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From GED to College: The Role of Age and Timing in Educational Stratification

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THE ROLE OF AGE AND TIMING IN EDUCATIONAL STRATIFICATION

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FROM GED TO COLLEGE: THE ROLE OF AGE AND TIMING IN EDUCATIONAL STRATIFICATION

ABSTRACT

GED certification has changed the landscape of educational stratification in the U.S. People who complete high school by obtaining a GED are less likely to go to college than those who obtain a traditional high school diploma. Disparities in family background and cognitive skills explain some of the differences in college entry rates between the two groups. Past research, however, ignores the effect of age and timing on each group's transition from secondary to post-secondary schooling. Age is likely to influence college entry because educational attainment is a highly age-dependent process. GED recipients complete high school at later ages than traditional graduates and take longer to make the transition from high school to college. These differences in age are likely to influence the odds of college entry, independent of factors such as family background and cognitive skills. I use data from the National Longitudinal Survey of Youth and discrete time hazard analysis to investigate the relationship between the timing of educational transitions and differences in rates of college entry between traditional graduates and GED recipients. The analysis shows that adjusting for differences in family background and cognitive skills accounts for less than half the difference in rates of college entry while controlling for age and timing accounts for much of the remaining difference. Once social background, cognitive skills and age are controlled, estimated adjusted cumulative probabilities of college entry are nearly equal between the two groups.

FROM GED TO COLLEGE: THE ROLE OF AGE AND TIMING IN EDUCATIONAL STRATIFICATION

INTRODUCTION

Educational attainment is a central component of social mobility and stratification and a correlate of opportunity and inequality within and across generations and societies. As a result, social scientists have devoted considerable energy to understanding the contours of educational stratification, including differences in educational levels between groups, changes in educational patterns over time and place, and the relationship between education and other life experiences and outcomes. Educational inequality has many facets, including quantitative ones such as differences in levels or returns as well as qualitative ones such as differences in quality within a given level of education. Thus, developments that alter existing systems of educational stratification, either quantitatively or qualitatively, warrant examination because of the important role education plays in social organization. Completion of high school by passing the battery of General Educational Development (GED) tests, an alternative credential to the traditional high school diploma, represents a new and important dimension in the landscape of educational stratification in the United States. Increasing rates of GED certification have increased average levels of education over time and introduced substantial heterogeneity with a given level of education, namely secondary school completion. Yet, the rapid expansion of GED certification and its implication for educational stratification in the U.S. have been largely ignored in sociological research.

Over the past three decades, the percentage of people who completed high school via GED certification has increased dramatically. In the mid 1970s, only two percent of people ages 15 to 24 had completed high school by GED certification; by the 1990s, that quantity had increased to about 12 percent, or one in eight young adults (author's own tabulation using October Current Population Surveys; see also Cameron and Heckman 1993; Murnane, Willett and Tyler 1999). This increase in GED certification has

generated growing interest in the costs and benefits of the GED, as well as numerous estimates of whether the GED and traditional high school diploma are in fact equivalent.

The increase in high school completion by GED certification is part of a larger pattern of increasing educational attainment in the United States. In recent decades, this trend has been fueled by increases in average levels of education among traditionally disadvantaged groups such as racial-ethnic minorities and people from economically disadvantaged backgrounds. The GED has contributed to this process by providing an alternative route to secondary school completion, which allows those who might not otherwise complete high school an additional opportunity to reach this educational milestone. Part of the recent convergence in high school completion rates between blacks and whites, for example, may be explained by the increasing rate of GED certification among blacks (Cameron and Heckman 1993). Gaining a better understanding of GED certification and its consequences, then, is an important part of understanding this larger pattern of educational expansion in the US.

What is particularly important about GED certification is that it adds a new dimension to the system of educational stratification that has historically prevailed in the U.S. Disparities in education have traditionally been caused by differences in levels of education among groups. GED certification, however, has introduced substantial heterogeneity in quality and timing *within* a pivotal level of education, which was otherwise particularly homogenous in nature. Several econometric studies (reviewed below) show that people with a GED have poorer labor market outcomes than those with a traditional diploma. The current study shows that, on average, GED recipients complete high school and enter college at substantially later ages than traditional high school graduates. The introduction of these qualitative differences at this key educational juncture has implications for socioeconomic mobility and stratification that have been overlooked by previous research.

As average levels of education have increased for all groups, a general pattern has emerged. Inequalities in formal education have moved from elementary and secondary school to post-secondary levels. For example, although there has been an overall decline

in racial-ethnic disparities in educational attainment, differences in school continuation rates persist in high school and grow much larger for transitions into and within college (Mare 1995). Inequality at the post-secondary level is especially important in light of the larger economic context of the past few decades: Only those people who completed college were successful at maintaining their economic position in the 1980s and 1990s (Levy and Murnane 1992). Therefore, a key component of the role of GED acquisition in educational stratification is whether GED recipients obtain post-secondary education at similar rates to traditional graduates. This study investigates differences in the rates and age patterns of college entry between GED recipients and traditional graduates. I focus on college entry because this is the first step towards obtaining a college education.

This paper has three goals. The first is to compare the characteristics of GED recipients and the ages at which they receive their certification to those of traditional graduates. The second is to gain a better understanding of the association between age and timing and differences in rates of college entry between the two groups, net of factors such as family background and cognitive skills. The third goal is account for the age-dependent nature of the educational process in such a way to minimize the effect of censoring, both in relation to how long individuals are observed and how the sample of individuals eligible to make particular educational transitions is defined. These goals emphasize the unique features of GED certification, in particular the more complicated age patterns of educational transitions, in order to gain a better understanding of how the path to college varies for GED recipients versus traditional graduates.

This paper proceeds as follows. The next section provides a brief history of the GED, a review of recent research examining the costs and benefits of the GED, and a discussion of the role of age in educational transitions. Section three presents the data and methods used. Section four presents the results. The paper ends with a discussion of the findings and some conclusions about what these contribute to our understanding of the role age and timing in education stratification, particularly in the context of GED certification.

THE GED, LABOR MARKET EXPERIENCES AND EDUCATIONAL PROCESSES

The GED tests were developed during World War II as a tool to aid veterans and service members gain access to college. After the war, civilians were allowed to take the tests as well, and states began to recognize the GED certificate as an acceptable credential of high school completion. By 1963, the tests were administered in all 50 states and civilians comprised a larger proportion of GED test takers than did veterans and service members (Boesel et al. 1998). The tests cover five subject areas – writing skills, reading skills, social studies, science, and mathematics – and although the standards required for passing the tests vary across states, these standards are generally similar.

For most people, the GED certifies accumulated academic and cognitive skills, as opposed to a substantial gain in human capital since departure from high school. Most GED candidates spend relatively little time preparing for the exams – substantially less time than is spent in a typical year in high school. A survey conducted in 1980 showed that half of the GED candidates had spent 20 hours or less preparing for the exams. Only about 12 percent had spent more than 100 hours preparing for the exams. Results from a survey in 1989 showed that the median preparation time had increased to 30 hours and the proportion of candidates who spent more than 100 hours had increased to nearly one in four (24.2 percent). But an investment of even 100 hours is substantially less than the 400 plus hours of instruction students receive during a typical year in traditional high school (Cameron and Heckman 1993; Boesel et. al 1998). This investment is unlikely to produce substantial gains in human capital, though it may help those with very weak reading and math skills make some gains in these areas.[1]

Although it is commonly assumed that GED recipients are educationally equivalent to traditional high school graduates, and the Census classifies both groups in the same educational category, a growing body of research shows that the GED does not offer the same opportunities as the traditional diploma. Much of the research about GED recipients has focused on comparing the labor market outcomes of this group with that of

high school dropouts and traditional graduates. The early evidence on the economic benefits of the GED for dropouts was mixed. Some studies showed positive results while others show none. More recent research shows that completion of the GED may benefit those dropouts with the lowest cognitive skills. For dropouts with stronger skills, however, completion of the GED is not associated with higher earnings (Boesel et al. 1998; Murnane et al. 1999; Tyler 2000).[2] The evidence on whether the GED and traditional diploma achieve similar labor market success is more consistent. Most studies show that getting a GED instead of a traditional diploma results in lower earnings later in life (Cameron and Heckman 1993; Murnane et al. 1999).

The studies also show that differences in labor market outcomes disappear once years of schooling is controlled. The principal advantage of the high school diploma is that it opens the door to postsecondary education. GED recipients, however, spend substantially less time in post-secondary education and training activities than do traditional graduates, even though college pays off equally well for both groups. Murnane et al. (1999) estimate that about 30 percent of GED recipients had entered college by age 27 compared to 69 percent of those with a regular diploma. This estimate is substantially less than one might expect, given that two-thirds of GED recipients report that they plan to continue their education after completing the GED (Murnane et al. 1997; Tyler 2001). Moreover, when they do attend, GED recipients complete postsecondary education at substantially lower rates than traditional graduates. This trend is apparent across different types of post-secondary training including four-year, two-year, and less than two-year institutions (Cameron and Heckman 1993; Murnane et al. 1997; Boesel et al. 1998). A deeper understanding of differing rates of college attendance between traditional high school graduates and GED recipients is a central part of understanding the economic disadvantages associated with GED certification.

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[1] Murnane et al. (1999) find some evidence for the hypothesis that studying for the GED increases the math skills of dropouts.

[2] Heckman, Hsse and Rubinstein (2000) find that the benefit of the GED for low skilled dropouts is greater for women than for men and is not statistically different from zero in their fixed effect models (although positive in magnitude).

Differences in labor market outcomes and acquisition of post-secondary schooling between GED recipients and traditional graduates have been explained by several factors. Some studies show that GED recipients do not perform as well on tests of cognitive skills (Cameron and Heckman 1993; Murnane et al. 1999; but see also Boesel 1998). A similar argument can be made for more difficult-to-measure concepts such as motivation or the non-cognitive skills (such as norms and preferences) that are valued by employers (Bowles and Gintis 1998). In this perspective, a regular diploma is a signal that identifies those applicants who posses more of these qualities by their ability to persevere in traditional high school while the GED identifies those dropouts with higher cognitive skills but lacking in the non-cognitive skills that would have helped them complete high school in the first place (Heckman et al. 2000; Heckman and Rubinstein 2001). Finally, the two groups also differ in social background characteristics such as race-ethnicity and family income or socioeconomic status (SES) (Cameron and Heckman 1993; Murnane et al. 1997; Murnane et al. 1999). GED recipients come from more disadvantaged backgrounds than do traditional graduates and these characteristics are associated with lower educational attainment.[3]

The emphasis on social background, human capital and motivation, however, ignores the fact that educational attainment is an age-dependent process. In the U.S. (and indeed in most societies), college entry is a highly age-specific event. Among those who go to college, most enter college for the first time between ages 17 and 19 (U.S. Department of Education 1998). Yet no studies have considered the association between age and disparities in rates of college entry between traditional graduates and GED recipients. If GED certification changes the timing of high school completion, that is, the age at which someone completes high school and is "eligible" to attend college, then this factor alone could play a substantial role in explaining low rates of college attendance among GED recipients. Economic and public policy research about the costs and benefits of the GED misses this sociological and life course perspective. Are there factors, beyond

[3] Differences in rates of college entry could also result from college selectivity in admitting GED recipients versus traditional graduates. Most investigations of this topic have defined college to include both two- and

individual characteristics, that might account for some of the differences we observe between GED recipients and traditional graduates?

Age is associated with college entry in at least three ways. First, age serves as a proxy for numerous other factors that may delay completion of high school and extend the time that passes between high school completion and college entry. Factors such as grade retention, repeated suspensions or expulsions, motivation or dislike of school, child bearing, full time employment, health issues or family crises can cause some individuals to complete high school at a later age than most other youths. Similarly, these factors might also cause some individuals to wait longer before entering college. The effects of these factors are reflected in differences in age between individuals at key educational transitions, namely high school completion and college entry.[4]

Second, the young adult years mark a part of the life course that includes peak fertility, first marriage, migration, school exit, and unemployment rates as well as the start of career trajectories for those who take their first post-school job (Rindfuss 1991). In this context, the order or sequence of these events is organized by certain normative, age-specific patterns (Hogan 1978; Marini 1984). Some sequences of events (college, first job, marriage, first child) are more common and less difficult than other sequences (marriage, first child, college, first job). Post-secondary schooling as an institution is organized around the assumption that people attend college at ages when school will be the primary activity in their lives as opposed to older ages when family and work responsibilities would compete for students' attention.[5]

Third, chronological age has a social dimension. Age can be a barrier to college entry because of the particular expectations and statuses that are associated with different chronological ages (Binstock and Shanas 1976). Individuals have informal yet shared notions about the right and wrong ages at which to experience different life events. These

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four-year programs. Unless GED recipients choose not to enter college rather than attend a two-year program, college selectivity is an unlikely explanation.

[4] It is difficult to disentangle the direction of causation between many of these life experiences and GED certification. For example, working full time may lead someone to leave school and eventually get a GED, or someone may get a GED in order to facilitate working full time. Using age as a proxy avoids this problem.

[5] Although this is truer of four-year universities than community colleges, the larger point applies to both.

age-specific norms shape a shared definition of age-appropriate roles, behaviors and time schedules (Elder 1975:168). Expectations about particular age-specific norms are reinforced by the fact that formal schooling is largely organized by age. Most children enter kindergarten around age five, and complete high school by age 17 or 18. Among those who ever attend college, most enter college for the first time in the months following high school completion. In 1997, 67 percent of recent high school graduates were enrolled in college the October after completing high school (U.S. Department of Education 1999). The completion of high school and the transition to college occurs at a juncture in life, namely at the cusp of adolescence and adulthood, when even one or two years difference in age can be associated with different social and educational norms. For all these reasons, then, the association of age and college entry is an important dimension overlooked by past research on the GED.

One of the central differences between the traditional high school diploma and the GED is the age pattern that characterizes each path. Most youth complete regular high school between age 17.5 and 18.5, often precisely in May or June of that year.[6] The GED lacks this level of institutional structure. Although some states restrict access to the GED until youths reach a certain age, usually age 16 or 17, few other restrictions exist. The GED is offered throughout the year, can be taken again if not passed, and sets no upper age limit for potential candidates. In the NLSY sample used for this study, only one third of GED recipients received their GED at ages 17 or 18. The mean age of GED receipt was approximately 21 years. Overall, the GED population is more heterogeneous than traditional graduates in terms of age at high school graduation and time elapsed between high school and college. These differences are likely to influence the odds of college entry, independent of factors such as family background and cognitive skills, because college entry itself is highly dependent on age.

Figure 1 shows the gross relationship between age and the probability of college entry. The graph shows the discrete hazard (or the conditional probability) of going to college at a particular age given that the individual has obtained a high school credential

by that age and has not yet entered college. The probability of entering college is highest at age 18, then falls appreciably by age 20 and remains low thereafter. The probability that a high school graduate will enter college at age 18 is 0.44, at age 19 is 0.15, and by age 20 is 0.7. The median age for college entry is age 18.[7] Because GED recipients are more likely to gain their high school credential during a period in their lives when people are less likely to go to college overall, disparities in rates of college entry may be a function of age (or those factors correlated with age). After adjusting for age, social background and cognitive skills, one might expect to observe little if any difference between the two groups in rates of college entry.

Understanding the influence of age on college entry rates can provide useful lessons for public policy as well. While differences in cognitive skills or family background point to policy interventions targeting early childhood (such as Head Start), barriers caused by differences in age point to policies that target adulthood. Such policies might, for example, alleviate the incompatibility of activities such as parenting or full-time employment with formal education, especially post-secondary education. Policies that aim to increase rates of college attendance among disadvantaged populations would benefit from a better understanding of the relative influence of age versus other factors on the likelihood that GED recipients will pursue post-secondary training.

FIGURE 1 HERE

DATA AND METHODS [8]

I use the National Longitudinal Survey of Youth 1979 (NLSY), a nationally representative sample of 12,686 people who were ages 14 to 22 when first surveyed in 1979. Respondents were interviewed annually from 1979 to 1994, and then every other year in subsequent waves. I use data from the 1979 to 1998 survey years. The NLSY

[6] In the random, cross-sectional sample of the NLSY, 90 percent of the youth with a regular diploma had graduated from high school before their 19th birthday.
[7] The first and third quartiles are ages 18 and 20, respectively, and the mean age of college entry is age 19.5.
[8] Appendix A describes the sample, variables and models that I have used in the analysis.

includes three subsamples. One is a cross-sectional sample of 6,111 youths designed to represent non-institutionalized civilian youths living in the U.S. in 1979 who were ages 14 to 21 as of December 31, 1978. The second is a supplemental sample of 5,295 youths (in the same age range) designed to oversample civilian Hispanic, black and low income non-Hispanic non-black youths living in the US in 1979. The third is a sample of 1,280 youths who were enlisted in active military duty. I do not include the oversamples of non-Hispanic non-black poor youths or those in the military because these individuals were not followed in all survey years. I begin with an initial sample of 9,763 youths (6,111 cross sectional plus 3,652 black and Hispanic oversampled youth). After excluding those with missing information or nonsensical educational histories, the sample includes 9,491 youths.[9]

The NLSY classifies race by three mutually exclusive categories: (1) Hispanic, (2) black, and (3) non-Hispanic non-black. I maintain this same classification in my analyses. In the analyses that follow, I report robust standard errors to account for the fact that this is not a simple random sample (Greene 2000: 462-463). I use sample probability weights provided for the 1979 sample to correct for the oversampling of Hispanic and black youth as well as differences in the probability of selection at the first interview.[10] Finally, I calculate age at high school completion and age at college entry in whole year intervals (e.g., college entry at age 18.2 and 18.7 both appear as age 18).

In studies of educational attainment, measures of cognitive skills are problematic because, when measured at later ages, these have a reciprocal relationship with schooling. Cognitive skill is both a cause and a consequence of schooling. The reader should interpret results that use this measure, represented here by scores on the Armed Forces Qualifying Test (AFQT), with caution. It is important to include this measure for theoretical reasons because cognitive skills play a role in how much education one obtains. Also, including this measure makes this study more comparable with other GED studies. Because respondents ranged in age from 16 to 24 during the survey wave in

[9] When possible, I have imputed missing values. See Appendix A for details.
[10] Using the 1979 weights means that I make no adjustment for non-response in subsequent waves. However, more complicated weighting schemes did not change the results of the analyses.

which AFQT was measured, I have included age at which the test was taken as a control variable in all models that include AFQT scores. In addition, I present analyses both with and without this variable so that the reader can assess its contribution to the results. Overall, it is reassuring that the results are similar whether or not I include this measure in the models.

In describing differences between GED recipients and traditional graduates, I use multinomial logit models to investigate the association between background characteristics and GED receipt. This framework allows me to conduct multivariate analyses predicting the odds that an individual falls in one of three categories – GED recipient, traditional graduate, high school dropout – while controlling for other individual and family characteristics.

In analyses of educational transitions, I use discrete time hazard models to estimate the likelihood that a particular transition (high school completion or college entry) occurs within a given period of time (Allison 1984). In the binary logit case, for example, the discrete time hazard function can be expressed (ignoring subscripts for individuals) as follows:

$$(1) \quad \log(P_t)/(1-P_t) = \alpha_t + \beta X + \delta Z_t,$$

where α_t is a set of time-specific intercepts, β is a vector of coefficients for time invariant variables such as race and sex, and δ_t is a vector of coefficients for time varying covariates such as age. The dependent variable may be binary as shown here (e.g. enters college vs. does not enter college) or polytomous (e.g. enters 2-year college, enters 4-year college, does not enter college) with the model parameterized as a multinomial logit. In either case, discrete time hazard analysis calculates the odds that an event will occur in a given period of time for a group of people at risk to the event. For example, in the case of getting a GED at age 19, people are only considered at risk if they have not received a regular diploma and have not permanently left the survey before age 19. Respondents provide the month and year of high school graduation as well as the type of high school degree obtained. I use this information combined with date of birth and date of interview to determine each person's status at each whole age interval from age 16 to

35.[11] Using these models, I estimate predicted probabilities of high school completion by age for people who get a traditional diploma and those who get a GED.

In the analysis of the transition to college, I restrict the sample to people with either a regular diploma or GED (with valid information on date of high school graduation) and again use discrete time hazard models to estimate the predicted probability of college entry between ages 16 and 35 by type of high school degree.[12] Because I aim to compare differences in the odds of college entry between traditional graduates and GED recipients, this part of the analysis excludes those who did not graduate from high school. A small fraction of high school dropouts, about 11 percent, also enter college. I excluded these individuals because they do not comprise a large enough group to analyze separately.

I have chosen as wide a range in age as these data will support to minimize the effect of censoring. If GED recipients have less favorable educational outcomes in their twenties but catch up to traditional graduates by their mid thirties, this approach can capture that phenomenon. The magnitude of the effect of censoring on the conclusions we draw should not be taken lightly. Consider the following comparisons. In these data, if individuals are observed to age 25, 64 percent of people with a regular diploma enter college compared to 29 percent of those with a GED. If individuals are observed to age 30, 67 percent of people with a regular diploma enter college compared to 38 percent of GED recipients. When respondents are observed up to age 35, however, 68 percent of people with a regular diploma enter college compared to 41 percent of GED recipients. Observing people to age 35 increases the proportion of GED recipients who enter college by more than 40 percent. Using discrete time hazard analysis has the added advantage that people who were not observed to age 35 need not summarily be excluded from the analysis. This approach allows people who were not observed for all years to contribute

[11] I exclude from the analysis people who complete high school before age 16. People who complete high school after age 35 are treated as having *not* completed high school during the observation period, namely ages 16 to 35. I make these restrictions to avoid having estimates distorted by very small numbers at the lower and upper ages.

[12] Because there were very few people who entered college before age 16, I exclude these individuals from this part of the analysis. People who enter college after age 35 are treated as not having entered college.

information to the analysis for the years that they were observed, but to be excluded (or censored) once they leave the survey.

RESULTS

Who Gets a GED?

As noted in other studies, GED recipients tend to come from more disadvantaged backgrounds than those with a traditional diploma, but more advantaged ones than those who do not complete high school. Table 1 describes the family and educational characteristics of traditional graduates, GED recipients and high school dropouts. The parents of GED recipients have about one and a half years less education than the parents of traditional graduates. GED recipients are more likely to have lived in a female-headed household at age 14 (19% versus 11%) and twice as likely to live in a family in which the household head did not work when the respondent was age 14 (14% versus 7%).

On average, GED recipients complete their high school credential about 3.6 years later than do traditional graduates (age 21.4 versus age 17.8). In both groups, people who go on to college complete high school at earlier ages. This difference is particularly large for GED recipients who go on to college. These individuals complete their credential about 1.5 years earlier than their non-college bound counterparts. While nearly seven out of ten traditional graduates have entered college by age 35, only about four out of ten GED recipients have entered college by that age (69% versus 43%). Among those who ever enter college, GED recipients enroll at substantially later ages than traditional graduates (23.2 versus 19.2 years). Finally, GED recipients have considerably lower average cognitive skills than do traditional graduates.

TABLE 1 HERE

Because simple comparisons of means can be misleading, it is useful to investigate the association between background characteristics and GED receipt using a multivariate framework. For example, the results in Table 1 suggest an association between race-ethnicity and GED receipt. The results in Table 2, however, suggest that this association can be explained by other factors. Table 2 presents results from a series of multinomial logit models predicting the odds of having a GED or not completing high school versus having a traditional diploma. Model 2.A, which includes only dummy variables for sex and race-ethnicity, suggests statistically significant differences by race-ethnicity (but no differences by sex) in the odds of getting a GED versus a regular diploma. Model 2.B, however, shows that controlling for parent's education reverses the effect of race-ethnicity on the odds of having GED versus a regular diploma and renders the coefficients statistically insignificant. Holding all else constant, each additional year of mother's education decreases the odds of having a GED by about ten percent. Similarly, holding all else constant, each additional year of father's education decreases the odds of having a GED versus a traditional diploma by about nine percent. Given equally well-educated parents, Hispanics and blacks are just as likely to get a regular high school diploma as are non-Hispanic non-blacks. Model 2.C shows that, holding all else constant, respondents who lived in a female headed household at age 14 are about 1.5 times more likely to have a GED than a traditional diploma – that is the odds are about 1.5 times greater. Including household structure only attenuates modestly the effects of parents' education. [13]

TABLE 2 HERE

Model 2.D adds AFQT to the variables included in Model 2.C. Keeping in mind the causal ambiguity implicit in using AFQT, the results of this model suggest that, holding all else constant, scoring one percentile higher on the AFQT decreases the odds

[13] In models not shown here, I controlled for the occupation of the head of household in addition to the variables presented in Table 2. The coefficients for the occupational categories were jointly statistically significant but did not change the estimated effects of the variables included in Model 2.C.

of having a GED versus a regular diploma by about two percent. Controlling for AFQT makes the coefficients for race and ethnicity statistically significant, but reverses the direction. Conditional on parents' education and cognitive skills, blacks and Hispanics are more likely than non-Hispanic non-blacks to obtain a traditional diploma rather than a GED. [14] The results in Model 2.D imply that being Hispanic decreases the odds of getting a GED by about 24 percent relative to non-Hispanic non-blacks once social background and cognitive skills are controlled. Similarly, controlling for social background and cognitive skills decreases the odds of getting a GED for blacks by about 40 percent relative to non-Hispanic non-blacks. Controlling for AFQT changes the estimated effects of parents' education and sex only slightly. Overall, the odds of getting a GED rather than a regular high school diploma decrease as parents' education increases. Either with or without the inclusion of a measure of cognitive skills, race-ethnicity does not have a positive association with GED receipt once parents' education is controlled.

The Timing of High School Completion

The evidence above indicates that GED recipients come from more disadvantaged families than traditional graduates. The association between family background and educational attainment has been well documented. Children whose parents have more income and education are much more likely to succeed in school than children whose parents have fewer resources (Mare 1995). This relationship can be observed in differences in age at high school completion between those with a regular diploma and GED recipients. Figure 2 shows the estimated discrete hazard of getting a traditional diploma or GED by age using models in which getting each high school credential is the dependent variable and ages at risk (treated as single year dummies) are the independent variables. No other variables are included in the models. I show the hazards for each degree on the same graph to highlight differences in age densities and prevalence between the two groups.

[14] This finding is consistent with research that shows that once parents' education is controlled, Hispanics

FIGURE 2 HERE

The timing of getting a regular high school diploma is homogeneous and concentrated. People are very likely to get a traditional diploma between ages 17 and 19 (hazard of about .65 at age 18) and quite unlikely to get a regular diploma at any other age. Moreover, the hazard of getting a traditional diploma at ages 17, 18 or 19 far exceeds the hazard of getting a GED at those ages. The inset box in Figure 2 shows a magnification of the GED hazard. Unlike the age trajectory for getting a traditional diploma, the trajectory for getting a GED is quite heterogeneous in age. The discrete hazard of getting a GED peaks at age 21, but is still relatively high from ages 19 to 22. Moreover, the GED hazard tapers off slowly, with people receiving GEDs in their mid to late twenties.

Table 3 presents the distribution and density of age at high school graduation in more detail.[15] More than 90 percent of those with a regular diploma graduate at age 17 or 18. The mean age of graduation for this group is 17.8 years and the median age is 18. In contrast, the mean age of graduation for GED recipients is 21.4 years, with a median age of 20. Only one-third (34%) of GED recipients received their credential by age 19. The middle quartiles cover a range of seven ages, from 18 to 24, compared to only two ages (17 and 18) for traditional graduates. GED certification changes the timing of high school completion by allowing people to get a high school credential at much later ages than allowed by the path of traditional high school.

TABLE 3 HERE

Consider, then, four groups of high school graduates: (1) people who complete a regular high school diploma before age 19, (2) people who obtain a regular diploma at age 19 or older, (3) people who take and pass the GED before age 19, and (4) people who take and pass the GED by age 19 or older. The first group represents what we commonly consider “traditional” high school graduates. The peak in Figure 2 represents this group.

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and blacks are more likely than whites to enter college (Hauser 1993).

The second group is uncommon because it is quite unusual to get a regular diploma after age 18. Fewer than one in ten people with a regular diploma belong to this second group. Table 4 provides further evidence that groups one and two represent different populations. In the NLSY, those who complete a regular diploma after age 18 have parents who have about one and a half fewer years of education than the parents of traditional graduates and are more likely to lived in a family in which the household head did not work (13% versus 7%). More men than women fall into this group, as do a larger proportion of ethnic minorities than non-Hispanic non-blacks. Those in this age group, on average, have substantially lower cognitive skills than those in the first age group.

TABLE 4 HERE

People who obtain a GED before age 19, group three, are like traditional graduates in that they complete this educational and social transition by the normative age. They are unlike traditional graduates, however, because they are heterogeneous in the number of years of schooling they have actually completed, and presumably the academic, cognitive and non-cognitive skills they have, on average. This group represents about one third GED recipients. It is not uncommon to hear this third group referred to as people who "could have completed regular high school" (see for example Chaplin 1999). This statement is correct in that this group is within the normative age for traditional high school. But it is not accurate in the sense that youths who are age 18 but, say, two years behind grade level cannot readily complete regular high school by age 19. People in this third group generally come from less advantaged backgrounds than traditional graduates but more advantaged backgrounds than individuals who complete either a GED or a regular diploma after age 19. They have higher cognitive skills than those in group two, but lower skills than those in group one.

Most people who obtain a GED do so at age 19 or later. The rate for obtaining a GED peaks at age 21, only after the rate for completing a high school diploma falls to

[15] Note that the units of analysis differ between Table 3 and Figure 2. The table describes individuals while

near zero (see Figure 2). Most traditional high schools do not let youths remain enrolled in school after age 21, nor are most youths inclined to attend traditional high school after their teenage years. It is not surprising then that the hazard for getting a GED peaks at age 21. People who complete a GED after age 18 have parents with average education levels similar to those who complete a regular diploma after age 18, but have higher average cognitive skills (32nd percentile versus 28th).

The Association Between Age and Differences in Rates of College Entry

The results above show that completing high school by GED certification changes the timing of high school completion by a substantial amount. How does the timing of high school completion influence the timing of college entry? Age at college entry captures two processes: time to high school completion and time elapsed between high school and college. The analyses above indicate that GED recipients take longer to complete high school than individuals with a regular diploma. In addition to being older at the time of high school completion, GED recipients also take longer to make the transition from high school to college. In these data, among high school graduates who go on to college, the average time elapsed between high school completion and college entry for those with a regular diploma is about 1.6 years. In comparison, the average time elapsed between graduation and college entry for GED recipients is about 3.3 years. Both these factors suggest the need to examine the association between age and college entry between traditional graduates and GED recipients.

To examine how these differences in age are associated with rates of college entry, and to separate these effects from those of social background and cognitive skills, I use discrete time hazard rate models to predict the odds of college entry from age 16 to age 35 for people with a regular diploma and GED. I restrict the sample to those who have received either a GED or regular diploma by age 35 and have valid information on the covariates included in the models. Here, I define college as entry into either a two-

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the figure is based on person-years.

year or four-year institution. The results are shown in Table 5 and Figure 3. The only difference between Models 5.B to 5.E and Models 5.F to 5.I is the inclusion of a measure of cognitive skills (AFQT) in the latter models. I have included both sets of models to show that the conclusions are the same in either case. For the sake of brevity, I limit the discussion here to models that include a control for cognitive skills.

TABLE 5 HERE

Model 5.A estimates the gross effect of having a GED on the odds of college entry. Based on this model, having a GED reduces the odds of college entry by about 56 percent (odds ratio of 0.44). Model 5.B controls for differences in social background characteristics, which reduces the effect of having a GED only slightly. Based on Model 5.B, having a GED is associated with a 50 percent reduction in the odds of college entry, holding constant social background.[16] Model 5.F controls for differences in cognitive skills as well as social background. In this model, having a GED is still associated with a 45 percent reduction in the odds of college entry. After controlling for both differences in social background and cognitive skill, substantial differences remain in the odds of college entry between those with a GED and those with a traditional diploma.

Model 5.G adds controls for the effect of chronological age. Age is entered in single year dummies from 16 to 22 (ages in which there are many transitions) then grouped into multiyear categories (ages 23 to 25, 26 to 30, and 31 to 35) for the ages when transitions are less common. Controlling for chronological age pushes the odds of college entry for GED recipients to parity with the odds for traditional graduates (odds ratio of 0.99). The GED coefficient is not statistically significant and a test of the joint significance of the age dummies is highly significant.

[16] Social background variables and AFQT are entered additively. The results of analyses not shown here suggest that the effect of a few social background variables may vary by type of high school credential. Specifically, mother's education appears to have a larger positive effect for traditional graduates than for GED recipients. Also, controlling for parent's education, being black or Hispanic has a larger positive effect for traditional graduates than for GED recipients. However, including these interactions does not change the pattern of results presented here.

Model 5.H accounts for a second dimension of timing by controlling for the number of years that elapse between high school completion and college entry (dummies for less than one year, one year, two or more years). Taking more time to make the transition from high school to college lowers the odds of college entry overall. All else being equal, waiting one year (versus going to college within a few months of completing high school) decreases the likelihood of college entry by about 24 percent (odds ratio of 0.76). Waiting two or more years decreases the likelihood of college entry by about 71 percent. In this model, the main effect of having a GED is negative but not statistically significant (odds ratio of .88 with p-value of 0.13).[17]

Do GED recipients catch up later in life? Model 5.I examines whether the effect of age on the odds of college entry varies for those with a regular diploma and a GED after differences in social background and cognitive skills are controlled. Estimates from this model are shown in Figure 3 (holding the other covariates at the sample mean). Before age 21, people with a regular diploma (and mean values on other covariates) are more likely to enter college than those with a GED, even after differences in social background and cognitive skills are controlled. At age 18, the discrete hazard that someone with a traditional diploma will enter college is more than three times that of a GED recipient with similar characteristics (0.31 versus 0.09). By age 21, however, the pattern reverses. At age 21 the hazard of college entry is higher for GED recipients than traditional graduates (0.14 versus 0.09) and stays higher for the next ten years. After age 30 the hazard of college entry is about the same for the two groups. Although GED recipients are at a substantial disadvantage at earlier ages, they make educational gains later in life at ages when traditional graduates are less likely to pursue post-secondary education.

FIGURE 3 HERE

[17] In the model that does not include AFQT (5.D) this coefficient is marginally significant with a p-value of 0.54. The interaction of the elapsed time dummies and having a GED is not significant in either case.

A Narrower Definition of College: two-year versus four-year schools

The models described in Table 5 and Figure 3 use a broad definition of college, which does not distinguish two-year colleges from four-year ones. We might expect, however, that substantial differences exist between traditional graduates and GED recipients in the types of post-secondary institutions they attend. Indeed, among those who ever entered college in the NLSY sample, 56 percent of traditional graduates entered four-year colleges compared to 31 percent of GED recipients. To explore if the effect of age varies by type of college attended, I redefine the dependent variable (enters college) from a binary variable to a polytomous one with three categories: enters a two-year school, enters a four-year school, does not enter college while observed. I then re-estimate the models shown in Table 5 using discrete hazard multinomial logit methods (coefficients not shown; independent variables are the same as those shown in Table 5; only the dependent variable changes). Figure 4 recreates the results presented in Figure 3 (model 5.I), but using a model that estimates separate hazards for different types of colleges.

FIGURE 4 HERE

The top panel of Figure 4 shows differences in the hazard of entry to a four-year college for those with a regular diploma and GED. The hazards are quite similar in shape to those shown in Figure 3. People with a regular diploma are much more likely to enter a four-year college at earlier ages but by age 21 GED recipients have a higher hazard of entry to a four-year college than those with a regular diploma. By age 26, the hazards converge substantially and are indistinguishable by age 31. The bottom panel of Figure 4 shows a similar pattern for two-year colleges although differences at earlier ages are less pronounced between the two groups in this context. But in general, traditional graduates are again more likely to enter college at younger ages and GED recipients are more likely to enter after age 21.

Figure 5 displays smoothed versions of the four hazards shown in Figure 4 (using a median smoother). After age 21, the hazard of entry to a two-year college for those with a

traditional diploma is about the same as the hazard of entry to a four-year college for GED recipients. Both hazards are higher than traditional graduates' hazard of entry to a four-year college. At these ages, GED recipients' hazard of entry to a two-year college is the highest of the four, suggesting that GED recipients are more likely to pursue post-secondary training at later ages and they are likely to choose two-year institutions as their point of entry.

Before age 21, the difference between the two groups is substantially larger for entry to four-year schools than two-year schools, although traditional graduates have higher hazards for both events. Although at ages 17 and 18 the hazard of entry into the two types of colleges are equal for traditional graduates, GED recipients are much more likely to enter a two-year versus a four-year college at these ages. Moreover, both hazards for traditional graduates peak at age 18 while the hazard for GED recipients' entry to a four-year college peaks at age 22. The hazard for GED recipients' entry to a two-year college is at a high plateau from ages 18 to 22.

FIGURE 5 HERE

Cumulative Probability of College Entry by Age 35

The results shown above suggest that after age 21, GED recipients begin to make up for some of the deficit in rates of college entry observed at earlier ages. Their rates of college entry generally exceed those of traditional graduates during their twenties and thirties. One way to examine this hypothesis further is to calculate the cumulative adjusted probability of college entry by age 35 as predicted by the models described in Table 5. The cumulative probability gives the total likelihood of college entry by age 35 for each group. It is calculated as follows:

(2) Cumulative Pr = $1 - \prod_{a=16}^{35}(1 - \hat{P}_a)$, where

$\hat{P}_a$ equals the conditional probability of college entry at each age (predicted from the models). The probability of not going to college at any given age is one minus the

probability of going to college at that age. The probability of not going to college by age 35 is the product of the individual probabilities of not going to college at each age between 16 and 35. Since this product calculates the probability of not going to college by age 35, then one minus this quantity is the probability of going to college by age 35 (that is, one minus the product of the probabilities of *not* going to college at each age). Table 6 presents these results. For baseline comparison, Table 6 also includes the simple proportions attending college that are actually observed in the data. The cumulative probabilities shown in Table 6 are adjusted probabilities, estimated by assessing covariates at the sample means.

TABLE 6 HERE

As mentioned earlier, when individuals are only observed until age 25, about 64 percent of those with a regular diploma and 29 percent of GED recipients attend college. The proportion of GED recipients entering college is only 45 percent of the proportion of those with a regular diploma entering college. Simply observing people to age 35, however, increases the ratio of the GED rate to 60 percent of the rate for traditional graduates. Using model-based estimates that account for censoring of observations improves this ratio further. Model 5.A estimates the gross probability that someone with a regular diploma versus a GED will go to college by age 35, taking account of censoring at each discrete age. Based on this model, the predicted adjusted probability of college entry by age 35 for a traditional graduate is 0.87. The probability of college entry for someone with a GED is 0.60. The cumulative GED probability is about 69 percent of the cumulative probability of college entry for traditional graduates.

Models 5.B through 5.I estimate the hazard of college entry by age 35 controlling for various characteristics. For example, adjusting for differences in social background (Model 5.B) reduces the gap in the overall odds of college entry even further. Based on Model 5.B, the estimated cumulative probability of college entry for GED recipients is about 74 percent of the cumulative probability for traditional graduates (0.64 versus 0.87) Model 5.F controls for cognitive skills in additional to differences in social background. The cumulative probability of college entry by age 35 increases to 0.87 for traditional

graduates and 0.68 for GED recipients. The latter estimate is now about 78 percent of the former one.

Model 5.G and Model 5.H add controls for two facets of timing. Model 5.G controls for differences in chronological age between the two groups. Controlling for age, in addition to social background and cognitive skills, brings the predicted probabilities of college entry to parity between the two groups. Model 5.H adds controls for differences in time elapsed between high school completion and college entry. The cumulative predicted probability of college entry by age 35 is 0.81 and 0.77, respectively. Model 5.I allows for the effect of age to vary across the two groups but the estimated cumulative probabilities are essentially the same. Traditional graduates have an estimated cumulative probability of 0.80 and GED recipients 0.76. The estimated cumulative GED probability is about 95 percent of the estimated cumulative probability for traditional graduates. This represents a significant reduction in the difference observed between the two groups when comparing only the simple proportions attending college by age 25. Also, accounting for differences in age and timing in addition to differences in family background and cognitive skills narrows the gap between the two groups substantially. Although the discussion above has focused on models that include controls for cognitive skills, the pattern of results does not change when considering models that do not include this control (see Models 5.C through 5.E).

Summary and Conclusion

In order to understand differences in rates of college entry between GED recipients and those with a regular diploma, we must account for the fact that educational attainment is a process that is age-dependent. An emphasis on differences in social background and human capital misses this distinction. Past accounts of low achievement of GED recipients place a mistakenly strong emphasis on human capital and background factors, ignoring the role of timing and the life course, and perhaps misconstruing the reasons why GED recipients have worse outcomes than traditional graduates.

GED recipients are both older when they complete high school and, on average, take more time to make the transition from high school to college. The combination of these two factors means that these individuals are likely to enter college at a point in life, namely after age 20, when the odds of college entry are low overall. Adjusting for differences in social background reduces the estimated difference in the probability of college entry between the two groups by about 34 percent (Table 6 row 1 versus row 5). Controlling for cognitive skills in addition to social background reduces the estimated difference by about 46 percent (Table 6 row 1 versus row 9). Adjusting for differences in age and timing, in addition to the other two factors, reduces the estimated difference by about 89 percent (Table 6 row 1 versus row 12) and brings estimates of predicted cumulative rates of college entry between the two groups to near parity. Part of the observed differences in labor market outcomes between GED recipients and traditional graduates might be due to differences in the process of educational attainment described here.

People who obtain a GED have more heterogeneous characteristics, on average, than those who complete a regular diploma. However, a general characteristic of GED recipients is that they have left the path of traditional schooling. Perhaps because they have already left this highly age-specific path, they are more likely to enter college at untraditional ages. GED recipients generally have steady, albeit relatively low, rates of college entry after age 21. This suggests that public policies that alleviate barriers to post-secondary schooling faced by adults (versus adolescents) may bolster GED recipients' college entry and completion rates. Such policies might include flexible scheduling such as evening classes or classes that meet only once a week as well as family housing and on-campus child care, which might allow adults more leeway in balancing school with work and family responsibilities.

Even though differences in adjusted cumulative probabilities of college entry between GED recipients and traditional graduates converge once age and other variables are controlled, a substantial difference remains at ages younger than 21, when neither age, social background, nor cognitive skills can account for disparities between the two

groups. At these ages, people with a regular diploma are much more likely to enter college than those with a GED. These differences in rates reflect factors not measured by this study, or those for which age may not serve as a proxy, including motivation, values, and preferences.

Differences in the age patterns of educational transitions between GED recipients and traditional graduates underscore the fact that our understanding of disparities in rates of college entry depends greatly on the ages at which each group is observed. This study chooses as wide an age range as possible to account for the fact that GED recipients may catch up later in life. GED recipients have less favorable educational outcomes when observed at earlier ages but differences diminish when individuals are observed at later ages. Censoring can distort the outcomes we observe, especially in age-dependent processes such as educational attainment.

GED certification has changed educational stratification in at least two ways. First, GED certification has increased overall levels of high school completion by providing an opportunity for those who did not complete high school through the traditional route to reach this important educational milestone. Of course, if GED certification does not provide the same opportunity for social mobility as the traditional diploma, then these apparent educational gains might be a victory won at a substantial cost. Second, GED certification has introduced important qualitative differences within a given level of education, which adds a new dimension to educational stratification. These qualitative differences make it difficult to generalize about "high school graduates" as a group because the outcomes and opportunities that people experience vary by the type of high school credential they obtain. These differences are particularly striking in the context of the timing of high school completion, which is highly homogenous and specific for one credential and highly variable for the other.

Differences in the timing of high school completion have important implications for the larger system of educational stratification because high school completion serves as a gateway to college entry. Currently, people with a GED complete high school at later ages than traditional graduates. If this trend continues and rates of GED certification

continue to increase, we may observe a compositional change that shifts the overall timing of high school completion to later ages. If, however, the accessibility of GED certification induces high school students on the margin of dropping out to take the GED instead of completing traditional high school, then the shift in timing might be to increasingly younger ages of high school completion. In either case, changes in the timing of high school completion have important implications for the timing and rates of college entry and, therefore, future patterns of mobility and inequality.

Appendix A. Description of Data and Variables

Although the NLSY is longitudinal (meaning that the same cohort of youths has been followed over a span of about 20 years) respondents ranged in age from 14 to 22 in 1979, the year in which the survey began. While many youths were still enrolled in high school at the start of the survey, many others had already completed high school and entered college. The latter provided detailed retrospective information about their educational histories during the first interview in 1979. They reported if and when they had completed high school, whether they had received a regular diploma or GED, and when they had entered college (if ever). I use this information to construct educational histories for all respondents with valid information either by using retrospective reports or by observing educational transitions in subsequent survey waves. I can then compare age-specific statuses or transitions (for example, the enrollment status of respondents when they were age 18) irrespective of whether people were actually observed at that age. An additional advantage of the NLSY is that respondents who were not interviewed in some years but were interviewed again in subsequent years provided retrospective educational information for the years in which they were not observed.

In order to retain as many cases as possible, I have flagged cases with missing information on some control variables (such as parent's education and AFQT standardized test scores) and then substituted sample means for these variables. For parents' education, I used race, sex and nativity specific means. I include a dummy variable that flags when a parent's education is missing as well as race and nativity in models that include parents' education. Overall, father's education was missing in 15 percent of cases, mother's education in five percent of cases and AFQT in five percent of cases. I assigned cases with missing month of high school graduation to June (53 cases).

I resolved cases that report more than one high school graduation date as follows (about 145 cases). In cases where the multiple dates were less than 13 months apart, I chose the earlier date unless this conflicted with individuals' enrollment status or grade progression (in which case I chose the later date). In cases where the difference was more

than 13 months, I used enrollment status and grade progression to determine the correct date if possible, and dropped the case otherwise (37 cases). In 125 other cases, respondents reported a college entry date that was earlier than their high school graduation date. When this difference was less than ten months, I recoded the college entry date to one day after the high school graduation date. I did this because high school seniors who take Advance Placement or other classes at a local college during their last year in high school might report having attempted grade 13 before completing grade 12. When this difference was ten months or more, I excluded the case from the analysis (39 cases).

Appendix Table A.1 describes the variables used in the analysis and how these were constructed. Appendix Table A.2 shows proportions, means and standard deviations for the variables included in the models. A full listing of all coefficients estimated in the binary and multinomial hazard models is available from the author by request.

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Table 1. Means and Proportions for Background Variables by Type of High School Degree, NLSY (N=9,491).[a]

	Has Diploma	Has GED	Did Not Graduate from High School [b]
Background Characteristics			
Mother's Education (years)	12.0	10.7	10.0
Father's Education (years)	12.2	10.6	9.9
Mother's Ed Missing	.04	.08	.13
Father's Ed Missing	.08	.18	.21
Live in Fem Hsehld-age 14	.11	.19	.20
Live w/Biol Father-age 14	.82	.64	.64
Occup. Hsehld Head-age 14			
Profess or Manager	.28	.13	.10
Did not work	.07	.14	.18
Born in US	.96	.95	.92
Male	.49	.52	.57
Hispanic	.62	.13	.25
Black	.72	.11	.17
Non-Hispanic Non-Black	.83	.08	.10
Educational Characteristics			
Age at HS Degree	17.8	21.4	---
Age at HS Degree for those who ever entered college	17.6	19.9	
Entered College by Age 35	.69	.43	.11
Age at College Entry	19.2	23.2	19.9
AFQT Percentile	53.5	36.0	23.6
Percent in Sample	74	10	16
Number in Sample	7043	952	1496

[a] Means and proportions shown are weighted using sample probability weights.
[b] Ninety-one percent of these individuals were observed until they were age 30 or older, and they had not completed high school by that age. Only five percent had left the survey before age 25 (n=78).

Table 2. Multinomial Logit Models Predicting Odds of Having a GED or Not Completing High School, NLSY, (N=9491; logit/robust standard errors in parentheses)[a]

Model	2.A		2.B		2.C		2.D	
Variable	GED	No HS degree	GED	No HS degree	GED	No HS degree	GED	No HS degree
Male	1.152 (.142/.085)	1.405 (.340/.073)	1.207 (.188/.087)	1.486 (.396/.077)	1.210 (.191/.087)	1.490 (.399/.077)	1.236 (.212/.088)	1.477 (.390/.080)
Hispanic [b]	2.117 (.750/.094)	3.549 (1.27/.077)	.8878 (-.119/.131)	.9880 (-.012/.113)	.8475 (-.165/.132)	.9455 (.-.056/.114)	.7570 (-.278/.130)	.7896 (-.236/.110)
Black [b]	1.590 (.463/.086)	2.085 (.735/.073)	1.014 (.004/.101)	1.155 (.144/.086)	.9149 (-.089/.106)	1.057 (.055/.088)	.5931 (-.522/.111)	.4616 (-.773/.096)
Mother's Education			.8986 (-.107/.019)	.8458 (-.168/.017)	.8979 (-.108/.019)	.8453 (-.168/.017)	.9355 (-.067/.020)	.9143 (-.090/.017)
Father's Education			.9058 (-.099/.015)	.8869 (-.120/.014)	.9061 (-.099/.015)	.8869 (-.120/.014)	.9314 (-.071/.016)	.9386 (-.063/.015)
Mother's Educ. is Missing			1.404 (.339/.173)	2.641 (.971/.129)	1.442 (.366/.173)	2.710 (.997/.129)	1.304 (.265/.179)	2.106 (.745/.138
Father's Educ. is Missing			2.116 (.749/.128)	2.077 (.731/.101)	1.927 (.656/.134)	1.899 (.641/.107)	1.726 (.546/.137)	1.432 (.359/.110)
Fem. Headed Hshld - Age 14					1.512 (.413/.119)	1.490 (.399/.100)	1.492 (.400/.122)	1.499 (.405/.103)
AFQT [c]							.9804 (-.020/.002)	.9510 (-.050/.003)
Log Likelihood	-5982		-5608		-5595		-5158	

[a] Coefficients are odds ratios. The reference group is having a regular diploma.
[b] Omitted category is non-Hispanic non-black
[c] Models with AFQT include controls for whether AFQT score is missing and age at which AFQT was taken.

Table 3. Distribution and Density of Age at High School Graduation by Degree Type, NLSY (N=7995)[a]

	Regular Diploma	GED
Distribution (%)		
Age 16	1.1	2.6
Age 17	36.6	13.6
Age 18	54.0	18.2
Age 19	6.4	11.9
Age 20	1.1	9.7
Age 21	0.3	9.2
Age 22-24	0.2	12.8
Age 25-29	0.2	14.0
Age 30+	0.1	7.9
Median age in years	18	20
Mean age in years	17.8	21.4
(standard error)	(.01)	(.18)
Interquartile range in years	17 to 18	18 to 24
Total N	7043	952

[a] Means and proportions shown are weighted using sample probability weights. Table excludes 1,496 people in the sample who did not complete high school while observed.

Table 4. Family and Individual Characteristics by Type of High School Degree and Age, NLSY (N=7,995)[a]

	HS Diploma		GED	
	Before Age 19	Age 19+	Before Age 19	Age 19+
Mother's Education (years)	12.1	10.5	11.4	10.3
Father's Education (years)	12.4	10.6	11.2	10.3
Occupation of Household Head – age 14				
Professional/Manager	.29	.16	.18	.09
Did not work	.07	.13	.10	.16
Lived in Female Headed Household – age 14	.10	.14	.19	.18
Male	.47	.63	.54	.51
Hispanic	.68	.15	.04	.13
Black	.73	.14	.04	.10
Non-Hispanic Non-Black	.85	.06	.03	.05
AFQT	55.8	28.2	42.9	32.4
N	6232	811	293	659

[a] Excludes 1,496 people in the sample who did not complete high school while observed.

Table 5. Binary Logit Discrete Time Hazard of College Entry by Age, NLSY (N=59,751 person years) [a]

Model	5.A	5.B	5.C	5.D	5.E	5.F	5.G	5.H	5.I
Has GED (1=yes; 0=no)	.436 (-.831/.069)	.498 (-.698/.073)	.935 (-.067/.084)	.853 (-.159/.083)	.188 (-1.67/.245)	.551 (-.596/.078)	.993 (-.007/.085)	.880 (.-127/.085)	.210 (-1.56/.245)
Age in Categories [b]:									
16			.297 (-1.21/.306)	.208 (-1.27/.308)	Yes		.268 (-1.32/.338)	.246 (-1.40/.341)	Yes
17			.392 (-.937/.063)	.365 (-1.01/.066)			.323 (-1.13/.066)	.291 (-1.24/.069)	
19			.257 (-1.36/.061)	.346 (-1.06/.069)			.302 (-1.20/.063)	.449 (-.800/.072)	
20			.124 (-2.09/.082)	.265 (-1.33/.108)			.149 (-1.91/.083)	.388 (-.946/.114)	
21			.080 (-2.52/.010)	.189 (-1.66/.134)			.097 (-2.33/.101)	.280 (-1.27/.139)	
22			.069 (-2.68/.110)	.167 (-1.79/.143)			.084 (-2.48/.112)	.250 (-1.39/.147)	
23-25			.043 (-3.16/.084)	.106 (-2.25/.125)			.053 (-2.94/.084)	.161 (-1.83/.129)	
26-30			.032 (-3.45/.078)	.079 (-2.54/.126)			.040 (-3.22/.079)	.123 (-2.10/.130)	
31-35			.020 (-3.92/.104)	.050 (-3.00/.142)			.026 (-3.67/.104)	.079 (-2.53/.146)	
Yrs since HS Completion: 0 (omitted)									
1				.825 (-.192/.058)	.844 (.170/.059)			.762 (-.272/.061)	.776 (-.253/.061)
2+				.371 (-.992/.104)	.425 (-.857/.101)			.294 (-1.23/.109)	.333 (1.10/.106)
GED * Age					Yes				Yes
AFQT [c]						1.04 (.038/.001)	1.03 (.028/.001)	1.03 (.029/.001)	1.03 (.029/.001)
Social Background Controls [d]		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Log Likelihood	-17955	-16336	-12597	-12529	-12456	-14923	-11998	-11902	-11849

(continued)

Table 5 (continued)

Model	5.A	5.B	5.C	5.D	5.E	5.F	5.G	5.H	5.I
Tests of Joint Significance									
Age Dummies									
χ^2 (9)			4470.0	809.3	901.0		3784.1	756.1	824.5
p> χ^2			0.00	0.00	0.00		0.00	0.00	0.00
Age Dummies * GED									
χ^2 (9)				91.0	91.3			124.5	79.1
p> χ^2				0.00	0.00			0.00	0.00
Years Elapsed Dummies									
χ^2 (2)					73.2				108.1
p> χ^2					0.00				0.00

[a] Coefficients are odds ratios ($\exp^B$). Numbers in parentheses are logit coefficient/robust standard errors.

[b] Age 18 is the omitted category.

[c] Models with AFQT include controls for whether AFQT score is missing and age at which AFQT was taken.

[d] Models with social background controls include sex, race-ethnicity, mother's and father's education, father in household at age 14 interacted with father's education, mother's and father's education missing flags, occupation of household head (in categories) measured at age 14, whether respondent lived in female-headed household at age 14, and whether respondent was born in U.S.

Table 6. Cumulative Predicted Probabilities of College Entry from Models in Table 5, NLSY

	Traditional Diploma	GED	Difference	Ratio of GED to HSD (%)
Simple Proportions				
(1) Observe until age 25	.64	.29	.35	45
(2) Observe until age 30	.67	.38	.29	57
(3) Observe until age 35	.68	.41	.27	60
Model-Based Estimates [a]				
(4) Mod 5.A: GED only	.87	.60	.27	69
(5) Mod 5.B: GED + Controls	.87	.64	.23	74
(6) Mod 5.C: GED + Controls + Age	.80	.78	.02	98
(7) Mod 5.D: GED + Controls + Age + Yrs Since HS Completion	.80	.75	.05	94
(8) Mod 5.E: GED*Age + Controls + Yrs Since HS Completion	.80	.71	.09	89
(9) Mod 5.F: GED + Controls + AFQT	.87	.68	.19	78
(10) Mod 5.G: GED + Controls + AFQT + Age	.78	.78	0	100
(11) Mod 5.H: GED + Controls + AFQT + Age + Yrs Since HS Completion	.81	.77	.04	95
(12) Mod 5.I: GED*Age + Controls + AFQT + Yrs Since HS Completion	.80	.76	.04	95

[a] Models account for censoring, covariates, and observe individuals to age 35.

Appendix Table A.1. Variables Included in Analyses, NLSY

Variables	Description	Notes
Male	1=yes 0=no	
Hispanic	1=yes 0=no	
Black	1=yes 0=no	
GED	1=yes 0=no	Having a GED and having a regular high school diploma are mutually exclusive states.
HS Diploma	1=yes 0=no	
College	1=yes 0=no	First report of college entry (i.e., attending grade 13). Respondent asked month and year of entry. Includes only a regular 2- or 4-year post-secondary institution as "college". The survey instrument does not assume that those who attempted grade 13 completed grade 12. Respondents were asked both about grades attempted and those completed.
Mother's Education	0 to 20 years	Missing values flagged and imputed using race and nativity specific means
Father's Education	0 to 20 years	Missing values flagged and imputed using race and nativity specific means
Mother's Ed Missing Flag	1=yes 0=no	
Father's Ed Missing Flag	1=yes 0=no	
Father in Hshld at age 14	1=yes 0=no	Whether biological father was present in household at age 14 based on respondent report of who s/he lived with at that time
Female Headed Household	1=yes 0=no	Whether household in which respondent lived at 14 only had adult female present
AFQT	Coded in percentiles	Armed Forces Qualifying Test. Used as a measure of cognitive skills. Missing values flagged and imputed at sample mean
Age in 1981	16 to 24 years	Respondent's age in 1981, year in which AFQT was administered
AFQT Missing Flag	1=yes 0=no	
Occupation of Household Head at age 14	Coded in categories: 1=professional, technical, kindred 2=manager, proprietor, officer 3=sales worker; 4=clerical 5=crafts, foremen; 6=armed forces; 7=operatives; 8=non farm laborer; 9=farmer; 10=farm laborer; 11=non household service worker 12=household service worker; 13=did not work; 14=missing	Household occupation is coded as male adult's occupation unless male was not working, household had adult female only, or male adult's information is missing. It is used as a proxy for income when respondent was age 14.
Respondent Born in the US	1=yes 0=no	
Age at HS degree	Rounded to integer. 18.2 and 18.8 are both coded as 18.	Respondent provides month and year of high school graduation (I assume day is the 15th). Age at degree is computed by subtracting date of birth from graduation date and rounding to integers
Age at college entry	Rounded to integer. 18.2 and 18.8 are both coded as 18.	Respondent provides month and year of college entry (I assume day is the 15th). Age at entry computed by subtracting date of birth from college entry date and rounding to integers.
Time Elapsed between HS grad and College Entry	Rounded to whole years. Zero to 5.9 months is zero years, 6 months to 1.59 years is 1 year, etc.	Age at college entry minus age at high school degree. Approx. 135 cases report college entry date that precedes graduation date. Cases in which difference exceeds 9 months dropped (46). Otherwise, college entry date recoded to the day after reported date of high school graduation.

Appendix Table A.2. Sample Proportions, Means and Standard Deviations, NLSY [a]

Variables	Hispanic	Black	Non-Hispanic Non-black	Full sample w/ Prob. weights
	Mean (std dev)	Mean (std dev)	Mean (std dev)	Weighted mean (std error)
Mother's Education	7.84	10.79	11.93	11.63
	(4.01)	(2.50)	(2.39)	(0.03)
Father's Education	8.16	10.19	12.23	11.82
	(4.32)	(3.01)	(3.20)	(0.04)
AFQT	30.78	23.63	52.85	48.52
	(23.97)	(20.94)	(26.62)	(0.32)
Age at HS degree[b]	18.8	18.4	18.1	18.1
	(2.93)	(2.30)	(1.97)	(0.03)
Age at college entry [c]	19.9	19.5	19.5	19.4
	(3.81)	(3.28)	(3.50)	(0.06)
Age in 1981	19.49	19.49	19.56	19.66
	(2.24)	(2.19)	(2.25)	(0.03)
Male	0.49	0.49	0.50	0.50
Mother's Ed Missing	0.08	0.09	0.04	0.05
Father's Ed Missing	0.18	0.26	0.07	0.10
AFQT missing	0.08	0.04	0.06	0.06
Live in Fem Household-age 14	0.20	0.34	0.09	0.12
Live w/Biological Father-age 14	0.69	0.52	0.83	0.78
Born in US	0.74	0.97	0.97	0.96
Enter College	0.49	0.52	0.61	0.60
Has GED	0.13	0.11	0.08	0.09
Has Diploma	0.61	0.72	0.81	0.80
Occupation of Hsehld Head				
Professional, technical, kindred	0.05	0.04	0.13	0.12
Manager, proprietor, officer	0.05	0.03	0.14	0.13
Sales worker	0.02	0.01	0.06	0.05
Clerical	0.04	0.05	0.05	0.06
Crafts, foremen	0.15	0.13	0.21	0.20
Armed forces	0.01	0.02	0.01	0.02
Operative	0.15	0.19	0.14	0.15
Non farm laborer	0.06	0.07	0.03	0.04
Farmer	0.02	0.01	0.03	0.02
Farm Laborer	0.09	0.02	0.00	0.01
Non-household service worker	0.09	0.11	0.05	0.06
Household service worker	0.01	0.02	0.00	0.00
Did not work	0.20	0.22	0.07	0.09
Missing	0.06	0.08	0.05	0.06
Sample size	1854	2824	4813	9491

[a] Data includes oversampling by race with the following proportions: 19.5% Hispanic, 29.8% black and 50.7% non-Hispanic non-black. The weighted proportions are 7% Hispanic, 14% black, and 79% non-Hispanic non-black.
[b] Calculated only for those who completed high school
[c] Calculated only for those who completed high school (either with a diploma or GED) and entered college

Figure 1. Gross Discrete Hazard of College Enrollment by Age, NLSY (N=59,751 person years)

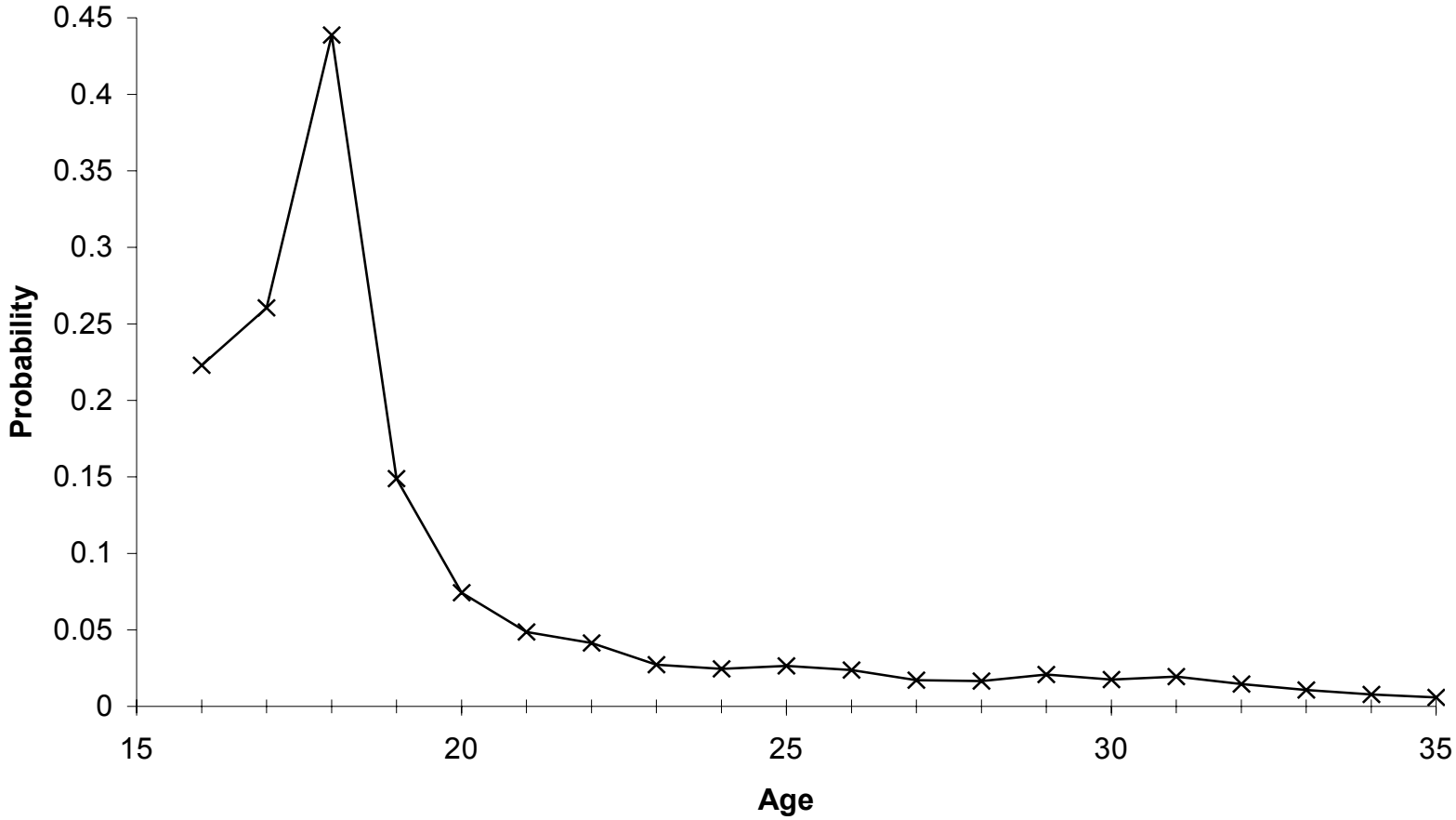


Figure 2. Discrete Hazard of High School Degree by Age, NLSY (N=53,932 person years). GED hazard is magnified in inset box.

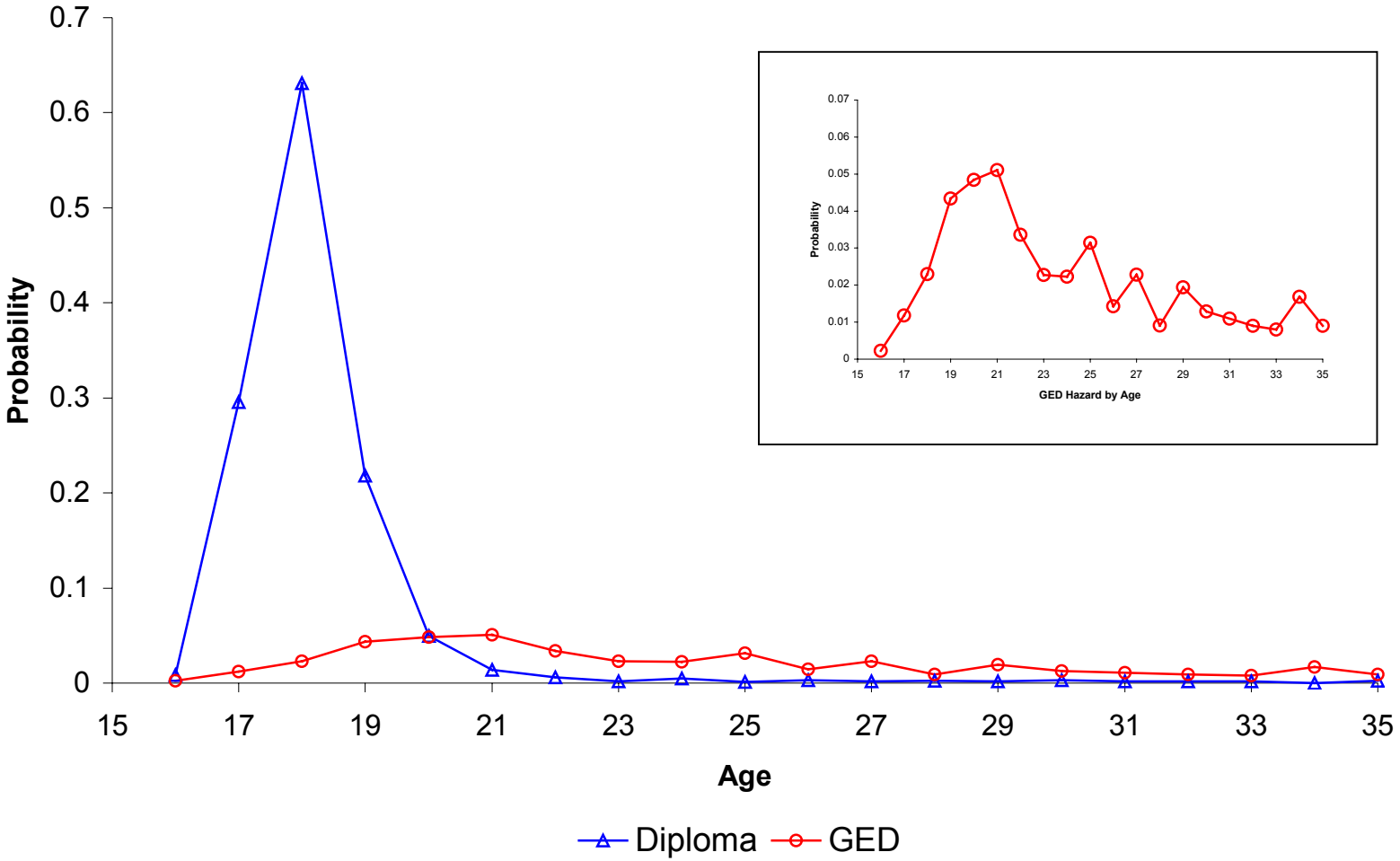


Figure 3. Discrete Time Hazard of College Entry, Binary Logit Model (Model 5.I), NLSY (59,751 person years)

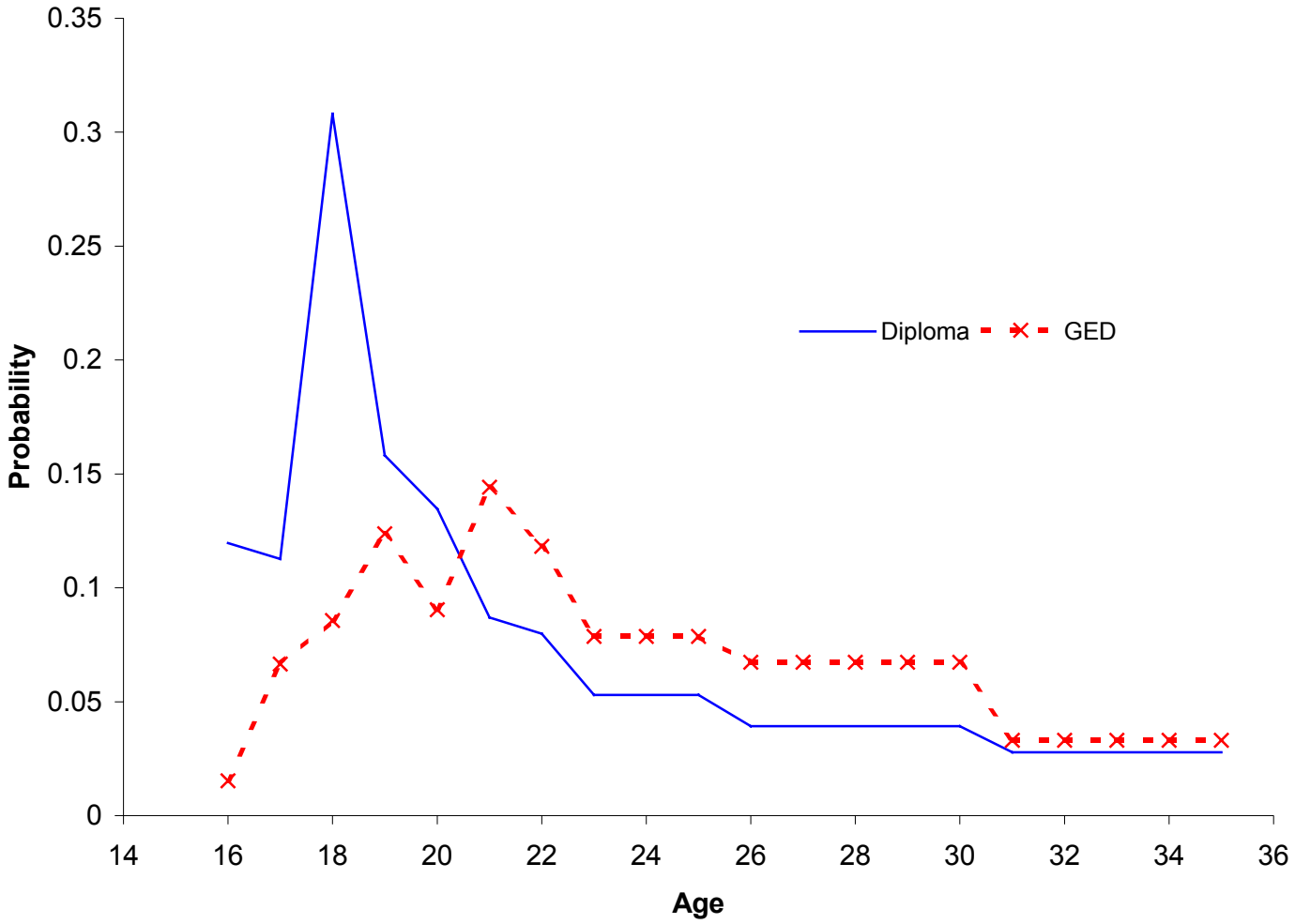
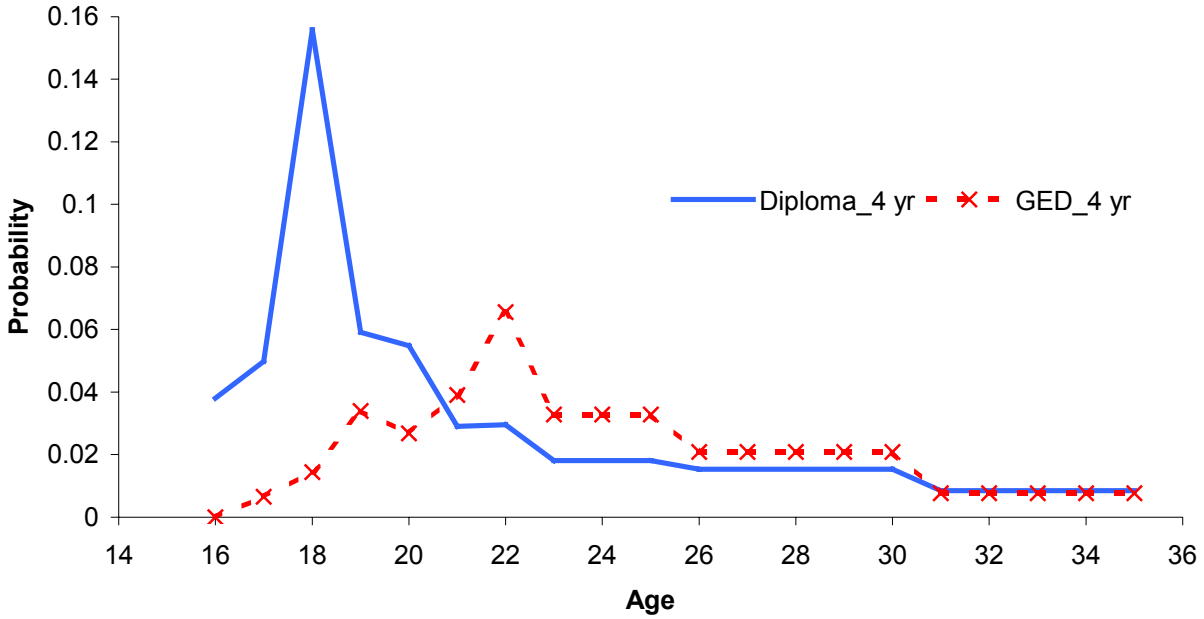


Figure 4: Discrete Time Hazard of College Entry: 4-year versus 2-year school, Multinomial Logit Model 5.I, NLSY (59,751 person years)



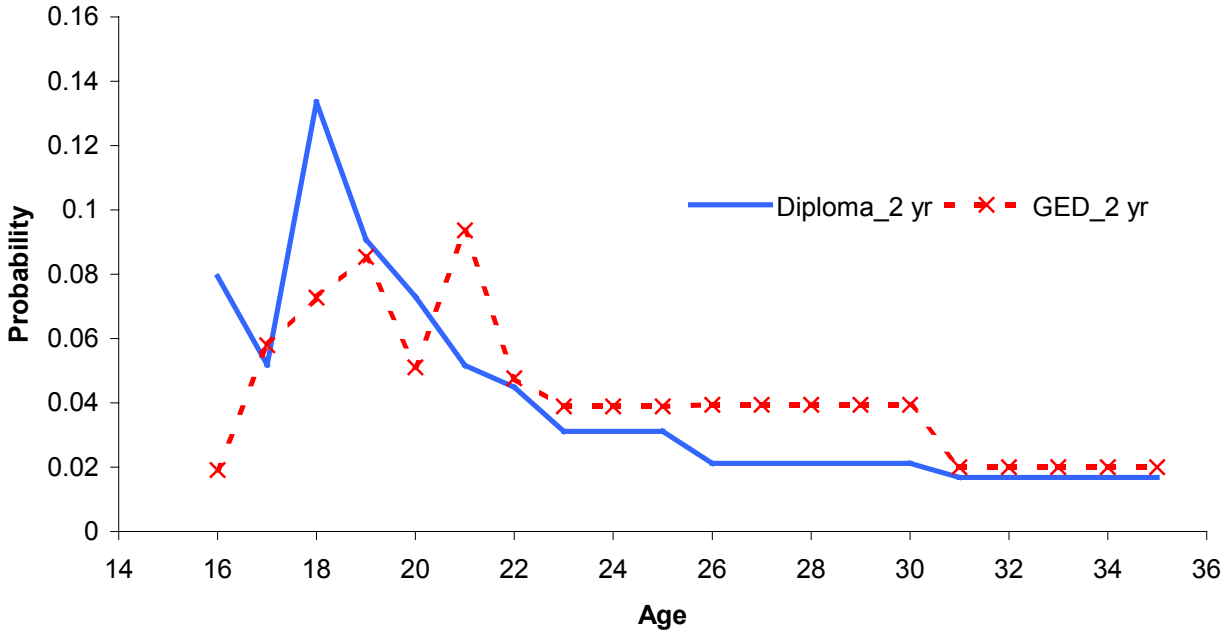


Figure 5. Smoothed Discrete Time Hazard of Entry to a 2- vs. 4-Year College, Multinomial Model 5.I, NLSY (59,751 person years)