HS	(2) Enrolled In College	(3) Enrolled in College	(4) Ed>=15	(5) Enrolled in College
	No HS Diploma by 21	No Degree	<= 1 Year Credit, No Degree	No Bachelor's Degree	Log Hourly Wage (2004)
Impatient - Hypothetical	0.018***	0.017***	0.016***	0.007	-0.032***
	(0.006)	(0.006)	(0.006)	(0.007)	(0.011)
Has Bachelor's Degree					0.281***
					(0.048)
Bachelor's*Impatient					-0.009
					(0.018)
Male	0.017	0.025	0.013	-0.031	0.260***
	(0.022)	(0.021)	(0.019)	(0.022)	(0.031)
African-American	-0.057*	0.052*	-0.029	0.058	-0.073*
	(0.033)	(0.031)	(0.029)	(0.040)	(0.043)
Other race	0.024	0.033	-0.023	0.012	0.058
	(0.052)	(0.053)	(0.054)	(0.087)	(0.080)
Mother HS Dropout	0.048	0.039	0.087***	-0.039	0.006
	(0.030)	(0.031)	(0.030)	(0.042)	(0.044)
Mother Some College	-0.053	-0.024	-0.029	0.053	0.027
	(0.032)	(0.031)	(0.028)	(0.035)	(0.045)
Mother College Grad	-0.015	-0.085**	-0.067**	-0.044	-0.001
	(0.035)	(0.033)	(0.028)	(0.028)	(0.049)
Father HS Dropout	0.046	-0.023	-0.022	0.057	-0.046
	(0.031)	(0.033)	(0.032)	(0.043)	(0.045)
Father Some College	0.003	-0.109***	-0.088***	-0.024	0.002
	(0.036)	(0.035)	(0.033)	(0.038)	(0.049)
Father College Grad	-0.036	-0.145***	-0.134***	-0.038	0.025
	(0.033)	(0.032)	(0.028)	(0.032)	(0.047)
Library card at 14	-0.022	-0.043	-0.017	-0.014	0.101***
	(0.027)	(0.029)	(0.028)	(0.034)	(0.037)
Magazines at 14	-0.042	-0.062**	-0.094***	-0.032	0.012
	(0.029)	(0.028)	(0.028)	(0.038)	(0.037)
Newspapers at 14	-0.062*	0.005	0.034	0.020	-0.005
	(0.032)	(0.034)	(0.034)	(0.045)	(0.046)
Urban in 1979	-0.007	0.060**	0.041	0.036	0.090**
	(0.027)	(0.028)	(0.026)	(0.028)	(0.038)
Live with both parents at 14	-0.094***	-0.093***	-0.076***	-0.094**	0.007
	(0.030)	(0.028)	(0.027)	(0.038)	(0.039)
Family Income - 1st Quartile	0.030	-0.011	0.020	-0.073	-0.028
	(0.061)	(0.048)	(0.047)	(0.068)	(0.073)
Family Income - 3rd Quartile	0.030	0.035	0.086**	-0.053	-0.021
	(0.044)	(0.041)	(0.039)	(0.058)	(0.054)
Family Income - 4th Quartile	0.037	-0.052	0.020	-0.114**	-0.012
	(0.047)	(0.041)	(0.037)	(0.053)	(0.056)
Poverty Status 1979	0.139***	0.041	0.072*	-0.019	-0.083
	(0.049)	(0.044)	(0.043)	(0.058)	(0.065)
Age (in 1979) fixed effects	Y	Y	Y	Y	Y
Region (in 1979) fixed effects	Y	Y	Y	Y	Y
Observations	1,251	2,060	2,060	1,070	1,625
R-squared	0.133	0.152	0.122	0.101	0.174

Data: NLSY 1979-2008. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Measure of impatience is based on survey response to the question, "How much would you need to be paid to delay a $1000 prize for one month?" Responses scaled by $100. Data definitions provided in Data Appendix. Includes a full set of demographic, geographic, and family background controls. See Table 1 for complete list of controls.

Table A-8: Regression Estimates for Lifetime Cost Figures

	Earnings		Annual Hours		Hourly Wages		Earnings - Purged of Completed Ed	
Age	Gap	Standard Error	Gap	Standard Error	Gap	Standard Error	Gap	Standard Error
25	-1039	611	-102	36	0.26	0.33	-458	601
26	-2102	579	-82	37	-0.23	0.33	-1346	559
27	-2578	658	-162	36	0.13	0.39	-1667	637
28	-2695	693	-157	37	-0.20	0.41	-1717	671
29	-3315	671	-193	38	-0.23	0.36	-2217	633
30	-3300	751	-179	37	-0.42	0.40	-2102	719
31	-2689	776	-144	38	-0.52	0.37	-1387	743
32	-3162	787	-188	39	-0.07	0.43	-1718	745
33	-3589	804	-226	40	-0.13	0.45	-2016	759
34	-3704	850	-205	41	0.03	0.46	-2186	798
35	-3444	904	-191	41	0.03	0.46	-1911	854
36	-3509	944	-154	43	-0.78	0.43	-1952	887
37	-4246	953	-189	42	-1.01	0.42	-2671	897
38	-5419	947	-223	44	-1.27	0.43	-3803	898
39	-5220	957	-214	46	-1.06	0.48	-3404	909
40	-4713	1003	-170	46	-0.77	0.49	-2757	946
41	-4746	1009	-177	44	-1.03	0.48	-2660	942
42	-4327	1044	-131	43	-0.55	0.50	-2374	968
43	-3794	1081	-101	45	-1.13	0.52	-1860	1011
44	-4384	1067	-109	44	-1.28	0.51	-2446	1005
45	-4559	1059	-113	44	-1.19	0.47	-2672	1005
Total	-$76,533	4025	-3409	188	-11.42	2.00	-45324	3806

Percent of earnings gap explained by schooling	40.8%
Patient mean total earnings (full panel)	$583,877
Ratio of earnings gap to patient mean earnings	-13.1%

Data: NLSY 1979-2008. Standard errors are heteroskedasticity-robust.

Table A-9: Present-Biased Behaviors and Impatience

	(1)	(2)	(3)	(4)	(5)
	Bank Account	Ever Smoker	Hangovers	Never Attrit from NLSY	Early Military Exit
Impatient	-0.105***	0.057***	0.068**	-0.063***	0.074
	(0.015)	(0.019)	(0.033)	(0.015)	(0.063)
Male	-0.024***	0.041***	0.127***	-0.037***	-0.096**
	(0.009)	(0.012)	(0.017)	(0.009)	(0.043)
African-American	-0.133***	-0.062***	-0.121***	0.205***	-0.114***
	(0.012)	(0.015)	(0.021)	(0.011)	(0.044)
Other race	-0.056**	-0.068**	-0.011	0.061***	-0.099
	(0.022)	(0.027)	(0.040)	(0.021)	(0.072)
Mother HS Dropout	-0.092***	0.034**	0.013	0.028**	0.080*
	(0.012)	(0.015)	(0.023)	(0.011)	(0.043)
Mother Some College	0.015	-0.028	0.048*	-0.009	0.093
	(0.016)	(0.022)	(0.029)	(0.017)	(0.072)
Mother College Grad	0.035**	-0.068***	0.022	0.011	0.139*
	(0.017)	(0.026)	(0.038)	(0.019)	(0.076)
Father HS Dropout	-0.048***	-0.012	-0.024	-0.016	-0.111**
	(0.012)	(0.016)	(0.022)	(0.012)	(0.044)
Father Some College	0.006	-0.010	-0.073***	-0.001	0.055
	(0.017)	(0.023)	(0.024)	(0.017)	(0.069)
Father College Grad	0.047***	-0.026	0.015	-0.022	-0.053
	(0.015)	(0.022)	(0.034)	(0.016)	(0.062)
Library card at 14	0.018*	-0.005	0.009	-0.001	-0.014
	(0.011)	(0.014)	(0.020)	(0.011)	(0.046)
Magazines at 14	0.101***	-0.021	-0.025	0.023**	0.000
	(0.011)	(0.014)	(0.019)	(0.010)	(0.040)
Newspapers at 14	0.063***	0.045***	0.041*	-0.031***	-0.054
	(0.013)	(0.016)	(0.023)	(0.012)	(0.057)
Urban in 1979	0.002	0.016	0.061***	0.047***	0.083
	(0.011)	(0.015)	(0.021)	(0.011)	(0.107)
Live with both parents at 14	0.047***	-0.054***	-0.022	0.005	-0.013
	(0.011)	(0.014)	(0.021)	(0.011)	(0.039)
Family Income - 1st Quartile	0.033**	0.048**	0.064**	-0.022	0.008
	(0.016)	(0.023)	(0.026)	(0.016)	(0.043)
Family Income - 3rd Quartile	0.046***	-0.042**	-0.025	0.095***	-0.023
	(0.015)	(0.020)	(0.033)	(0.015)	(0.060)
Family Income - 4th Quartile	0.072***	-0.072***	0.034	0.156***	0.059
	(0.016)	(0.021)	(0.034)	(0.016)	(0.111)
Poverty Status 1979	-0.127***	-0.040*	-0.064**	-0.111***	0.012
	(0.015)	(0.021)	(0.027)	(0.015)	(0.071)
Age (in 1979) fixed effects	Y	Y	Y	Y	Y
Region (in 1979) fixed effects	Y	Y	Y	Y	Y
Patient mean	0.722	0.498	0.239	0.786	0.382
Percent diff	-14.5%	11.3%	28.2%	-8.0%	19.3%
Observations	10,046	7,268	10,038	10,046	621
R-squared	0.206	0.026	0.018	0.154	0.158

Table A-10: Impatience and Time-Inconsistent High School Dropout Behavior

	(1)	(2)	(3)	(4)
Sample	Under 17 in 1979	Wants to Finish HS	Expects to Finish HS	Under 17 in 1979
Outcome	No HS Diploma by 21	No HS Diploma by 21	No HS Diploma by 21	No HS Diploma by 2008
Impatient	0.103***	0.098***	0.099***	0.054**
	(0.032)	(0.032)	(0.033)	(0.026)
Male	0.022	0.026	0.019	0.027**
	(0.017)	(0.017)	(0.017)	(0.013)
African-American	-0.098***	-0.089***	-0.067***	-0.053***
	(0.023)	(0.023)	(0.023)	(0.018)
Other race	-0.019	-0.010	0.001	-0.023
	(0.040)	(0.041)	(0.042)	(0.033)
Mother HS Dropout	0.094***	0.090***	0.071***	0.040**
	(0.023)	(0.023)	(0.023)	(0.017)
Mother Some College	-0.054**	-0.052**	-0.050**	-0.042***
	(0.024)	(0.024)	(0.024)	(0.012)
Mother College Grad	-0.027	-0.028	-0.030	-0.011
	(0.027)	(0.028)	(0.027)	(0.014)
Father HS Dropout	0.057**	0.053**	0.060**	0.080***
	(0.023)	(0.024)	(0.023)	(0.017)
Father Some College	-0.015	-0.014	-0.008	0.017
	(0.029)	(0.029)	(0.028)	(0.018)
Father College Grad	-0.047*	-0.046*	-0.040	-0.007
	(0.026)	(0.026)	(0.025)	(0.012)
Library card at 14	-0.015	-0.012	-0.006	-0.014
	(0.020)	(0.020)	(0.020)	(0.016)
Magazines at 14	-0.082***	-0.078***	-0.054**	-0.050***
	(0.021)	(0.021)	(0.021)	(0.016)
Newspapers at 14	-0.046**	-0.038	-0.048**	-0.032*
	(0.023)	(0.023)	(0.023)	(0.018)
Urban in 1979	0.017	0.017	0.006	0.007
	(0.021)	(0.021)	(0.021)	(0.016)
Live with both parents at 14	-0.106***	-0.109***	-0.102***	-0.027
	(0.022)	(0.022)	(0.022)	(0.017)
Family Income - 1st Quartile	0.014	0.003	-0.009	0.019
	(0.040)	(0.040)	(0.041)	(0.034)
Family Income - 3rd Quartile	-0.008	-0.004	-0.006	-0.032
	(0.032)	(0.032)	(0.033)	(0.025)
Family Income - 4th Quartile	-0.013	-0.009	-0.004	-0.037
	(0.034)	(0.034)	(0.034)	(0.026)
Poverty Status 1979	0.101***	0.105***	0.105***	0.046
	(0.035)	(0.035)	(0.036)	(0.029)
Age (in 1979) fixed effects	Y	Y	Y	Y
Region (in 1979) fixed effects	Y	Y	Y	Y
Patient mean	0.184	0.179	0.162	0.076
Percent diff	56.0%	54.7%	61.1%	71.1%
Observations	2,322	2,292	2,210	2,322
R-squared	0.148	0.142	0.126	0.106

Table A-11: Impatience and Time-Inconsistent College Dropout Behavior

	(1)	(2)	(3)	(4)	(5)	(6)
Sample	Desires College Degree	Expects College Degree	Enrolled In College	Desires Bachelor's Degree	Expects Bachelor's Degree	Enrolled In 4-year School
Outcome	No Degree	No Degree	No Degree	No Bachelor's Degree	No Bachelor's Degree	No Bachelor's Degree
Impatient	0.072***	0.068***	0.077***	0.072***	0.077***	0.055*
	(0.018)	(0.021)	(0.024)	(0.020)	(0.024)	(0.030)
Male	-0.004	-0.001	-0.011	-0.012	-0.005	-0.020
	(0.012)	(0.013)	(0.014)	(0.012)	(0.015)	(0.017)
African-American	0.023	0.044***	0.042**	0.060***	0.090***	0.085***
	(0.015)	(0.017)	(0.019)	(0.015)	(0.019)	(0.023)
Other race	-0.024	0.000	0.008	0.012	0.036	0.014
	(0.027)	(0.031)	(0.033)	(0.028)	(0.037)	(0.045)
Mother HS Dropout	0.061***	0.049***	0.026	0.068***	0.066***	0.058**
	(0.015)	(0.017)	(0.020)	(0.016)	(0.020)	(0.026)
Mother Some College	-0.067***	-0.050**	-0.045**	-0.037*	-0.024	-0.006
	(0.020)	(0.021)	(0.021)	(0.021)	(0.023)	(0.025)
Mother College Grad	-0.139***	-0.124***	-0.117***	-0.158***	-0.118***	-0.111***
	(0.022)	(0.022)	(0.023)	(0.023)	(0.024)	(0.025)
Father HS Dropout	0.036**	0.039**	0.017	0.048***	0.045**	0.055**
	(0.016)	(0.018)	(0.021)	(0.017)	(0.022)	(0.027)
Father Some College	-0.077***	-0.076***	-0.074***	-0.050**	-0.050*	0.001
	(0.022)	(0.023)	(0.025)	(0.023)	(0.027)	(0.029)
Father College Grad	-0.177***	-0.155***	-0.126***	-0.147***	-0.116***	-0.086***
	(0.019)	(0.020)	(0.021)	(0.021)	(0.023)	(0.024)
Library card at 14	-0.039***	-0.023	-0.027	-0.018	-0.012	-0.000
	(0.014)	(0.017)	(0.019)	(0.016)	(0.020)	(0.023)
Magazines at 14	-0.073***	-0.067***	-0.059***	-0.089***	-0.091***	-0.083***
	(0.014)	(0.016)	(0.018)	(0.015)	(0.018)	(0.023)
Newspapers at 14	-0.037**	-0.056***	-0.068***	-0.025	-0.048**	-0.082***
	(0.016)	(0.019)	(0.021)	(0.017)	(0.022)	(0.028)
Urban in 1979	0.040**	0.059***	0.057***	0.063***	0.081***	0.053**
	(0.016)	(0.018)	(0.019)	(0.018)	(0.021)	(0.022)
Live with both parents at 14	-0.078***	-0.070***	-0.069***	-0.065***	-0.059***	-0.046**
	(0.014)	(0.016)	(0.018)	(0.015)	(0.018)	(0.022)
Family Income - 1st Quartile	-0.066***	-0.063***	-0.061**	-0.110***	-0.104***	-0.123***
	(0.020)	(0.022)	(0.026)	(0.020)	(0.024)	(0.032)
Family Income - 3rd Quartile	0.011	0.016	0.001	0.003	-0.014	-0.063**
	(0.019)	(0.022)	(0.025)	(0.020)	(0.025)	(0.031)
Family Income - 4th Quartile	-0.065***	-0.067***	-0.059**	-0.095***	-0.118***	-0.124***
	(0.020)	(0.023)	(0.025)	(0.022)	(0.026)	(0.031)
Poverty Status 1979	0.019	0.029	0.009	0.037*	0.035	0.003
	(0.018)	(0.021)	(0.023)	(0.019)	(0.023)	(0.028)
Age (in 1979) fixed effects	Y	Y	Y	Y	Y	Y
Region (in 1979) fixed effects	Y	Y	Y	Y	Y	Y
Patient mean	0.539	0.476	0.425	0.549	0.450	0.359
Percent diff	13.4%	14.3%	18.1%	13.0%	17.1%	15.4%
Observations	6,089	5,143	4,658	4,880	3,739	3,091
R-squared	0.186	0.186	0.148	0.227	0.239	0.169

Table A-12: Impatience and College Dropout Dynamics

	(1)	(2)	(3)	(4)	(5)	(6)
Sample	Enrolled in College	Ed>=14	Ed>=15	Gave reason for dropping out	Gave reason for dropping out	Enrolled in College
	<= 1 Year Credit, No Degree	14 Years, No Degree	No Bachelor's Degree	Dropped out due to financial difficulties	Dropped out due to academic difficulties	Log Hourly Wage (2004)
Impatient	0.071***	0.005	0.090***	0.003	0.007	-0.074
	(0.024)	(0.026)	(0.033)	(0.030)	(0.012)	(0.056)
Has Bachelor's Degree						0.289***
						(0.027)
Bachelor's*Impatient						0.187**
						(0.089)
Male	-0.016	-0.004	-0.027*	0.043**	0.010	0.266***
	(0.013)	(0.013)	(0.015)	(0.017)	(0.007)	(0.025)
African-American	-0.027	0.051**	0.084***	0.075***	-0.009	-0.105***
	(0.018)	(0.020)	(0.026)	(0.023)	(0.009)	(0.031)
Other race	-0.028	0.045	0.002	0.012	0.009	0.039
	(0.033)	(0.038)	(0.049)	(0.039)	(0.017)	(0.061)
Mother HS Dropout	0.039*	0.030	0.010	-0.017	0.004	-0.005
	(0.020)	(0.022)	(0.029)	(0.023)	(0.008)	(0.034)
Mother Some College	-0.063***	-0.025	0.022	-0.050*	0.010	0.008
	(0.020)	(0.018)	(0.023)	(0.026)	(0.011)	(0.036)
Mother College Grad	-0.120***	-0.035*	-0.028	-0.011	-0.008	-0.021
	(0.019)	(0.019)	(0.020)	(0.031)	(0.012)	(0.040)
Father HS Dropout	0.012	0.018	0.037	0.012	0.001	-0.064*
	(0.021)	(0.022)	(0.028)	(0.024)	(0.008)	(0.035)
Father Some College	-0.086***	-0.015	0.006	-0.012	0.017	0.005
	(0.023)	(0.021)	(0.027)	(0.029)	(0.012)	(0.038)
Father College Grad	-0.117***	-0.021	-0.040*	-0.011	0.016	0.022
	(0.019)	(0.019)	(0.021)	(0.026)	(0.010)	(0.037)
Library card at 14	-0.012	-0.016	-0.015	-0.022	-0.016	0.102***
	(0.018)	(0.020)	(0.023)	(0.023)	(0.010)	(0.030)
Magazines at 14	-0.062***	-0.020	-0.032	-0.030	-0.004	0.074**
	(0.018)	(0.019)	(0.025)	(0.021)	(0.009)	(0.029)
Newspapers at 14	-0.036	-0.010	-0.073**	-0.032	-0.011	-0.004
	(0.022)	(0.025)	(0.032)	(0.026)	(0.010)	(0.035)
Urban in 1979	0.035**	0.014	0.052***	-0.016	0.019**	0.072**
	(0.018)	(0.017)	(0.019)	(0.025)	(0.008)	(0.030)
Live with both parents at 14	-0.057***	-0.025	-0.040*	-0.057***	0.003	0.014
	(0.018)	(0.019)	(0.024)	(0.022)	(0.009)	(0.030)
Family Income - 1st Quartile	-0.043*	-0.035	-0.101***	-0.032	0.018	0.021
	(0.026)	(0.029)	(0.035)	(0.030)	(0.011)	(0.052)
Family Income - 3rd Quartile	0.005	0.002	-0.028	-0.029	0.024**	0.009
	(0.024)	(0.028)	(0.035)	(0.029)	(0.010)	(0.044)
Family Income - 4th Quartile	-0.035	-0.033	-0.058*	-0.041	0.015	0.024
	(0.024)	(0.026)	(0.032)	(0.030)	(0.010)	(0.045)
Poverty Status 1979	0.019	-0.004	0.051*	-0.022	0.014	-0.018
	(0.023)	(0.024)	(0.028)	(0.029)	(0.010)	(0.047)
Age (in 1979) fixed effects	Y	Y	Y	Y	Y	Y
Region (in 1979) fixed effects	Y	Y	Y	Y	Y	Y
Patient mean	0.292	0.129	0.132	0.211	0.028	--
Percent diff	24.3%	3.7%	68.0%	1.2%	24.5%	--
Observations	4,658	3,001	2,218	2,549	2,549	2,589
R-squared	0.124	0.060	0.091	0.033	0.016	0.175

Table A-13: Impatience and AFQT

	(1)	(2)	(3)	(4)	(5)	(6)
Sample	Full Sample	Expects to Finish HS	Enrolled In College	Enrolled in College	Ed>=15	Enrolled in College
	AFQT	No HS Diploma by 21	No Degree	<= 1 Year Credit, No Degree	No Bachelor's Degree	Log Hourly Wage (2004)
Impatient	-0.217***	0.0733**	0.0446*	0.0397*	0.0729**	-0.0421
	(0.0261)	(0.0311)	(0.0229)	(0.0229)	(0.0327)	(0.0549)
Has Bachelor's Degree						0.208***
						(0.0273)
Bachelor's*Impatient						0.173*
						(0.0882)
Male	-0.0426***	0.0124	0.00565	-9.85e-05	-0.0191	0.254***
	(0.0158)	(0.0163)	(0.0133)	(0.0127)	(0.0153)	(0.0243)
African-American	-0.608***	-0.155***	-0.103***	-0.162***	0.000731	0.0192
	(0.0207)	(0.0233)	(0.0197)	(0.0189)	(0.0281)	(0.0329)
Other race	-0.207***	-0.00411	-0.0256	-0.0604*	-0.0283	0.0732
	(0.0399)	(0.0402)	(0.0331)	(0.0332)	(0.0478)	(0.0602)
Mother HS Dropout	-0.277***	0.0299	0.000119	0.0146	0.00350	0.0176
	(0.0206)	(0.0221)	(0.0189)	(0.0191)	(0.0287)	(0.0330)
Mother Some College	0.156***	-0.0275	-0.0341	-0.0526***	0.0213	0.00480
	(0.0270)	(0.0238)	(0.0207)	(0.0192)	(0.0224)	(0.0362)
Mother College Grad	0.259***	0.0110	-0.0815***	-0.0863***	-0.0165	-0.0414
	(0.0284)	(0.0268)	(0.0220)	(0.0189)	(0.0199)	(0.0401)
Father HS Dropout	-0.218***	0.0291	-0.00743	-0.0109	0.0192	-0.0467
	(0.0216)	(0.0228)	(0.0198)	(0.0198)	(0.0280)	(0.0342)
Father Some College	0.108***	0.00443	-0.0594**	-0.0717***	0.00745	-0.00799
	(0.0295)	(0.0282)	(0.0233)	(0.0214)	(0.0269)	(0.0372)
Father College Grad	0.269***	0.00541	-0.0938***	-0.0868***	-0.0335	0.00979
	(0.0256)	(0.0249)	(0.0205)	(0.0186)	(0.0211)	(0.0366)
Library card at 14	0.189***	0.0111	-0.00629	0.00793	0.000573	0.0885***
	(0.0194)	(0.0193)	(0.0180)	(0.0179)	(0.0232)	(0.0295)
Magazines at 14	0.264***	-0.0234	-0.0246	-0.0295*	-0.0101	0.0429
	(0.0190)	(0.0208)	(0.0171)	(0.0173)	(0.0246)	(0.0282)
Newspapers at 14	0.215***	-0.0362	-0.0336	-0.00305	-0.0617*	-0.0268
	(0.0222)	(0.0223)	(0.0206)	(0.0212)	(0.0318)	(0.0348)
Urban in 1979	-0.0323	0.000135	0.0397**	0.0187	0.0483**	0.0793***
	(0.0199)	(0.0202)	(0.0182)	(0.0171)	(0.0188)	(0.0300)
Live with both parents at 14	0.00278	-0.106***	-0.0741***	-0.0612***	-0.0427*	0.0274
	(0.0192)	(0.0214)	(0.0172)	(0.0171)	(0.0237)	(0.0299)
Family Income - 1st Quartile	0.0493*	-0.0163	-0.0544**	-0.0366	-0.0983***	0.0321
	(0.0277)	(0.0386)	(0.0248)	(0.0247)	(0.0348)	(0.0511)
Family Income - 3rd Quartile	-0.0222	-0.0125	-0.0161	-0.0108	-0.0424	0.0303
	(0.0264)	(0.0310)	(0.0239)	(0.0236)	(0.0345)	(0.0429)
Family Income - 4th Quartile	0.0634**	0.00789	-0.0598**	-0.0360	-0.0605*	0.0319
	(0.0274)	(0.0327)	(0.0241)	(0.0230)	(0.0319)	(0.0439)
Poverty Status 1979	-0.219***	0.0678**	-0.0229	-0.0115	0.0334	0.0145
	(0.0256)	(0.0339)	(0.0227)	(0.0221)	(0.0271)	(0.0454)
AFQT	--	-0.156***	-0.202***	-0.190***	-0.115***	0.192***
	--	(0.0113)	(0.0103)	(0.0104)	(0.0164)	(0.0201)
Age (in 1979) fixed effects	Y	Y	Y	Y	Y	Y
Region (in 1979) fixed effects	Y	Y	Y	Y	Y	Y
Patient mean	0.324	0.166	0.425	0.292	0.132	--
Percent diff	--	44.2%	10.5%	13.6%	55.2%	--
Observations	9,827	2,219	4,658	4,658	2,218	2,589
R-squared	0.426	0.195	0.211	0.187	0.116	0.205

Table A-14: Impatience, ADHD, and HS Dropout Behavior - Add Health Data

	(1)	(2)	(3)	(4)
Ever Impatient	0.031***	0.030***	0.022***	0.020***
	(0.006)	(0.006)	(0.006)	(0.006)
Ever ADHD (Wave IV)		0.040***		0.054***
		(0.015)		(0.015)
Male			0.026***	0.025***
			(0.005)	(0.005)
Hispanic			0.027***	0.029***
			(0.009)	(0.009)
Black			0.031***	0.034***
			(0.008)	(0.008)
Native American			0.097*	0.100*
			(0.053)	(0.053)
Asian			0.021*	0.024**
			(0.011)	(0.011)
Other Race			0.027	0.027
			(0.033)	(0.033)
Multiple Race			0.047***	0.049***
			(0.016)	(0.016)
Mother < High School			0.050***	0.051***
			(0.011)	(0.011)
Mother Some College			-0.009	-0.009
			(0.009)	(0.009)
Mother College Grad			-0.038***	-0.038***
			(0.006)	(0.006)
Father < High School			0.033***	0.033***
			(0.012)	(0.012)
Father Some College			-0.018*	-0.018*
			(0.009)	(0.009)
Father College Grad			-0.028***	-0.029***
			(0.007)	(0.007)
Family Income (1995, thousands)			-0.0001***	-0.0002***
			(0.00005)	(0.00005)
Live with both parents (Wave I)			-0.023***	-0.022***
			(0.007)	(0.007)
Month of Birth Dummies	NO	NO	YES	YES
Patient mean	0.086	0.086	0.086	0.086
Percent diff	36.0%	34.8%	25.2%	23.8%
Observations	11,631	11,631	11,631	11,631
R-squared	0.002	0.003	0.051	0.052

Table A-15: Additional Results Consistent with β-Impatience

	(1)	(2)	(3)
	Regret Index	Number of Job Switches	Fraction Job Switches with > Wages
Impatient	0.090**	0.346**	-0.024**
	(0.035)	(0.149)	(0.011)
Male	-0.066***	0.213**	0.043***
	(0.018)	(0.087)	(0.007)
African-American	-0.020	0.299***	-0.041***
	(0.024)	(0.111)	(0.009)
Other race	0.062	-0.397**	0.005
	(0.049)	(0.195)	(0.018)
Mother HS Dropout	0.017	0.184	-0.021**
	(0.023)	(0.114)	(0.009)
Mother Some College	-0.033	-0.136	-0.011
	(0.028)	(0.161)	(0.015)
Mother College Grad	-0.012	0.075	-0.031*
	(0.036)	(0.185)	(0.017)
Father HS Dropout	-0.007	-0.020	0.013
	(0.024)	(0.120)	(0.009)
Father Some College	-0.006	-0.135	0.016
	(0.030)	(0.170)	(0.015)
Father College Grad	0.045	0.026	0.026*
	(0.034)	(0.159)	(0.015)
Library card at 14	-0.030	0.168	0.004
	(0.023)	(0.104)	(0.008)
Magazines at 14	-0.051**	-0.030	0.010
	(0.022)	(0.106)	(0.008)
Newspapers at 14	0.008	0.201*	0.015*
	(0.027)	(0.118)	(0.009)
Urban in 1979	0.009	-0.030	0.013
	(0.023)	(0.113)	(0.009)
Live with both parents at 14	0.002	-0.146	-0.005
	(0.022)	(0.108)	(0.008)
Family Income - 1st Quartile	0.068*	0.197	0.006
	(0.038)	(0.173)	(0.013)
Family Income - 3rd Quartile	0.027	-0.070	0.025**
	(0.030)	(0.153)	(0.012)
Family Income - 4th Quartile	0.004	-0.122	0.017
	(0.030)	(0.159)	(0.013)
Poverty Status 1979	0.019	0.343**	0.010
	(0.033)	(0.161)	(0.011)
Completed education	Yes	Yes	Yes
Age (in 1979) fixed effects	Y	Y	Y
Region (in 1979) fixed effects	Y	Y	Y
Patient mean	-0.043	4.85	0.215
Percent diff	--	7.1%	-11.1%
Observations	6,714	6,771	5,607
R-squared	0.030	0.126	0.050

Table A-16: Reasons for Dropping Out

Reason Given For Not Completing Degree Program	Patient	Impatient
Marriage	2.9	0.8
Pregnancy	3.6	3.9
Didn't Like School	10.5	12.6
Poor Grades	1.8	2.8
Home Responsibilities	2.8	2.8
Chose to work	16.9	19.3
Financial Difficulties	19.6	19.7
Entered Military	1.4	2.4
Expelled or Suspended	0.8	0.4
School too dangerous	0.1	0.0
Moved away	4.4	2.8
Other	35.3	32.7

Data: NLSY 1979-2008. Sample consists of respondents who left school without completing a degree and who provided a reason for leaving. The numbers represent the percentage of each sub-sample listing each reason. The p-value from a test of the null hypothesis that the distribution of reasons is the same for the patient and the impatient is 0.49.

Table A-17: Key Results - Weighted

	(1) Under 17 in 1979 No HS Diploma by 21	(2) Enrolled In College No Degree	(3) Enrolled in College <= 1 Year Credit, No Degree	(4) Ed>=15 No Bachelor's Degree	(5) Enrolled in College Log Hourly Wage (2004)
Impatient	0.089**	0.066**	0.055*	0.098**	-0.069
	(0.037)	(0.032)	(0.029)	(0.039)	(0.059)
Has Bachelor's Degree					0.284***
					(0.032)
Bachelor's*Impatient					0.183*
					(0.097)
Male	0.004	-0.001	-0.001	-0.036**	0.301***
	(0.018)	(0.017)	(0.016)	(0.017)	(0.029)
African-American	-0.106***	0.042*	-0.030	0.091***	-0.106***
	(0.026)	(0.022)	(0.021)	(0.028)	(0.034)
Other race	0.023	-0.039	-0.087**	-0.006	0.025
	(0.052)	(0.044)	(0.039)	(0.048)	(0.070)
Mother HS Dropout	0.100***	0.026	0.045*	-0.003	-0.009
	(0.026)	(0.026)	(0.025)	(0.034)	(0.041)
Mother Some College	-0.049*	-0.047*	-0.056**	0.028	0.015
	(0.027)	(0.025)	(0.023)	(0.025)	(0.041)
Mother College Grad	-0.047*	-0.103***	-0.112***	-0.032	-0.010
	(0.025)	(0.026)	(0.022)	(0.020)	(0.048)
Father HS Dropout	0.050**	0.012	0.021	0.028	-0.061
	(0.025)	(0.026)	(0.026)	(0.034)	(0.041)
Father Some College	0.012	-0.110***	-0.108***	-0.019	0.030
	(0.032)	(0.029)	(0.027)	(0.030)	(0.042)
Father College Grad	-0.026	-0.154***	-0.140***	-0.056**	-0.015
	(0.026)	(0.025)	(0.022)	(0.023)	(0.043)
Library card at 14	0.000	-0.020	-0.008	0.013	0.058*
	(0.022)	(0.023)	(0.022)	(0.025)	(0.035)
Magazines at 14	-0.077***	-0.074***	-0.076***	-0.023	0.069**
	(0.025)	(0.022)	(0.022)	(0.027)	(0.034)
Newspapers at 14	-0.049*	-0.061**	-0.038	-0.055	-0.004
	(0.027)	(0.028)	(0.027)	(0.036)	(0.044)
Urban in 1979	0.024	0.049**	0.042**	0.034	0.094***
	(0.022)	(0.022)	(0.020)	(0.022)	(0.035)
Live with both parents at 14	-0.120***	-0.079***	-0.045**	-0.064**	0.045
	(0.026)	(0.023)	(0.022)	(0.028)	(0.038)
Family Income - 1st Quartile	0.007	-0.066*	-0.059*	-0.075	0.010
	(0.048)	(0.038)	(0.035)	(0.050)	(0.085)
Family Income - 3rd Quartile	-0.047	-0.019	-0.003	-0.050	0.004
	(0.041)	(0.033)	(0.031)	(0.043)	(0.053)
Family Income - 4th Quartile	-0.052	-0.090***	-0.061**	-0.088**	0.042
	(0.042)	(0.032)	(0.030)	(0.040)	(0.054)
Poverty Status 1979	0.080*	0.019	0.031	0.018	0.017
	(0.044)	(0.032)	(0.031)	(0.039)	(0.071)
Age (in 1979) fixed effects	Y	Y	Y	Y	Y
Region (in 1979) fixed effects	Y	Y	Y	Y	Y
Patient mean	0.184	0.425	0.292	0.132	--
Percent diff	48.4%	15.9%	18.7%	76.6%	--
Observations	2,322	4,658	4,658	2,218	2,589
R-squared	0.143	0.134	0.118	0.078	0.170

Results are weighted using 1979 sampling weights.

Table A-18: College Dropout Results - With and Without AFQT

Panel A: Table 3 from main paper

	(1)	(2)	(3)	(4)	(5)	(6)
Sample	Desires College Degree	Expects College Degree	Enrolled In College	Desires Bachelor's Degree	Expects Bachelor's Degree	Enrolled In 4-year School
Outcome	No Degree	No Degree	No Degree	No Bachelor's Degree	No Bachelor's Degree	No Bachelor's Degree
Impatient	0.072***	0.068***	0.077***	0.072***	0.077***	0.055*
	(0.018)	(0.021)	(0.024)	(0.020)	(0.024)	(0.030)
Patient Mean	0.539	0.476	0.425	0.549	0.450	0.359
Percent Diff	13.4%	14.3%	18.1%	13.0%	17.1%	15.4%
Observations	6,089	5,143	4,658	4,880	3,739	3,091
R-squared	0.186	0.186	0.148	0.227	0.239	0.169

Panel B: Corresponding specifications adding AFQT as a control

	(1)	(2)	(3)	(4)	(5)	(6)
Sample	Desires College Degree	Expects College Degree	Enrolled In College	Desires Bachelor's Degree	Expects Bachelor's Degree	Enrolled In 4-year School
Outcome	No Degree	No Degree	No Degree	No Bachelor's Degree	No Bachelor's Degree	No Bachelor's Degree
Impatient	0.031*	0.025	0.045*	0.033*	0.041*	0.017
	(0.017)	(0.020)	(0.023)	(0.019)	(0.023)	(0.028)
Patient Mean	0.539	0.476	0.425	0.549	0.450	0.359
Percent Diff	5.8%	5.3%	10.6%	6.0%	9.1%	4.7%
Observations	6,089	5,143	4,658	4,880	3,739	3,091
R-squared	0.266	0.264	0.211	0.304	0.310	0.238

See notes on Table 3 in the main paper for additional sample information.

Table A-19: College Dropout Dynamics Results - With and Without AFQT

Panel A: Table 4 from main paper

	(1)	(2)	(3)	(4)	(5)	(6)
Sample	Enrolled in College	Ed>=14	Ed>=15	Gave reason for dropping out	Gave reason for dropping out	Enrolled in College
Outcome	<= 1 Year Credit, No Degree	14 Years, No Degree	No Bachelor's Degree	Dropped out due to financial difficulties	Dropped out due to academic difficulties	Log Hourly Wage (2004)
Impatient	0.071***	0.005	0.090***	0.003	0.007	-0.074
	(0.024)	(0.026)	(0.033)	(0.030)	(0.012)	(0.056)
Has Bachelor's Degree						0.289***
						(0.027)
Bachelor's*Impatient						0.187**
						(0.089)
Patient Mean	0.292	0.129	0.132	0.211	0.028	--
Percent Diff	24.3%	3.7%	68.0%	1.2%	24.5%	--
Observations	4,658	3,001	2,218	2,549	2,549	2,589
R-squared	0.124	0.060	0.091	0.033	0.016	0.175

Panel B: Corresponding specifications adding AFQT as a control

	(1)	(2)	(3)	(4)	(5)	(6)
Sample	Enrolled in College	Ed>=14	Ed>=15	Gave reason for dropping out	Gave reason for dropping out	Enrolled in College
Outcome	<= 1 Year Credit, No Degree	14 Years, No Degree	No Bachelor's Degree	Dropped out due to financial difficulties	Dropped out due to academic difficulties	Log Hourly Wage (2004)
Impatient	0.040*	-0.010	0.073**	0.002	0.006	-0.042
	(0.023)	(0.025)	(0.033)	(0.030)	(0.012)	(0.055)
Has Bachelor's Degree						0.208***
						(0.027)
Bachelor's*Impatient						0.173*
						(0.088)
Patient Mean	0.292	0.129	0.132	0.211	0.028	--
Percent Diff	13.7%	-7.8%	55.3%	0.9%	21.4%	--
Observations	4,658	3,001	2,218	2,549	2,549	2,589
R-squared	0.187	0.087	0.116	0.033	0.017	0.205

See notes on Table 4 in the main paper for additional sample information..