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

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ABSTRACT

GED certification has changed the landscape of educational stratification in the U.S. People who get 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 rates of college entry. Past research, however, ignores the role of age and timing in each group's transition from secondary to post-secondary schooling. Taking a life course perspective, this analysis shows that adjusting for differences in the age trajectories of school continuation accounts for a substantial portion of the differences observed between the two groups. Important differences remain, however, in the type of college attended (two-year versus four-year) and the likelihood of college entry before age 21.

Key words: GED, educational inequality, college entry, school transitions, age trajectories

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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. High school certification by passing the battery of General Educational Development (GED) tests, an alternative credential to the traditional high school diploma, represents an important dimension in the landscape of educational stratification in the United States. Increasing rates of GED certification have increased secondary school certification rates over time and at the same time introduced substantial heterogeneity within that level of schooling. Yet, the rapid expansion of GED certification and its implication for educational stratification in the U.S. have been largely ignored in sociological research.

Between 1971 and 1981, the number of individuals who earned a GED more than doubled. By 2001, about 11% of individuals age 15 to 34 with a high school credential held a GED (National Center for Education Statistics 2000; U.S. Census Bureau, Survey of Income and Program Participation, 2001 panel). 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.

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

schooling 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 schooling, which was otherwise homogenous in nature. Several economic 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 secondary degrees and enter college at substantially later ages than traditional high school graduates. And when they do enter college, GED recipients are more likely to enter a two-year college than a four-year one. The introduction of these qualitative differences at this key educational juncture has important implications that have been overlooked by previous research.

This study investigates differences in the rates and age patterns of college entry between GED recipients and traditional graduates. I focus here on college entry because this is the first step towards obtaining post-secondary schooling. Secondary school certification and college entry represent two critical points of selection for going on to earn a college degree. To be sure, differences in college completion are also important and substantial between the two groups. However, access to college is a key condition for getting a college degree and the transition from high school to college is a key juncture for attrition in the schooling process (Hauser 1993: 62). This serves as a useful starting point for comparing differences between GED recipients and traditional graduates and leaves the investigation of college completion for future work.

This paper has two 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. To achieve this latter goal, one must 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. This approach provides a better understanding of how the path to college differs for GED recipients and traditional graduates.

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 secondary 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, Alsalam, and Smith 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. (Boesel et. al 1998; Cameron and Heckman 1993). This investment is unlikely to produce substantial gains in human capital, though it may help dropouts with very weak reading and math skills make some gains in these areas (Murnane, Willet and Tyler 2000). Although it may not

represent a significant gain in human capital, GED certification plays an important role in the educational attainment of high school dropouts. Most dropouts resume their schooling at a later time and many go on to earn a GED. GED certification also serves as a gateway to post-secondary schooling. Dropouts who later earn a high school diploma or GED certificate are three times more likely to enter a post-secondary institution than dropouts who do not earn a secondary school credential (U.S. Department of Education 1998a).

While the GED is widely accepted by colleges and employers as a credential of secondary school completion and the Census classifies both regular diplomas and the GED in the same educational category ("high school graduates"), a growing body of research shows that the GED does not offer the same opportunities as the traditional diploma. Much of the research on this topic has been done by economists, who have focused on comparing the labor market outcomes of this group with that of high school dropouts and traditional graduates. 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. 2000; Tyler, Murnane, and Willet 2000).[1] 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. 2000).[2]

[1] 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 using fixed effect models (although positive in magnitude).

[2] Cao, Stromsdorfer, and Weeks (1996) find mixed results for the effect of GED certification for low-income women. They find no differences in hours worked but find that GED recipients earn

The studies also show that differences in labor market outcomes disappear once years of schooling is controlled. 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. (2000) estimate that about 30% of GED recipients had entered college by age 27 compared to 69% 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 schooling after completing the GED (Murnane, Willet, and Boudett 1997). 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 (Boesel et al. 1998; Cameron and Heckman 1993; Murnane et al. 1997). A deeper understanding of how the school trajectories of traditional high school graduates and GED recipients differ is a central part of understanding the economic disadvantages associated with GED certification.

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. 2000; but see Boesel et al. 1998). A similar argument can be made for more difficult-to-measure concepts such as motivation or non-cognitive skills such as norms and preferences that are valued by employers (Bowles and Gintis 2000). 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

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higher hourly wages than dropouts but lower wages than traditional graduates. Differences between the two groups disappear once job experience and years of education are controlled.

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). The two groups also differ in social background characteristics such as race-ethnicity and family income or socioeconomic status (Cameron and Heckman 1993; Murnane et al. 1997; Murnane et al. 2000). GED recipients come from more disadvantaged backgrounds 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. Among those who go to college, most enter college for the first time between ages 17 and 19 (U.S. Department of Education 1998b). 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 secondary school completion, that is, the age at which someone completes a high school credential and is "eligible" to attend college, then these compositional factors could play a central 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 demographic life course perspective.

Age is associated with college entry in at least three ways. First, 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 get a high school

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

credential at later ages 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). 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 might compete for students' attention.[5]

Third, chronological age has a social dimension. Individuals have informal yet shared notions about the right and wrong ages at which to experience different life events. These age-

[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. This makes these variables endogenous to the process and difficult to model directly. Thus, they are not included in the models presented here. Though not the focus of the present paper, establishing the relationship between these variables and GED receipt is an important topic for future research.

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

specific norms shape a shared definition of age-appropriate roles, behaviors and time schedules (Binstock and Shanas 1976; Elder 1975). 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. The completion of high school and the transition to college occur 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.[6]

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. The GED lacks this level of institutional structure. Individuals may take the exam if they are not enrolled in high school, are at least age 16, and meet any additional state-specific requirements that exist regarding age or length of time since leaving school. 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 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

[6] The literature on adult education does include a focus on the age patterns of schooling (see Jacobs and King 2002 for a review). This literature, however, rarely focuses on the role of timing specifically, and generally ignores differences in age and timing at earlier educational stages that may underlie age differences in college persistence and completion.

than traditional graduates in terms of age at high school certification and time elapsed between high school certification 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 someone with a high school credential will enter college at age 18 is 0.44, at age 19 is 0.15, and by age 20 is 0.07. 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 closely tied to age patterns of high school completion and the timing of school transitions (or those factors closely tied to age and timing). After adjusting for these age patterns as well as for social background and cognitive skills, one might expect to observe little if any difference between the two groups in rates of college entry.

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. I begin with an

[7] The first and third quartiles are ages 18 and 20, respectively, and the mean age is 19.4.

[8] Appendix A and its accompanying tables provide additional information about the sample and the variables used in the analysis.

initial sample of 9,763 youths (6,111 cross sectional sample plus 3,652 black and Hispanic oversampled youth). After excluding those with missing information or nonsensical educational histories, the sample includes 9,415 youths.[9] I use 1979 sample probability weights to correct for differences in the probability of selection and report robust standard errors in the results (Greene 2000: 462-463). I calculate age at high school certification (whether by diploma or GED) 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). Calibrating age in whole years loses some precision but minimizes recall error and allows me to keep cases with missing month of school transition but valid data on year in the sample. This approach also allows me to develop a general rule for handling concurrent enrollment in secondary school activities and college of the sort that might happen in a student's last year in secondary school.

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. I conducted all analyses both with and without controls for AFQT to confirm that the pattern of results does not depend on whether it is included.

[9] As of 1998, the survey had a cumulative response rate of 84.3 percent. Overall, the data are quite complete. See Appendix A for a detailed discussion of missing data.

For analyses of educational transitions, I use discrete time hazard models to estimate the likelihood that a particular transition (secondary 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 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 versus does not enter college) or polytomous (e.g. enters two-year college, enters four-year college, does not enter college) with the model parameterized as a multinomial logit. Using these models, I estimate predicted probabilities of high school certification 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 certification) 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. Although a small fraction of high school dropouts also enter college (about 5%), this NLSY sample includes too few of such cases to include in the analysis.

I use the widest age range that 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. In these data, if individuals are observed to age 25, 64% of those with a regular diploma enter college compared to 29% of those with a GED. When respondents are observed up to age 35,

however, 68% of those with a regular diploma enter college compared to 41% of GED recipients. Observing people to age 35 increases the proportion of GED recipients who enter college by more than 40%. 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 those who were not observed for all years to contribute information to the analysis for the years that they were observed, but be excluded (or censored) once they leave the survey.

RESULTS

Who Gets a GED?

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 a secondary school degree. 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 schooling 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%). In contrast, GED recipients fare better than dropouts on each of these dimensions. The descriptive data also suggest an association between race/ethnicity and type of credential. Individuals who are black or Hispanic are less likely to hold a traditional diploma and more likely to hold a GED or have no credential.[10]

[10] This association is explained by their more disadvantaged backgrounds. For example, if parents' education is controlled, blacks and Hispanics have the same predicted odds as whites of

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 one and a half years earlier than their non-college bound counterparts. While nearly seven out of 10 traditional graduates have entered college by age 35, only about four out of 10 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 versus 19.3 years). Finally, GED recipients have considerably lower average cognitive skills than do traditional graduates.

Although not the focus of the present analysis, the topic of school continuation among dropouts is also quite relavant. A minority of dropouts also go on to enter college and, when they do, they enter at much younger ages than GED recipients (age 20.6 versus 23). Permanent dropouts generally leave high school at earlier ages and having completed fewer years of school than those with a GED. Their earlier entry into college is an advantage in terms of normative age patterns of college entry but is a large disadvantage if it results from their having completed fewer years of high school. That such a small proportion of dropouts enter college overall (about 5% in this sample) likely reflects their disadvantage on many factors that predict college going such as family background and academic performance in high school.

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having a GED or no high school degree. If cognitive skills are also controlled, blacks and Hispanics have *lower* predicted odds of getting a GED or having no degree (models not shown). This finding is consistent with research that shows that once parents' education is controlled, blacks and Hispanics are more likely that whites to enter college (Hauser 1993).

Because it is difficult to untangle the direction of causation between factors such as fertility, work, school suspension and probation and the type of degree received these variables are not included in the models presented here. The group-specific means, however, are interesting from a descriptive standpoint.[11] Among respondents age 18 and older in 1980, about 16% of those with a regular diploma had been suspended at least once in high school compared to 43% of GED recipients and 46% of dropouts. Similarly, 3% of traditional graduates age 18 and older in 1980 report having been on probation compared to 15% of GED recipients and 14% of dropouts. Among women with children, traditional graduates have their first birth, on average, at age 24.8. Female GED recipients and dropouts have first births at ages 19.8 and 19.6, respectively. The corresponding average ages at first birth for men are 26.4, 23.3 and 22.8, respectively. Although only suggestive, these summary statistics support the idea that GED recipients and dropouts are more likely to have other factors competing with school during their young adult years.

The Timing of Secondary School Completion

The evidence indicates that GED recipients come from more disadvantaged families than traditional graduates. The association between family background and educational attainment has

[11] The data for age at first birth use annual summary variables created by the administrators of the NLSY. These data are missing for about 20% of women and 30% of men (both because some individuals have not had any births and due to invalid skips). Data on suspensions and probations were collected in 1980 only. For these latter variables, I report means for those older than age 18 to standardize for age bias. However, the means are quite similar both for the full age range and at higher age cutoffs.

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 certification between those with a regular diploma and a GED. 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 hazards for each degree on the same graph to highlight differences in age densities and prevalence between the two groups.

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 0.65 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 twenties and early thirties.

Table 2 presents the distribution and density of age at high school certification in more detail. More than 90% 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 completion for GED recipients is 21.4 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 certification by allowing people to get a high school credential at much later ages than allowed by the path of traditional high school.

Consider, then, four groups of high school completers: (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. The second group is uncommon because it is quite unusual to get a regular diploma after age 18. 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%). Those in this age group, on average, have substantially lower cognitive skills than those in the first age group.

Those who obtain a GED after age 18, 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 of GED recipients. 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 18. On average, 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 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 or later have parents with education levels similar to those who complete a regular diploma after age 18, but have higher average cognitive skills (32^{nd} percentile versus 28^{th}).

The Association Between Age and Differences in Rates of College Entry

The results above show that GED certification is associated with a substantially different age pattern of secondary school completion than the path of traditional high school. How does the timing of high school certification influence the timing of college entry? Age at high school certification determines when one is "eligible" to enter college. This, plus the time that elapses between high school and college determines the timing of college entry.

The analyses above indicate that GED recipients take longer to obtain a secondary school degree than individuals with a regular diploma. In addition to being older at the time of high school certification, GED recipients also take longer to make the transition from high school to college. For traditional graduates who go on to college, the average time elapsed between high school and college entry is about 1.7 years. In contrast, the average time elapsed between GED certification and college entry is about 3 years. Moreover, substantial differences exist between traditional graduates and GED recipients in the types of post-secondary institutions they attend. Among those who ever entered college in the NLSY sample, 56% of traditional graduates entered four-year colleges compared to 31% of GED recipients.

To examine how differences in age and timing are associated with rates of college entry, and to isolate these effects from those of social background and cognitive skills, I use

multinomial discrete time hazard rate models. These models predict the odds of college entry from age 16 to 35 for those with a regular diploma and GED. The dependent variable has three categories: enters a two-year college, enters a four-year college, does not enter college while observed. The results are shown in Table 3 and Figure 3. The models shown here include a measure of cognitive skills (AFQT), however, this pattern of results is robust to whether or not this covariate is included in the models. [12]

Model 3.A estimates the gross effect of having a GED on the odds of college entry. Based on this model, individuals with a GED are about 31% less likely to enter a two-year college (versus no college) than those with a regular diploma (odds ratio of 0.69). Disparities for entry into a four-year college are much larger. GED recipients are about 74% less likely to enter a four-year college than are traditional graduates. Model 3.B controls for differences in family background characteristics, which slightly reduces the disadvantage associated with having a GED. Adjusting for family background, GED recipients are about 27% less likely to enter a two-year college than are traditional graduates and about 69% less likely to enter a four-year college. Model 3.C controls for differences in cognitive skills as well as family background. Controlling for differences in cognitive skills reduces disparities in predicted odds of college entry only slightly for both two and four-year colleges. Thus, after controlling for differences in family

[12] An alternative approach is to model the hazard of college entry using the time elapsed between high school certification and college entry as the measure of exposure. One could then control for age at high school certification to account for differences in age at that juncture. The comparison of rows 7 and 8 in Table 4 shows the relative effect of these two dimensions of timing on the odds of college entry.

background and cognitive skills, substantial differences remain in the likelihood of college entry between GED recipients and traditional graduates. [13]

Model 3.D adds controls for chronological age to adjust for potential differences in the age pattern of the transition to college. 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 differences in age changes the predicted odds of college entry substantially. Holding constant differences in family background and cognitive skills, GED recipients have predicted odds of entry into a two-year college (versus no college) of about 1.2 times that of traditional graduates. This coefficient is marginally significant ($p \leq 0.06$). This suggests that, depending on one's threshold for statistical significance, GED recipients are either equally likely or moderately more likely to enter a two-year college (versus none) than traditional graduates once age and other factors are controlled. Differences in predicted odds of entry into a four-year college are also substantially improved from a difference of 66% in Model 3.C to a difference of about 26% in this model, holding other factors constant. Adjusting for differences in age patterns of college entry, net of social background and cognitive skills, reverses the differences observed for two-year colleges and greatly reduces the disparities observed for four-year colleges.[14]

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[13]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. Including these interactions does not change the pattern of results.

[14] Simply controlling for GED status and chronological age (and not including controls for social background and cognitive skills) produces a similar pattern. The odds ratios for the GED versus traditional diploma contrast are 1.16 and 0.57 for two and four year colleges, respectively (model

Model 3.E accounts for a second dimension of timing by controlling for the number of years that elapse after high school certification, the time when the individual is eligible for college entry but has yet to make that transition (dummies for less than one year, one year, two or more years). Rates of college entry fall with each additional year that passes after high school certification. All else being equal, rates of entry are 25% lower one year after certification (versus less than one year) for two-year schools and about 22% lower for four-year schools. Rates of entry are 64% lower two or more years after certification for two-year schools and 77% lower for four-year schools (odds ratios of 0.36 and 0.23, respectively). In this model, once social background, cognitive skills, age, and time between high school and college are controlled, there is no statistically significant effect of having a GED versus a traditional diploma for entry into a two-year college. The disadvantage of having a GED, however, is still substantial and statistically significant for entry into a four-year school (odds ratio of 0.65).

Do GED recipients catch up later in life? Model 3.F examines whether age patterns of college entry differ for those with a regular diploma and a GED, net of differences in social background and cognitive skills. Adjusted estimates from this model are shown in Figure 3 (estimates shown are smoothed using a median smoother and hold the other covariates at the sample mean). Before age 21, differences in the likelihood of college entry are substantial even after adjusting for family background, cognitive skills and age. At age 18, for example, the discrete hazard that someone with a traditional diploma will enter a four-year college is about five times that of a GED recipient with similar characteristics (0.1 versus 0.02). Differences in the likelihood of entry to a two-year college are smaller but still considerable (0.1 versus 0.07).

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not shown). The GED coefficient in the two-year college equation has a p-value of 0.10. The GED coefficient in the four-year equation is highly significant.

Also, traditional graduates are equally likely to enter either a two-year or four-year college at age 18 while GED recipients are much more likely to enter a two-year college at this age. While both hazards for traditional graduates peak at age 18, the hazard for GED recipients' entry to a four-year college increases steadily from age 16 to 20 but does not peak until age 22. The hazard for GED recipients' entry to a two-year college is at a relatively high plateau from ages 18 to 21.

By age 21, the pattern reverses. At age 21 the adjusted hazard of college entry is higher for GED recipients than traditional graduates for both two and four-year colleges, a pattern that continues throughout their twenties. 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 enter post-secondary schooling for the first time. Between ages 21 and 30, GED recipients are more likely to enter both two- and four-year colleges (conditional on social background and cognitive skill with covariates held at sample mean). During their twenties, GED recipients' adjusted hazard of entry into a four-year college is about the same as traditional graduates' hazard of entry into a two-year college, and higher than traditional graduates' hazard of entry into a four-year college. GED recipients' adjusted hazard of entry to a two-year college is the highest of all, suggesting that, holding all else constant, GED recipients are more likely than traditional graduates to enter college for the first time at later ages, and when they do, they are likely to choose two-year institutions as their point of entry.

Model 3.G tests whether the association between the number of years that elapse between secondary school certification and college entry differs for GED recipients and traditional graduates. This interaction is not statistically significant. Although GED recipients take longer to make the transition to college, the relationship between this dimension of timing and the likelihood of college entry does not differ in a meaningful way between the two groups.

Cumulative Probability of College Entry by Age 35

The results above suggest that from ages 21 to 35, GED recipients begin to make up for some of their early deficit in rates of college entry. One way to examine this hypothesis further is to calculate the cumulative adjusted probability of college entry by age 35 for each group. The cumulative probability gives the total likelihood of college entry by age 35 for each group. The cumulative probability can be calculated as follows:

$$(2) \quad \text{Cumulative Pr} = 1 - \prod_{a=16}^{35} (1 - (\hat{P}_a{}^{4yr} + \hat{P}_a{}^{2yr})), \text{ where}$$

$\hat{P}_a{}^{4yr}$ equals the predicted conditional probability of first entry to a four-year college at each age and $\hat{P}_a{}^{2yr}$ equals the predicted conditional probability of first entry to a two-year college at each age. The multinomial models described in Table 3 provide these estimates for each age between 16 and 35. At each age, the probability of not entering college is one minus the sum of the probabilities of entering either a two or four year college at that age. The probability of not entering college by age 35 is the product of the individual probabilities of not entering college at each age between 16 and 35. Since this product calculates the probability of not entering college by age 35, then one minus this quantity is the probability of entering college by age 35 (that is, one minus the product of the probabilities of *not* going to college at each age). Table 4 presents these results. For baseline comparison, Table 4 also includes the proportions attending college that are observed in the data. The cumulative probabilities shown in Table 4 are adjusted probabilities, estimated by assessing covariates at the sample means.

When individuals are only observed until age 25, about 64% of those with a regular diploma and 29% of GED recipients attend college (Table 4, row 1). The proportion of GED recipients entering college is only 45% of the proportion of those with a regular diploma entering

college. Simply observing people to age 35, however, increases the ratio of the GED proportion to 60% of the proportion for traditional graduates (row 3). Using model-based estimates that account for censoring of observations improves this ratio further. Table 4, row 4 shows the estimated 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 adjusted probability of college entry by age 35 for a traditional graduate is 0.87. The adjusted probability of college entry for someone with a GED is 0.60. The cumulative GED probability is about 69% of the cumulative probability of college entry for traditional graduates.

Rows (5) through (9) show the cumulative probability of college entry by age 35 controlling for various characteristics. For example, adjusting for differences in family background (row 5) reduces the gap in the overall odds of college entry even further. Based on this model, the estimated cumulative probability of ever entering college by age 35 (be it a two or a four year school) for GED recipients is about 73% of the cumulative probability for traditional graduates (0.63 versus 0.86). Adding controls for cognitive skills in addition to differences in social background (row 6) further reduces disparities in college entry between the two groups (ratio equals 0.78)

The estimates shown in rows (7) and (8) add controls for two facets of timing. The results in row 7 show that controlling for age and other covariates brings predicted cumulative probabilities of college entry to near parity (0.77 and 0.76 respectively). Controlling for differences in the time that passes between high school certification and college entry (row 8) shows that those with a regular diploma have a slightly higher likelihood of college entry by age 35 (0.79 versus 0.75). Allowing the effect of age to differ across the two groups produces similar results (row 9). The estimated cumulative GED probability is about 95% of the estimated

cumulative probability for traditional graduates. Adjusting for differences in age and timing in addition to differences in family background and cognitive skills narrows the gap between the two groups to near parity.

That the adjusted cumulative probability of entering college approaches parity in the full model does not mean that there are no qualitative differences between the two groups. Traditional graduates are more likely to enter a four-year college. The results from model 3F in Table 3, for example, can also be used to predict the cumulative probability of first entering a four-year college by age 35. This estimate can be computed by omitting $\hat{P}_a{}^{2yr}$ from equation (2) above. The estimates in row (10) show that after controlling for age, family background, cognitive skills and differences in both age and timing, GED recipients' adjusted cumulative probability of first entering a four-year college by age 35 is 0.38 compared to 0.47 for traditional graduates. The GED estimate is about 81% of the estimate for traditional graduates.

SUMMARY AND CONCLUSION

In order to understand differences in rates of college entry between GED recipients and traditional graduates 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 strong emphasis on human capital and background factors, ignoring the role of timing and the life course.

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% (Table 4 row 1 versus row 5). Controlling for cognitive skills in addition to social background reduces the estimated difference by about 46% (Table 4 row 1 versus row 6). Adjusting for differences in age and timing, in addition to the other factors, reduces the estimated difference by about 89% (Table 4 row 1 versus row 9) and brings estimates of predicted cumulative rates of college entry between the two groups to near parity.

Before age 21, GED recipients are much less likely to enter college and substantially less likely to enter a four-year college if they do enter. At ages 17 and 18, traditional graduates are equally likely to enter a two-year or a four-year college. GED recipients, on the other hand, are much less likely to enter a four-year college at these ages. After age 21, GED recipients begin to make up some of their deficit at earlier ages. From age 22 to 30, GED recipients are more likely to enter both types of colleges and enter four-year colleges at a higher rate than traditional graduates. In their early thirties, GED recipients continue to have higher rates of entry into two-year colleges.

This higher propensity to enter college later in life and to choose a two-year college as the point of entry supports the argument that the GED introduces qualitative differences in the schooling process. On the one hand, each additional year of post-secondary schooling increases earnings regardless of type of college (two or four year). On the other hand, those who attend two-year colleges are more likely to attend school part-time and less likely to complete their degree. Certainly, completing a four-year degree offers the highest rewards. GED recipients higher rates of entry into four-year schools during their twenties is encouraging but these rates are relatively low overall and much lower than the rates we observe for traditional graduates at

ages 17, 18 and 19. Moreover, the highest rewards are associated with college completion and GED recipients have substantially lower rates of college completion than traditional graduates.

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 may reflect factors not captured by this study, such as motivation, values, and preferences.

Gaining a better understanding of differences in age patterns of schooling does not answer an important related issue, namely the cost of these differences. Differences in time spent without a secondary degree or acquiring post-secondary schooling may represent losing key years of potential benefits in earnings and experience. This is a potential cost not measured here, and one that may itself be highly age-specific. For example, the cost of taking more time to enter college may be quite high for GED recipients if there are substantial differences in wages and experience in the late teens and early twenties or if disparities accumulate quickly early in career trajectories. On the other hand, if the cost of having no college experience is particularly high in the late twenties (or at a different point in the career trajectory) then GED recipients may gain some ground despite their early disadvantage given their higher rates of college entry after age 21. This is an important issue and a fruitful avenue for future research.

These compositional differences in age and timing are closely tied to many of the underlying mechanisms that shape schooling trajectories such as work, family, health, and involvement in the juvenile justice system. These dynamics are correlated with age and timing, some leading to

differences in age and timing and others the consequence of these. Although not the focus of the current paper, these mechanisms lurk behind the more complicated schooling trajectories of those who falter from or leave the traditional path of high school.

GED certification has changed educational stratification in at least two ways. First, GED certification provides an opportunity for those who do not complete high school through the traditional route to reach this important educational milestone. At least in principle, this mechanism may increase overall levels of secondary school certification. Of course, if the option of GED certification induces youth to leave high school or if the GED 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 differences are particularly striking in the timing of high school certification and college entry, which is highly homogenous and specific for one credential and quite variable for the other.

Differences in the timing of high school certification have important implications for the larger system of educational stratification because high school certification serves as a gateway to college entry. Currently, people with a GED complete a high school credential 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 secondary 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 certification. In either case, changes in the timing of high school certification 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

The analysis uses the 1979 to 1998 waves of the NLSY. 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 either by using retrospective reports or by observing educational transitions in subsequent survey waves. I 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.

Overall, the data are quite complete. Mother's education and AFQT are missing in 5% of cases, respectively, and father's education is missing in 13% of cases. I have flagged cases with missing information on parent's education and AFQT and substituted sample means. For parents' education, I use race, sex and nativity specific means. Models that include these variables include dummy variables to control for missing/imputed values. Race and being native born are also included in these models. The results are the same if cases with missing values are dropped from the analysis or if I use the overall sample means for parents' education. Although

substituting means is far from an ideal solution, the data are complete enough not to require a more sophisticated way of handling missing data such as multiple imputation.

I have resolved missing or problematic data in the education histories with an eye to salvaging as many cases as possible without making guesses or imputations that might have a meaningful effect on the dependent variables. I assign cases with missing month of high school certification to June (53 cases). I resolve cases that report more than one high school certification date as follows (about 145 cases). In cases where the multiple dates were fewer than 13 months apart, I chose the earlier date unless this conflicted with individuals' enrollment status or grade progression. 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 certification date. When this difference was fewer than 10 months (98 cases), I recoded the college entry date to one day after the high school certification date. I did this because high school seniors who take 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 10 months or more, I excluded the case from the analysis (39 cases).

Overall, I exclude 348 cases from the sample (3.6%). Fifty-five have nonsensical grade progressions, 64 report being graduates but not the type of degree obtained, 76 have missing data on whether they completed a high school degree, 133 have missing high school completion dates, 19 complete a secondary degree or enter college at age 15 or younger, and one is missing nativity status. This drops 2% of diploma recipients (n=141), 8% of GED recipients (n=88) and 4% of dropouts (n=55) and 64 cases with degree unknown.

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 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 Credential, NLSY (N=9,415).

	Has Diploma	Has GED	Did Not Complete High School Credential [a]
Background Characteristics			
Mother's Education (years)	12.0	10.7	9.8
Father's Education (years)	12.2	10.6	9.7
Mother's Ed Missing	.04	.08	.14
Father's Ed Missing	.08	.18	.22
Live in Fem Hsehld-age 14	.11	.19	.21
Live w/Biol Father-age 14	.82	.64	.62
Occup. Hsehld Head-age 14			
Professional or Manager	.28	.12	.09
Did not work	.07	.14	.19
Born in US	.96	.95	.92
Male	.49	.52	.58
Hispanic	.62	.13	.25
Black	.73	.11	.16
Non-Hispanic Non-Black	.83	.08	.09
Educational Characteristics			
Age at HS Degree	17.8	21.4	---
Age at HS Degree for those who ever entered college	17.6	20.0	---
Entered College by Age 35	.69	.43	.05
Age at College Entry	19.3	23.0	20.6
AFQT Percentile	53.5	36.0	21.3
Percent in Sample	75	10	15
Number in Sample	7043	952	1420

Notes: Means and proportions shown are weighted using sample probability weights.
[a] Ninety-two percent of these individuals were observed until age 30 or older and had not earned a high school credential by that age. Only 5% had left the survey before age 25 (n=70).

Table 2. Distribution and Density of Age at High School Certification 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 1,420 people in the sample who did not complete high school while observed.

Table 3. Multinomial Logistic Discrete Time Hazard of College Entry by Age (odds ratios shown), NLSY (N=59,751 person years)

Model	3.A		3.B		3.C		3.D		3.E		3.F		3.G	
	2 yr.	4 yr.	2 yr.	4 yr.	2 yr.	4 yr.	2 yr.	4 yr.	2 yr.	4 yr.	2 yr.	4 yr.	2 yr.	4 yr.
Has GED (1=yes)	0.687*	0.258*	0.726*	0.306*	0.765*	0.343*	1.189†	0.735*	1.066	0.651*	0.424*	0.072*	0.433*	0.067*
Age in Categories: [a]														
16							0.415*	0.178*	0.380*	0.164*	yes	yes	yes	yes
17							0.355*	0.287*	0.318*	0.259*				
19							0.417*	0.228*	0.594*	0.352*				
20							0.213*	0.107*	0.461*	0.343*				
21							0.156*	0.057*	0.366*	0.206*				
22							0.118*	0.061*	0.285*	0.231*				
23-25							0.080*	0.033*	0.198*	0.130*				
26-30							0.059*	0.027*	0.146*	0.104*				
31-35							0.041*	0.014*	0.103*	0.056*				
Yrs since HS [b]														
1									0.747*	0.778*	0.756*	0.796*	0.758*	0.790*
2+									0.363*	0.231*	0.388*	0.282*	0.386*	0.275*
GED * Age											yes	yes	yes	yes
GED * 1 yr since HS													0.942	1.178
GED* 2+ yr since HS													0.996	1.175
AFQT					1.025*	1.052*	1.017*	1.040*	1.018*	1.040*	1.018*	1.040*	1.018*	1.040*
Social Background Controls			yes		yes		yes		yes		yes		yes	
Log Likelihood	-21594		-19732		-18147		-15189		-15094		-15024		-15024	

(continued)

Table 3 (continued)

Model	3.A	3.B	3.C	3.D		3.E		3.F		3.G	
Tests of Joint Significance											
Age Dummies											
χ^2 (9)				1627.5	2352.8	351.4	497.2				
p> χ^2				0.00	0.00	0.00	0.00				
Age Dummies * GED											
χ^2 (9)								31.0	2332.4		
p> χ^2								0.00	0.00		
Years Elapsed Dummies											
χ^2 (2)						56.5	81.1				
p> χ^2						0.00	0.00				
Years Elapsed * GED											
χ^2 (2)										0.06	0.24
p> χ^2										0.97	0.89

Notes: 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. Models with AFQT include controls for whether AFQT score is missing and age at which AFQT was taken.

[a] Age 18 is the reference category.

[b] Zero years (immediate transition to college) is the reference category

* $p \leq 0.05$; † $p \leq 0.06$

Table 4. Cumulative Predicted Probabilities of College Entry, NLSY

	Traditional Diploma	GED	Difference	Ratio of GED to HSD (%)
Observed Proportions [a]				
(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 [b]				
(4) GED only	.87	.60	.27	69
(5) GED + Family Background Controls	.86	.63	.23	73
(6) GED + Controls + AFQT	.85	.66	.19	78
(7) GED + Controls + AFQT + Age	.77	.76	.01	99
(8) GED + Controls + AFQT + Age + Yrs Since HS Completion	.79	.75	.04	95
(9) GED*Age + Controls + AFQT + Yrs Since HS Completion	.78	.74	.04	95
(10) GED*Age + Controls + AFQT + Yrs Since HS Completion for entry to a 4-year college only	.47	.38	.09	81

[a] Proportions are weighted using sample probability weights.
[b] Models account for censoring, covariates, and observe individuals to age 35 (shown in Table 3).

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 two- or four-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 certification. 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. 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. Categorized at 0, 1, or 2+ year dummy variables.	Age at college entry minus age at high school certification. 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 certification.

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

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	7.85	10.78	11.93	11.62
	(4.0)	(2.5)	(2.4)	(0.03)
Father's Education	8.17	10.19	12.23	11.82
	(4.3)	(3.0)	(3.2)	(0.04)
AFQT	30.75	23.56	52.79	48.48
	(24.0)	(21.0)	(26.7)	(0.3)
Age at HS degree[a]	18.8	18.4	18.1	18.1
	(2.9)	(2.3)	(2.0)	(0.03)
Age at college entry [b]	19.9	19.5	19.5	19.4
	(3.8)	(3.3)	(3.5)	(0.06)
Age in 1981	19.5	19.5	19.6	19.7
	(2.2)	(2.2)	(2.3)	(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	0.51	0.60	0.60
Has GED	0.13	0.11	0.09	0.09
Has Diploma	0.61	0.72	0.82	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	0.02	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	0.01	0.01
Non-household service worker	0.09	0.11	0.05	0.06
Household service worker	0.01	0.02	0.001	0.004
Did not work	0.20	0.22	0.07	0.09
Missing	0.06	0.08	0.05	0.06
Sample size	1849	2793	4773	9415

Notes: Data are oversampled by race with the following proportions: 19.6% Hispanic, 29.7% black and 50.7% non-Hispanic non-black. The weighted proportions are 7% Hispanic, 14% black, and 79% non-Hispanic non-black.

[a] Calculated only for those who completed high school

[b] 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)

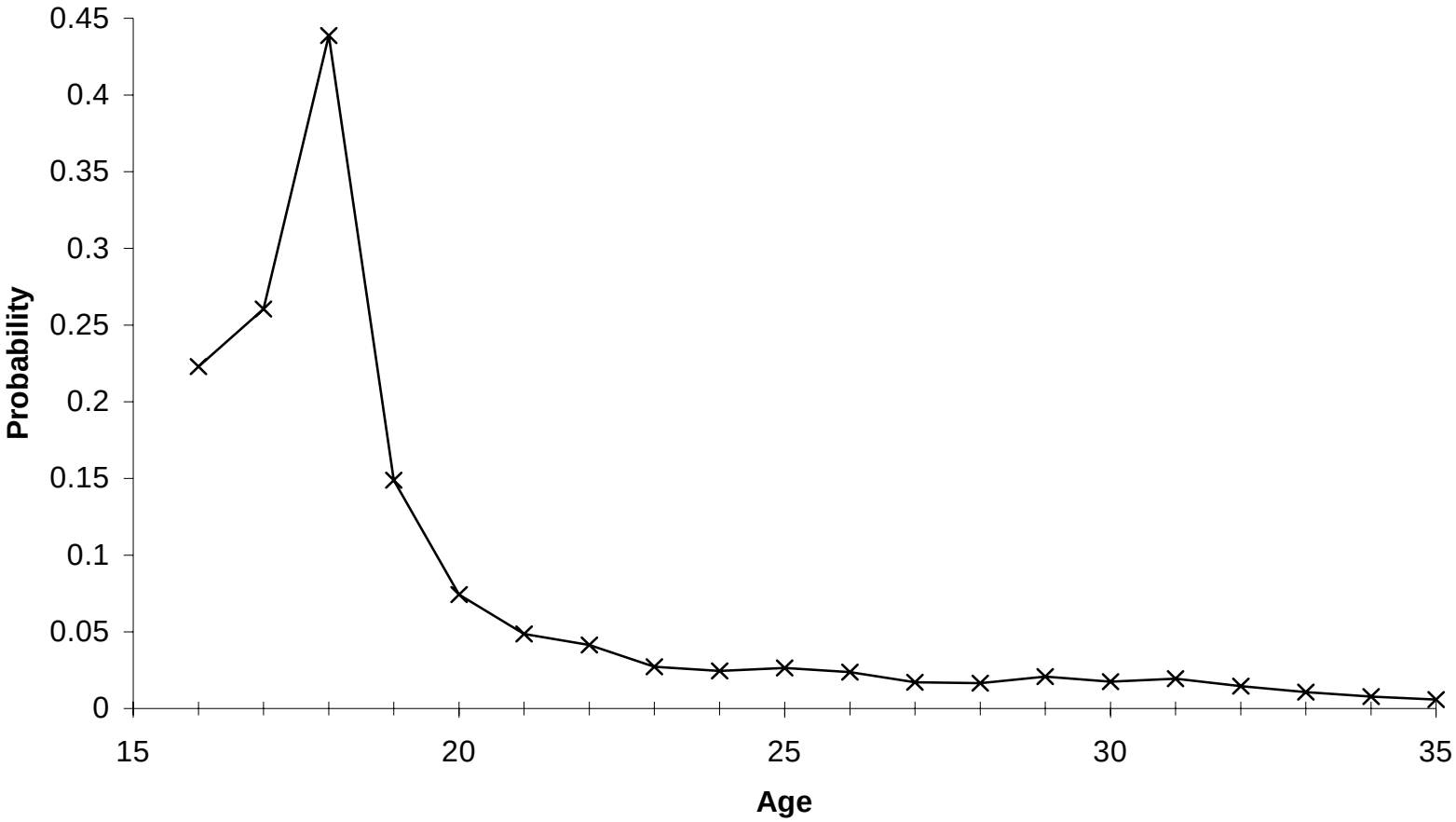

Figure 2. Discrete Hazard of High School Degree by Age, NLSY (N=53,932 person years). GED hazard is magnified in inset box.

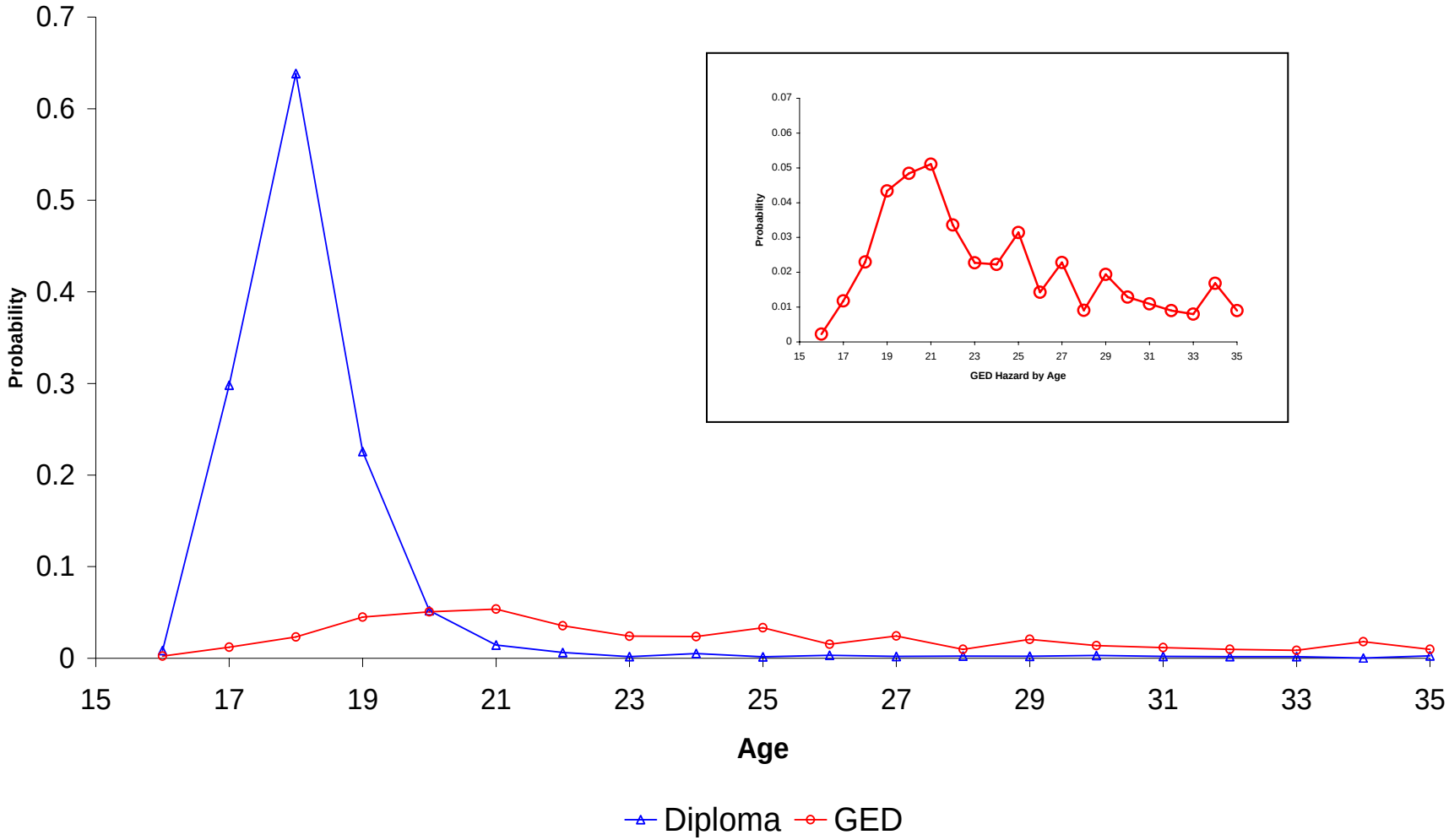

Figure 3. Smoothed Discrete Time Hazard of Entry to a Two-Year or Four-Year College, Multinomial Model 3.F using median smoother with covariates held at sample mean, NLSY (N=59,751 person years)