

**Career & Technical Education and School-To-Work at the End of the  
20th Century:  
Participation and Outcomes**

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**Abstract**

*We examined participation in the Career and Technical Education concentration (CTE), and School-to-Work activities at the end of the century following more than a decade of education reform in the United States. Using data from the National Longitudinal Survey of Youth 1997, we also explored whether school-to-work activities have extended beyond their traditional CTE curricular base and have become part of the high school experience for all youth. We explored the relationship between students' background characteristics and curriculum concentration and key education outcomes, including course-taking patterns, high school GPA, school completion, and post-school expectations. We concluded that there are ethnic, racial and socioeconomic differences among youth in the four curriculum concentrations. CTE concentrators, more than general concentrators, appear to benefit from changes aimed at increasing the academic rigor of their high school programs, as evidenced by their enrollment in math and science courses, high school GPA, and school completion.*

Over a decade ago, at a time when the U. S. economy began a sustained period of economic growth, concerns were voiced about the quality of education, and in particular the contribution of the educational system to ensuring that the United States remained competitive in the emerging global economy through the adequate preparation of youth for work. Spurred by reports such as *A Nation at Risk* (Gardner, 1983), states and federal legislators sought to fix what was perceived to be a poorly

performing education system. Different educational reforms then both sought to increase the number of rigorous academic courses required for graduation and introduce changes in work-related education.

The latter included efforts to increase participation of high school students in CTE, to prepare them for the world of work, and to ensure they were well prepared for educational and economic attainment. Toward this end, the federal government initiated in the early 1990s a wave of CTE reforms providing national guidelines and funding for program and systems change with the purpose of improving the quality of high school preparation for careers. We are now at a time when the federal government is proposing a substantial change in CTE legislation, which is based, in part, on assumptions about the lack of progress under previous legislation.

### **Purpose and General Approach**

The purpose of this study is to examine participation in CTE and in school-to-work (STW) activities at the end of the 20th century, *vis-à-vis* a set of family background and school achievement characteristics. We also examined the extent to which career major (CM), tech prep (TP) and specific, work-based learning school-to-work activities have become infused in the schooling of all adolescents.

We do so from the perspective that social origins affect school achievement. Studies in the sociology of education tradition have explored the impact of social factors on educational achievement. Specifically, they have focused on sets of factors that influence how students do in school. One such factor is the family background (Dauber, Alexander, & Entwisle, 1996; Ensminger & Slusarcick, 1992; Roscigno & Ainsworth-Darnell, 1999), which includes socio-economic status, race, and family structure characteristics. In particular, research studies during the 20th century have focused on the differences in educational achievement based on social inequalities (Gamoran, 2001). It has been well documented that race/ethnic differences in achievement reflect conditions outside school, but also the quality of schooling, since “what students bring to school from home greatly influences how they perform” (Peng, Wright, & Hill, 1995, p. 20) and is related to educational processes like quantity of courses, aspirations, and tracking. Other factors look into the effects of school behavior, and community characteristics (Dauber, Alexander, & Entwisle, 1996; Stull, 2002), in particular prior academic achievement at the pre-high school level, as well as family values and expectations (Ensminger & Slusarcick, 1992).

We therefore examined the direct effects of a set of social factors on participation in CTE and STW activities (career major, tech prep, and specific STW activities—cooperative education, job shadowing, mentoring, school-based enterprise, and apprenticeship/internship) and how they influenced overall school achievement, school completion and post high school aspirations. The factors included are students’ family background characteristics (e.g., gender, race,

ethnicity), family socioeconomic status (e.g., father's and mother's education), school performance and achievement (e.g., 8th grade GPA), and community characteristics (e.g., community location).

### **CTE and the High School Experience**

Adolescents enter high school with different home and neighborhood backgrounds, different levels of academic preparation, varying degrees of commitment to education, and a wide range of aspirations for their post-high school years. Which concentration pattern a student follows depends on both individual choice and the sorting mechanisms of schools (Garet & DeLany, 1988). Because building the workforce skills and increasing the academic performance of high school students was viewed as vital for the health of the domestic economy (Bozick & MacAllum, 2002), the federal Perkins reform legislation aimed to provide both for all students—a departure from traditional vocational education perceptions, policies and practices that had focused mostly on the disadvantaged (Halperin, 1994), or those considered non-college bound.

The goal of the CTE-focused reforms was perceived as an effort to blur the boundaries between curriculum concentrations. The emphasis on improvement of work and academic skills for all students was based on the positive associations found between work-based learning and students' educational outcomes (Wanacott, 2002). Academically, early research indicates CTE and STW can help decrease dropout rates and increase college enrollment, as well as improve attendance and grades, although there are no studies available about the impact on test scores (Hughes, Bailey, & Mechur, 2001). Other studies have reported the positive, yet limited impact, of CTE and STW on at-risk youth (Castellano, Stringfield, & Stone, 2003).

But while federal legislation has sought to increase the availability of work-related education for all students, high schools tend to have their own internal logic. Despite years of reform efforts, most high schools still have a recognized academic track or concentration and a concentration for students thought to be headed for early entry into the labor market. The rest of the students are left to wander haphazardly through their high school years, mostly under the umbrella or influence of a pseudo-academic concentration (the general concentration), a problem that has been recognized for more than a decade (Hallinan, 1994; Hughes, et al., 2001; Oakes, 1994; Oakes, Selvin, Karoly, & Guiton, 1992). One result of the CTE reform is the emergence of a fourth concentration, comprised of students who follow both a rigorous academic sequence of courses and a rigorous sequence of CTE courses (dual concentration). While small in numbers, it may represent the culmination of the reform efforts by combining the two long-standing philosophical traditions and curricula prevalent in high schools since the early 1900s.

### **CTE Enrollment Prior to the School Reform of the 1990s**

An often debated issue is the definition of CTE participation—and how to measure it. How one makes these distinctions will have a profound effect on the examined outcomes. There are two main approaches used by researchers to describe CTE and STW participation and each yields different findings. The first, commonly used approach is to impose a template on transcripts and define CTE participants post hoc—hence, *transcript* analysis. The second is an alternative method that uses the student's self-classification, and it is based on the assumption that the participant is in the best position to define his or her curricular concentration.

#### **CTE Participation: Transcript Analysis**

Roey and his colleagues (2001) illustrated how high school students are sorted into curriculum patterns. Imposing a template over transcript data, they found that the percentage of high school graduates from both public and nonpublic institutions that were CTE concentrators has decreased from 23.2% in 1982 to 4.4% in 1998, while academic concentrators increased from 42.5% in 1982 to 71% in 1998. Based on the U.S. Department of Education's High School Transcript Study and the National Educational Longitudinal Study of 1988 (NELS 88), Tuma (1996) reported that in 1982, 33.7% of public high school graduates were CTE concentrators, and 24.4% in 1992. Plank (2001), also using the NELS 88 data, calculated that 18.9% of 1992 graduates were CTE concentrators and 36.3% were academic concentrators.

Levesque and her colleagues (2000) found that CTE concentrators were 33.1% of all students in 1982 but declined to 21% by 1994. The current (2004) National Assessment of Vocational Education (NAVE) concludes that the decade of decline through the 1980s appears to have leveled off, with occupational concentrators falling substantially between 1982 and 1992 and remaining steady since then, at about one-quarter of all high school graduates (Silverberg, Warner, Fong, & Goodwin, 2004). These sometimes contradictory findings suggest that using researcher-imposed templates on transcripts does not guarantee consistent findings.

#### **CTE Participation: Self-Classification Analyses**

Other researchers have used a different approach—self-classification, provided through student surveys. Self-classification data are more likely to show student *intent* rather than student placement by counselors or others. For example, the almost 35% of youth who self-classified as an academic concentrator is a proportion more closely aligned with current estimates of college enrollment (see Rosenbaum, 2002) than are estimates derived from transcript analysis. Similarly, we might assume that the true number of CTE concentrators is much lower than identified through transcript analysis.

This review highlights the lack of current knowledge about who participated in CTE and STW activities at the end of the 1990s. This gap is the focus of the present study. This study will also provide data and analyses covering other topics. Research on CTE prior to the mid-1990s does not report on career major and only on a limited basis for tech prep as these are recent innovations. The concept of STW is similarly absent or lightly addressed in the literature (Boesel, Rahn, & Deich, 1994; Levesque et al., 1995; Milne, 1998). Thus, the analysis provided in this paper can be considered benchmark analysis for student participation in CTE and STW activities in the 1990s.

### **Research Questions**

In these analyses, we examined the following research questions:

1. What are the participation rates in the career and technical education concentration in schools? How do they compare to participation in the general, academic and dual tracks? What are the participation rates in career major, tech prep, cooperative education, job shadowing, mentoring, school-based enterprise, and internship/apprenticeship?
2. What family background, community and school achievement characteristics define participants in the different CTE-related curricula offered in American high schools? How do they compare to participation in the general, academic and dual tracks?
3. To what extent have CTE-related activities become embedded in the high school curriculum concentrations? To what extent do non-CTE youth participate in STW and STW related activities?
4. What is the relationship between curriculum participation, family background, school achievement and community characteristics and measures of academic rigor (math and science course taking), achievement (GPA and high school completion) and post high school four-year college aspirations for youth who completed high school at the end of the 20th century?

### **Data**

We analyzed data from the National Longitudinal Survey of Youth (NLSY97), Rounds 1 to 5 of youth interviews to answer the research questions of the study. The NLSY97, described by the Bureau of Labor Statistics (2002) as a database consisting of a nationally representative sample of approximately 9,000 youth who were 12 to 16 years old as of December 31, 1996, was designed to document the transition from school to work and into adulthood.

## Method and Procedure

Youth who had attended the 9th grade or higher were asked a number of questions about their participation in school programs, including what curriculum concentration they believed best described their high school experience and the extent to which they participated in CTE, CM, TP, and STW activities. Some limitations to the data relate to the limited options in questions regarding, for example, school-to-work activities, or even in the type of courses taken at school.

For this study, CTE is analyzed in its two different meanings. First, CTE corresponds to the *curricular program* students can be enrolled in while in high school. For this purpose, the analyses are based on their reported curriculum concentration as last reported in any of the five rounds of interviews. Second, CTE is also referred to as a set of structural strategies related to preparation for work supported by the STWOA or the Perkins amendments—i.e. career pathway, tech prep, and the following School-to-Work activities: cooperative education, job shadowing, mentoring, school-based enterprise, and internship/apprenticeship, while respondents were enrolled in high school. We refer to the latter as to *CTE-related activities*.

Analysis of participation in CTE and CTE-related activities has been conducted by examining reported participation during high school. Those indicators were dummy coded to reflect participation or no participation. Family background characteristics were obtained from the first round of interviews, as was the urbanicity. Family socioeconomic status was determined by using a proxy—parent education. In this case, the father’s educational background was used if the respondent was living with his or her family. The biological or residential parent’s education was used if the respondent came from a single-parent home. Eight-grade GPA, a school achievement indicator, was reported last as was the high school GPA. The number of courses for both math and science is a composite number of courses in those areas during high school only. High school completion excludes those that dropout of high school and those with a GED, as well as those currently enrolled by the 5th Round of interviews.

Analyses were performed with two types of statistical tests. First, we used crosstabulations for the descriptive part of the analysis. In that case, we weighted the observations, following the Bureau of Labor Statistics (BLS) guidelines, to estimate population parameters (Bureau of Labor Statistics, 2003; p. 38) and to control for the survey oversampling. The weighted sample enables estimation of the number of individuals represented by each respondent. We also performed logistic regression and linear regression analyses, for which we used omitted or reference variables.

## Results

### CTE Curriculum Participation in U.S. High Schools

An estimated 6.6% of the youth in the country identified themselves as CTE concentrators (see Table 1), a figure far lower than current NCES reports of 20.9% based on transcripts for public high schools (Hudson & Hurst, 1999; Levesque et al., 2000). Estimates for dual concentrators show more similarities with the other studies. Yet even our smaller estimation shows that CTE engages a large number of students across the nation.

Table 1

*Participation in Curriculum Concentration (Percentages and Weighted Estimates)*

	Percentage	Population Estimate
Concentration *		
General	52.2	10,026,963
Academic	34.6	6,641,333
CTE	6.6	1,270,071
Dual	5.9	1,126,828
Total	99.3 **	19,197,151
Sample n	8,765	

\* Last reported for years 1997 through 2001

\*\* Does not add up to 100% because others did not report participation in these concentrations.

For our prediction model of youth who participate in the four curricular options, we included characteristics they brought with them as they entered 9th grade (see Table 2). One predictor that is significant across all four models for curriculum concentration is parent's education, our proxy for the family socio-economic status.

Table 2

*Logistic Regression Probabilities for Curriculum Concentration Participation*

Independent Variable (Omitted)	Dependent Variable: Curriculum Concentration			
	General	Academic	CTE	Dual
	(Odds Ratios)			
Female (Male)	1.009	1.138 *	0.893	0.719 *
Black (White)	0.710 *	1.174 *	1.694 *	1.277 *
Hispanic (Non-Hispanic)	1.280 *	1.101	0.391 *	0.615 *
Parent Education	0.936 *	1.134 *	0.895 *	0.947 *
Urban (Suburban)	1.308 *	0.644 *	1.284 *	1.081
Rural (Suburban)	1.001	0.844 *	1.442 *	1.160
8th Grade GPA	0.508 *	2.826 *	0.723 *	0.916
N	6934	6934	6934	6934
-2 Log likelihood	8930.68	7528.23	3580.31	3186.46

\* Statistically significant at  $p < .05$ . General, Academic, CTE, and Dual models were significant at  $p < .05$ . Curriculum Concentration is last reported. Data for the independent variables are for 1997.

Five background characteristics predicted participation in CTE. Blacks were more likely than whites to identify with this concentration, and Hispanics were less likely than non-Hispanics. Like general concentrators, CTE youth entered high school with lower academic ability compared to other youth. As the parent education increases, the odds that a youth will identify as a CTE concentrator decreases—as with general concentrators. Like general concentrators, CTE concentrators are more likely to live in urban communities than suburban. These data suggest that CTE and general concentrators bring similar academic preparation to high school, share similar socioeconomic backgrounds, and come from similar communities.

General concentrators can be identified by five characteristics: race, ethnicity, GPA, community location, and parent education as follows. The odds that Black youth were general concentrators were 71% those of white youth, and Hispanic youth were more likely to identify with the general concentration than non-Hispanic youth. As 8th grade GPA increases, the odds that a youth identified with the general concentration significantly decreases. Urban youth were more likely than suburban youth to indicate they were in the general concentration.

**Participation Patterns in Career Major, Tech Prep and STW Activities**

We then examined how background characteristics combined with curriculum concentration to define youth who participated in a CM, TP, and the specific STW activities identified in this data base. Only a modest proportion of youth reported participation in STW activities at any time during their high school careers (see Table 3). The majority of youth reported not participating at all in any of these activities while in high school.

Table 3

*Participation in School-to-Work Activities (Percentages and Weighted Estimates)*

	Percentage	Population Estimate
STW or CTE-Related Programs *		
Career Major	32.7	6,136,522
Tech Prep	13.4	2,519,751
Specific STW Activities		
Cooperative Education	14.6	2,741,117
Job Shadowing	21.6	4,052,771
Mentoring	9.2	1,717,738
School-Based Enterprise	12.2	2,284,360
Internship/Apprenticeship	9.5	1,776,621
No Participation in Tech Prep or any STW Activities in all Years while in High School	51.4	9,637,027
Sample n		8,498

\*Analyses for 1997-2001 are performed for participation in CTE-related activities at any point during high school. For No Participation in Tech Prep or STW, data refer to students that did not participate in *all* high school years. Total percentage exceeds 100 because of multiple options to respond.

About a third of students in the country indicated they were career major participants at some point in their high school career. Over a fifth of high school youth participated in job shadowing. A substantial proportion of youth, approximately 25%, participated in cooperative vocational education and apprenticeships/internships, both arguably intensive work-based learning activities and perhaps surprisingly high participation rates coming after nearly two decades of increasing academic requirements.

To predict participation in STW our model included curriculum concentration to allow an examination of the relationship between curriculum, especially CTE, and STW participation.

Race is a defining characteristic of STW participation (see Table 4). Blacks were significantly more likely to participate in all but job shadowing compared to white youth. Gender too is a defining characteristic in TP, job shadowing, mentoring and school-based enterprise: females were significantly more likely to participate in the latter three activities and less likely in TP. The odds that a Hispanic student would participate in TP, job shadowing and school-based enterprise were significantly lower than for non-Hispanics.

Table 4

*Logistic Regression Probabilities for High School Participation in STW-Related Activities (Odds Ratios)*

Independent Variable (Omitted)	Dependent Variable: CTE-Related Activities						
	CM	TP	CE	JS	ME	SBE	IA
	(Odds Ratios)						
Female (Male)	1.012	0.913 *	1.015	1.116 *	1.194 *	1.129 *	1.037
Black (White)	1.202 *	1.168 *	1.194 *	0.999	1.267 *	1.143 *	1.144 *
Hispanic (Non-Hispanic)	0.949	0.925	0.992	0.837 *	1.056	0.843 *	1.054
Parent Education	0.966 *	0.962 *	0.970 *	1.018	1.028	1.002	0.996
Urban (Suburban)	1.031	0.949	1.025	0.941	1.114	1.079	1.171 *
Rural (Suburban)	1.023	1.045	0.974	1.161 *	0.956	0.927	0.798 *
8th Grade GPA	0.974	0.975	1.112 *	1.015	1.047	1.185 *	1.060
General (Academic)	0.577 *	0.559 *	0.608 *	0.894 *	0.793 *	0.826 *	0.694 *
CTE (Academic)	1.528 *	1.857 *	1.736 *	1.102	1.039	1.125	1.180
Dual (Academic)	1.573 *	1.653 *	1.551 *	0.982	1.172	1.133	1.379 *
N	6735	6732	6732	6732	6732	6732	6732
-2 Log likelihood	8290.15	5255.96	5524.52	6926.22	4052.60	4841.57	4058.84

\* Statistically significant at  $p < .05$ . The CTE-Related Activities models are all significant at  $p < .05$ . CM=Career Major; TP=Tech Prep; CE=Cooperative Education; JS=Job Shadowing; ME=Mentoring; SBE=School-based Enterprise; IA=Internship/Apprenticeship. Data for STW activities are for participation at any point during the high school experience. 8th-Grade GPA is last reported for 1997-2001.

As the education level of students' parent increases, youth were significantly less likely to participate in a CM, TP and cooperative education. However the 8th grade GPA had limited predictive power in defining STW participation with the exception of cooperative education and school-based enterprise, where each unit increase in 8th grade GPA increased the odds of participation by 11% and 19% respectively.

There were significant relationships between curriculum concentration and various elements of STW. We found that the odds that CTE and dual concentrators participated in a CM were more than 50% greater than for their academic counterparts and that the odds of general concentrators were half that of academic youth. In fact, general concentrators, compared to academic concentrators were less likely to participate in any STW related school activity.

CTE and dual concentrators were more likely than academic concentrators to participate in TP. Given that TP was built largely on articulation agreements between two-year colleges and CTE courses, this relationship is not surprising. Similarly, our finding that the odds of a CTE or dual concentrator participating in cooperative education are significantly greater than an academic concentrator is not unexpected. As with TP, cooperative education is part of the traditional CTE curriculum.

The profiles that emerge for the CM, TP and cooperative education student are quite similar in that curriculum concentration, race and parent's education are significant predictors of participation. We did not find such consistent patterns in the profiles of youth who participate in work based learning STW activities except that general concentrators are significantly less likely than academic concentrators to participate in any form of STW.

As we noted at the beginning of this report, there are no benchmarks for participation measures on most of these activities. The NLSY97 was one of the first efforts to document these activities. What these data show is a mixed picture of the extent to which STW is a part of the high school experience for all high school youth at the end of the 20th century. A majority youth do not participate in any STW activity. Of those who do, curriculum concentration was not predictive of participation in three specific STW activities but was for two important structural reforms—TP and CM—and two of the more intensive work-based learning pedagogies—cooperative education and internships/apprenticeships.

### **Predicting Student Achievement and Aspirations**

One salient feature of the Perkins amendments and the STWOA was the focus on upgrading the academic rigor of the high school programs followed by CTE students. As part of the Perkins II and Perkins III, TP specifically sought to increase the amount of math and science course taking by CTE students. There is some evidence in the recent NAVE report that this is occurring (see Silverberg, et al,

2004). With the data available, we sought to determine if there were different course taking patterns in math, science and CTE amongst all concentrators. A second measure of academic achievement was GPA. High school GPA, we argue, is at best a proxy for academic achievement. It is also interesting to note that lowest percentage of youth completing high school were general concentrators. Despite the lowest completion rate, the general concentrators have relatively high expectations of completing a four year college degree. CTE concentrators had a higher completion rate than general concentrators but the lowest expectation of completing a four year degree. Given the low percentage of youth who actually complete a four year degree (see Hoffman, 2003), one could argue that CTE students were more realistic about four year college aspirations and general concentrators less so.

As shown in Table 5, gender, race, ethnicity, and parents' education were significantly related to how much math and science a student reported taking in high school. Somewhat surprisingly, when we control for key background characteristics, blacks and Hispanics reported taking more math and science courses while in high school than did whites.

It has been widely reported that academic concentrators take more math and science than other concentrators (Roey, et al, 2001). In our study, students who participated in general, CTE and dual concentrations take significantly fewer math and science courses than academic concentrators. However, these data show that the effects differ among the three alternative curriculum concentrations. Controlling for critical background characteristics, the relative difference in math and science course taking between academic and general concentrators is greater than between academic and either CTE or dual concentrators. Independent of curriculum concentration and other background characteristics, we found that youth who participated in any form of STW reported taking more math and science than youth who do not. This finding suggests these reforms are influencing course taking in ways they were intended. The positive association between the specific STW, work-based learning activities, and greater math and science course taking is intriguing. This may suggest that classes or programs where these are included have higher standards for participation. Alternatively, it may mean that youth who get engaged in real-world learning see the value of math and science and thus elect to include more in their high school program. Regardless, these associations merit further examination.

Table 5

*Measures of High School Achievement and Aspirations: Course-Taking, Students' High School Grade Point Average, High School Completion, and Expectations of Obtaining a 4-Year College Degree by Age 30*

Independent Variable (Omitted)	Dependent Variable				
	Number of Courses		High School		Expectations
	Math	Science	GPA	Completion	
	$\beta$	$\beta$	$\beta$	Odds Ratio	$\beta$
Female (Male)	-0.025*	-0.029*	0.097*	1.022	0.015
Black (White)	0.072 *	0.098 *	-0.073*	0.904*	0.081*
Hispanic (Non-Hispanic)	0.046*	0.030*	-0.011	1.189*	0.039
Parent Education	0.122*	0.094*	0.105*	1.193*	0.173*
Urban (Suburban)	0.017	0.017	-0.040*	0.891	0.016
Rural (Suburban)	-0.038*	-0.015	0.024*	0.976	-0.093*
8th Grade GPA	0.230*	0.175*	0.528*	1.637*	0.140*
High School GPA	---	---	---	2.802*	0.166*
General (Academic)	-0.128*	-0.144*	-0.136*	0.662*	-0.193*
CTE (Academic)	-0.091*	-0.090*	-0.076*	0.711*	-0.174*
Dual (Academic)	-0.074*	-0.074*	-0.061*	0.932	-0.076 *
Career Major (no CM)	0.067 *	0.060 *	0.021	1.162 *	0.054
Tech Prep (no TP)	0.054 *	0.057 *	0.014	1.279 *	-0.053
Any Specific STW (no STW)	0.086 *	0.086 *	-0.002	1.183 *	0.006
N	6730	6730	4609	4543	1026
Adjusted R-Square	0.14	0.11	0.45	---	0.25
-2 Log likelihood	---	---	---	3362.21	---

\* Statistically significant at  $p < .05$ .

All models are statistically significant at  $p < .05$ . "High school completion" excludes from the analysis those still enrolled in school. Data for "Expectations ..." are for 2001 only.

Six sets of variables are associated with high school GPA. It is no surprise that of the six, 8th grade GPA is the strongest predictor. In addition, gender, race, parents' education, and community location are all significant contributors to explaining students' self reported high school GPA. Higher high school GPA is associated with being female, white and living in the suburbs rather than in an urban community.

While general, CTE and dual concentrators reported lower GPA than academics as expected (see Roey, et al, 2001) we note that the general concentration was a stronger, negative predictor of GPA than the either CTE or dual concentrations. Coefficients for CTE and dual concentrators are nearly half that of the general concentration. We found no relationship between participation in STW or STW activities and reported high school GPA.

There has been some debate about the effect of CTE in keeping youth in school (see Plank, 2001; Silverberg, et al., 2004). Determining a meaningful answer to this question is fraught with difficulties. Part of it is definitional (i.e., who is a CTE participant and which CTE does one include in the definition?). Defining a completer is also problematic. Under the current *No Child Left Behind* federal legislation, a 5th year senior is counted as a drop out. Yet there are vocational schools designed to take five years to complete. Many schools have programs designed to help struggling students complete high school in five years.

Another issue is timing. Much of the occupationally focused CTE is available only to 11th and 12th graders, so that those who drop out before 11th grade have not been exposed to that type of CTE. However, youth in this sample who were 16 and 17 (10th and 11th grade) reported the highest rate of CTE participation and even 18% of those in 9th grade reported they were a CTE concentrator (Stone & Aliaga, 2001). This suggests that even though occupational CTE may not be part of the 9th and 10th grade experience, students may be participating in other kinds of CTE (e.g., introduction to computers, family and consumer science).

In our model, each unit increase in 8th grade GPA increases the odds of completing high school by a factor of 1.6. We have a similar finding for high school GPA but the factor is greater (2.8). The direction of this coefficient is an expected finding.

An unexpected finding is the increased odds that Hispanic youth will complete high school compared to non-Hispanic youth. There are some explanations. While Hispanic youth have the highest drop out rates of all race and ethnicity groups (Kaufman, Alt, & Chapman, 2001), it is also true that Hispanic youth arrive in school with the greatest number of characteristics that put them at risk of dropping out (Romo & Falbo, 1996). Also, Hispanics drop out sooner than other youth, even before 8th grade (Schwartz, 1996). Therefore, they may have dropped out before the interviews for the NLSY97 surveys. We may also have a disproportionate number of whites who identified as Hispanic in our sample: 48% of Hispanics indicated they were white, and less than 3% as Black. The largest group of Hispanics self-identified

as “other” (49%). Another possible source of bias in these analyses is that in the NLSY97, Hispanic may also mean Cuban, Mexican, Puerto Rican, Colombian, or even individuals from Spain. Regardless, this finding deserves additional consideration in future analyses of the NLSY97.

When we compare the likelihood of completing high school as a function of curriculum concentration, we find that identifying as either a general or CTE concentrator decreases the odds of completing high school. The odds that a general concentrator will complete high school are only 66% those of academic concentrators. While CTE concentrators do better than general concentrators, the odds that a CTE concentrator will complete high school are 71% those of an academic concentrator.

The odds that youth who participate in STW or related activities will graduate from high school are significantly greater than for those who do not, independent of the effect of curriculum concentration. This is an intriguing finding. It could be that a sizable percentage of academic concentrators participate in one or more of these activities. Or that strategies like career pathways do engage youth and keep them in school (see Plank, DeLuca, & Estacion, forthcoming). Still another explanation is that of reverse causality, that is activities like Tech Prep and some, but not all, of the STW activities are largely associated with 11th and 12th graders. One could make the argument that youth who make it to the 11th grade are likely to complete high school and thus able to access the array of STW activities open to older students.

Youth in this study were asked their expectations that they would complete a four year college degree by age 30. Unfortunately, the data are limited to discussions of four-year college aspirations. As many youth, especially those in the CTE and dual concentrations, are likely to aspire to a two-year colleges or other, non-four year post high school education options, we expect that academic concentrators are more likely to think in terms of attending and completing a traditional four-year degree.

In these analyses, general, CTE, and dual concentrators are significantly less likely to aspire to a four-year degree than are academic concentrators. Similar to our findings for course-taking, and GPA, the three non-academic concentrations vary in their differences from academic concentrators. The beta coefficients for the general and CTE concentrators are similar. As with high school GPA, we found no statistically significant relationship between participation in STW and college expectations.

### **Discussion and Conclusions**

The NLSY97 offers evidence that allows us to create a portrait of student participation in career related education and pedagogies in the late 1990s. Our findings that the average number of CTE courses taken by all students is only slightly lower than that taken by CTE concentrators and given that CTE concentrators are a very small proportion of all students suggest that many youth are investing in CTE.

Despite continuing demands on school schedules for inclusion of more academic courses, CTE remains a large part of the high school experience.

While the percentage of youth who identify as a CTE concentrator is considerably smaller than reported elsewhere, we suggest that the difference may be more than simply the difference between transcript and self-report data. The difference may also reflect student motivation or fear of stigma when self-reporting. CTE for some youth may be a matter of conscious choice and for others may be a matter of tracking. The use of vocational education as a tracking system is a concept that has been described previously (Oakes, Gamoran, & Page, 1992).

The disparity may also be explained by the percentage of general concentrators who report taking many CTE courses. It is likely that many of these students have been placed in these courses by school counselors. It may also be true that many of these students elect to take CTE courses but do not see themselves as CTE concentrators because they believe, like most youth, that they are going to college and view CTE as a place for the non-college bound.

Regardless of how youth come to identify with a particular curriculum concentration, we find strong associations between family background and enrollment in CTE. Our findings show race, gender, ethnicity, and social class play an important role in such assignments.

An important point is found in the relationship between the early school achievement and CTE participation. While both general and CTE concentrators enter high school less academically prepared than academic concentrators, CTE concentrators exit high school with a smaller achievement gap compared to their academic counterparts than do general concentrators. Dual concentrators similarly exit high school behind academic concentrators, albeit with a smaller gap than that of either the CTE or general concentrators. This suggests there may be a small academic penalty or cost to combining career focused and college focused coursework while in high school. The benefit for this apparent cost may be worth it in the long run (Bishop & Mane, 2004).

The CTE and STW legislation of the 1990s intended to improve the transition of youth to careers through increased contact with and study of the workplace, and by improving the academic rigor of the high school experience. We found evidence of a positive relationship between participation in CTE and STW activities and key measures of high school achievement; however most students do not concentrate in CTE or participate in any STW activities. In the post No Child Left Behind era, many states are increasing the amount of traditional academic coursework required for graduation (e.g., requiring four years of mathematics). Given the fixed school day, such an increase in required coursework reduces the time available for elective coursework including CTE. As political leaders seek simple solutions to the complex problems confronting public education, we expect the trend toward mandating more academic coursework to continue, thus reducing the levels of participation in CTE and STW reported here.

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