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# 1992-93 Bachelor's Degree Recipients and Their Opinions About Education in 2003

**E.D. TAB**

July 2005

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## Foreword

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This E.D. TAB is the first publication using data from the final follow-up of the 1993/03 Baccalaureate and Beyond Longitudinal Study (B&B:93/03) conducted by the National Center for Education Statistics (NCES) within the U.S. Department of Education. B&B:93/03 is a long-term study of 1992–93 bachelor’s degree recipients who were interviewed in 1993, 1994, 1997, and 2003.

The sample was originally obtained by identifying eligible respondents from the 1992–93 National Postsecondary Student Aid Study (NPSAS:93), a nationally representative cross section of all students in postsecondary education institutions (from less-than-2-year institutions through those offering advanced degrees) in the 50 states, the District of Columbia, and Puerto Rico. As part of NPSAS:93, information was obtained from postsecondary institutions and through telephone interviews with students. Those members of the NPSAS:93 sample who completed a bachelor’s degree between July 1, 1992, and June 30, 1993, were identified and contacted for follow-up interviews in 1994, 1997, and 2003.

This E.D. TAB presents the percentages of students who reported important relationships between their undergraduate education and their lives in 2003; the percentages who enrolled for further postsecondary education; and, for those who completed graduate programs, their satisfaction with those programs and the programs’ importance to their lives. These estimates are presented by baccalaureate major, undergraduate grade point average (GPA), control of institution, highest degree attained, and field of advanced degree.

The estimates presented in the E.D. TAB were produced using the NCES Data Analysis System Online (DAS), a web-based table-generating application that provides the public with direct, free access to the B&B:93/03 study as well as other postsecondary datasets collected by NCES. The B&B:93/03 estimates are subject to sampling and nonsampling errors. The DAS produces the design-adjusted standard errors necessary for testing the statistical significance of differences in the estimates. All comparisons made in the text were tested using Student’s *t* statistic for comparing two numbers, and all differences cited were statistically significant at the .05 level. For more information about public access to the data files with DAS, readers should consult appendix B of this E.D. TAB.

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At NCES, Kristin Perry shepherded the E.D. TAB through the review process. Paula Knepper provided a careful technical review. Other reviewers at NCES included Marilyn Seastrom, Dennis Carroll, James Griffith, Tracy Hunt-White, and Aurora D'Amico. We also appreciate the thoughtful reviews provided by David Bergeron, Office of Postsecondary Education, U.S. Department of Education; Joan Burrelli, National Science Foundation; Dongbin Kim, National Association of Independent Colleges and Universities; Catherine Millett, Educational Testing Service; and Dawn Terkla, Tufts University.

# Contents

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	<b>Page</b>
<b>Foreword</b> .....	iii
<b>Acknowledgments</b> .....	iv
<b>List of Tables</b> .....	vi
<b>Introduction</b> .....	1
<b>Selected Results</b> .....	3
Importance of Undergraduate Education .....	3
Undergraduate Education and Occupational Training .....	4
Enrollment and Completion of Graduate Education .....	4
Satisfaction and Importance of Graduate Education.....	5
<b>References</b> .....	7
<b>Tables</b> .....	9
<b>Appendix A—Glossary</b> .....	A-1
<b>Appendix B—Technical Notes and Methodology</b> .....	B-1
The 2003 Baccalaureate and Beyond Longitudinal Study.....	B-1
Weighting .....	B-3
Quality of Estimates .....	B-3
Imputation .....	B-6
Data Analysis System.....	B-9
Statistical Procedures .....	B-11

## List of Tables

---

<b>Table</b>		<b>Page</b>
1	Percentage of 1992–93 bachelor’s degree recipients who reported that various characteristics of their undergraduate education were very important to their lives now, by education characteristics: 2003 .....	11
2	Percentage of 1992–93 bachelor’s degree recipients who reported that their undergraduate education was very important preparation for various areas of their lives now, by education characteristics: 2003 .....	12
3	Percentage of 1992–93 bachelor’s degree recipients who enrolled in subsequent undergraduate programs, and of those, percentage who completed such a program, by education characteristics: 2003 .....	13
4	Percentage of 1992–93 bachelor’s degree recipients who took training or classes outside a postsecondary degree or certificate program, by education characteristics: 2003 .....	14
5	Percentage of 1992–93 bachelor’s degree recipients who enrolled in a postbaccalaureate certificate or advanced degree program, by education characteristics: 2003 .....	15
6	Percentage distribution of 1992–93 bachelor’s degree recipients’ highest degree attained, by education characteristics: 2003 .....	16
7	Among 1992–93 bachelor’s degree recipients with advanced degrees, percentage who reported being very satisfied with various characteristics of their graduate education, by education characteristics: 2003 .....	17
8	Among 1992–93 bachelor’s degree recipients with advanced degrees, percentage who reported that various characteristics of their graduate education were very important to their lives now, by education characteristics: 2003 .....	18
9	Among 1992–93 bachelor’s degree recipients with advanced degrees, percentage who reported their graduate education was very important preparation for various areas of their lives now, by education characteristics: 2003 .....	19

<b>Table</b>	<b>Page</b>
<b>Appendix</b>	
B-1	B&B:93/03 variables in this publication that were imputed, with percentage of cases that were imputed ..... B-7
B-2	Standard errors for table 1: Percentage of 1992–93 bachelor’s degree recipients who reported that various characteristics of their undergraduate education were very important to their lives now, by education characteristics: 2003 ..... B-10

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# Introduction

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In the 1992–93 academic year, the National Center for Education Statistics (NCES) embarked on its first long-term study of bachelor’s degree recipients, the 1993/03 Baccalaureate and Beyond Longitudinal Study (B&B:93/03). The B&B:93/03 sample was obtained by identifying eligible respondents from the 1992–93 National Postsecondary Student Aid Study (NPSAS:93), a nationally representative cross section of students in all sectors of postsecondary education in the 50 states, the District of Columbia, and Puerto Rico.<sup>1</sup> For NPSAS:93, information was obtained from more than 1,000 postsecondary institutions on approximately 50,000 undergraduate students and more than 13,000 graduate students. Those members of the NPSAS:93 sample who completed a bachelor’s degree between July 1, 1992, and June 30, 1993, were identified and contacted for a 1-year follow-up interview in 1994 and a 4-year follow-up in 1997. In 2003, 10 years after they had completed a bachelor’s degree, the final follow-up of this cohort took place. This E.D. TAB provides some selected results on the opinions about education expressed by this cohort of college graduates at the time of their interviews in 2003.

Specifically, this E.D. TAB presents the percentages of bachelor’s degree recipients who reported important relationships between their undergraduate education and their lives in 2003; further education since completion of the 1992–93 bachelor’s degree; and, for those who completed graduate programs, important relationships between their graduate education and their lives.<sup>2</sup> These tabulations are presented by baccalaureate major, undergraduate grade point average (GPA), control of institution, highest degree completed, and field of advanced degree. More information about the variables used in this E.D. TAB can be found in the glossary in appendix A.

The estimates in this E.D. TAB are based on the results of surveys with almost 9,000 bachelor’s degree recipients, representing about 1.2 million students who completed a bachelor’s degree in 1992–93. The Internet-based survey could be self-administered by the respondent or completed over the telephone with a trained interviewer. The weighted overall response rate for the B&B:93/03 interview was 74 percent, reflecting an institution response rate of 88 percent and

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<sup>1</sup> All tables in this report show totals for college graduates both with and without Puerto Rico. Breakouts by other variables include college graduates from Puerto Rico.

<sup>2</sup> Because the median time between completing a bachelor’s degree and completing a Ph.D. is 10 years (Hoffer et al. 2004) and for some fields is much longer, many graduates will not have had time to complete an advanced degree. Therefore, the size of this group will tend to be underestimated.

a student response rate of 83 percent. All comparisons made in the text were tested using Student's  $t$  statistic for comparing two numbers or  $F$  tests for overall significance and linear trends for comparisons across ordered categories. All differences cited were statistically significant at the .05 level. The analysis conducted for this E.D. TAB does not include longitudinal analysis of change over time and does not control for interrelationships among the variables. To avoid confounding influences of previous undergraduate experience, all analyses in this E.D. TAB are restricted to those for whom the 1992–93 bachelor's degree was the first bachelor's degree received (about 93 percent of the sample). More information about the sample, data files, and analysis is provided in appendix B.

## Selected Results

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### Importance of Undergraduate Education

The 2003 follow-up concludes the study of 1992–93 bachelor’s degree recipients, and as the final installment of information about their postbaccalaureate paths, represents an appropriate time to ask graduates to reflect on their college years. Respondents were asked about both the importance of specific aspects of their college education to them now and the usefulness of their undergraduate education as a whole to some broad areas of their lives. For each item, the graduates were asked whether or not the item was “very important.”

- Among 1992–93 bachelor’s degree recipients, about three-fifths reported that the quality of instruction they received as undergraduates (61 percent) and their undergraduate major field (58 percent) remained very important to their lives 10 years later (table 1).
- The relative importance of various characteristics of undergraduate education varied by control of the institution from which students graduated. That is, graduates of public institutions were more likely than graduates of private not-for-profit institutions to report that their major field, the professional classes they had taken, and their internship or other work opportunities as undergraduates were very important in 2003. On the other hand, graduates of private not-for-profit institutions were more likely than graduates of public institutions to report that liberal arts courses and the quality of instruction they received were very important.
- Nearly four out of five graduates (78 percent) reported that their undergraduate education *as a whole* was very important in preparing them for work and career; a majority also indicated that their college years were very important preparation for their further education (56 percent) and financial security (57 percent; table 2).
- Graduates with an undergraduate major in health, science, mathematics, or engineering, or business were more likely than those who majored in arts and humanities, social and behavioral sciences, or “other” fields to feel that their undergraduate education was very important preparation for their work and career (80–86 percent vs. 70–77 percent; table 2).
- Graduates with higher undergraduate GPAs were more likely than those with lower GPAs to report that their undergraduate education was very important preparation for work and career and for further education. For example, 84 percent of graduates with cumulative undergraduate GPAs of 3.75 or higher reported that their undergraduate education was very important for work and career, compared with 80 percent whose GPAs were 2.75–3.74 and 76 percent whose GPAs were less than 2.75.

## **Undergraduate Education and Occupational Training**

Although students in this study had completed a bachelor's degree in 1992–93, a number of them pursued additional undergraduate education. In addition, some completed an occupational license or professional certification. Finally, others had taken either work-related or personal enrichment classes without pursuing a particular degree or credential.

- Among 1992–93 bachelor's degree recipients, 9 percent had subsequently enrolled in at least one undergraduate program within 10 years of completing a bachelor's degree: 2 percent enrolled in a diploma/certificate program, 2 percent in an associate's degree program, and 6 percent in an additional bachelor's degree program (table 3). Of those who enrolled in an undergraduate program, 59 percent completed a certificate or degree.
- After completing a bachelor's degree, one-fourth of 1992–93 bachelor's degree recipients obtained an occupational license and 30 percent obtained a professional certification (table 4). Also, as of 2003, 45 percent had participated in work-related training and 18 percent had taken personal enrichment classes in the past year.
- Among 1992–93 bachelor's degree recipients, those who majored in health as undergraduates were more likely than those with all other majors to enroll in an occupational license program (36 vs. 21–28 percent; table 4). Those who majored in education or health were more likely than those with all other majors to enroll in a professional certification program (46 and 39 vs. 25–29, respectively).

## **Enrollment and Completion of Graduate Education**

Graduates were also asked about any graduate degree or certificate programs that they pursued since completing their bachelor's degree. These included postbaccalaureate certificates and master's, first-professional, and doctoral degrees.<sup>3</sup>

- By 2003, 43 percent of 1992–93 bachelor's degree recipients had enrolled in a postbaccalaureate certificate, master's, doctoral, or first-professional degree program. Of those, 63 percent had completed such a program, and 24 percent had left without completing (table 5). As of 2003, 10 years after bachelor's degree completion, 17 percent of those who had ever enrolled were currently pursuing a graduate program of some type.
- As of 2003, the highest degree of about three-fourths of 1992–93 bachelor's degree recipients was a bachelor's degree or postbaccalaureate certificate (table 6). Twenty percent of students earned a master's degree, 4 percent earned a first-professional degree, and 2 percent earned a doctoral degree.

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<sup>3</sup> The terms "graduate program" and "postbaccalaureate education" are used to refer to postbaccalaureate certificate and master's, first-professional, and doctoral degree programs combined. First-professional degrees are also simply referred to as "professional degrees." The term "advanced degree" refers to master's, first-professional, and doctoral degrees (i.e., excludes postbaccalaureate certificates). First-professional degree programs include a number of professional degrees such as medicine (M.D.), chiropractic (D.C. or D.C.M.), dentistry (D.D.S. or D.M.D.), optometry (O.D.), osteopathic medicine (D.O.), pharmacy (D.Pharm.), podiatry (Pod.D. or D.P.M.), veterinary medicine (D.V.M.), law (L.L.B. or J.D.), and theology (M.Div., M.H.L., or B.D.).

- College graduates with a bachelor's degree in science, mathematics, or engineering were more likely than those who majored in all other subjects to earn a doctoral degree (7 vs. 0–4 percent; table 6). Graduates with majors in science, mathematics, or engineering or in social and behavioral sciences were also generally more likely than those with all other majors to earn a first-professional degree (8 and 6 percent vs. 2–4 percent, respectively), although no difference could be detected between social and behavioral sciences and arts and humanities. On the other hand, graduates who earned a bachelor's degree in education were more likely than those in all other subjects (except arts and humanities) to earn a master's degree by 2003 (26 vs. 15–21 percent).

## Satisfaction and Importance of Graduate Education

Finally, bachelor's degree recipients with any enrollment at the graduate level since the previous interview in 1997 were asked how satisfied they were with various aspects of their graduate experience. They were also asked whether areas of their graduate education were very important to their lives overall, and whether their graduate education as a whole was important to specific areas of their lives. For graduates who had completed an advanced degree (a master's, first-professional, or doctoral degree) by 2003, this section describes their responses.<sup>4</sup>

- Overall, bachelor's degree recipients who had completed an advanced degree were very satisfied with their graduate education (table 7). Seventy-one percent were very satisfied with the faculty and the teaching, 70 percent were very satisfied with the course offerings, 64 percent were very satisfied with the availability of courses, and 58 percent were very satisfied with the career preparation they received.
- Bachelor's degree recipients with graduate or professional degrees in the health field were more likely than those with degrees in all other fields to report being very satisfied with the career preparation aspect of their graduate education (77 vs. 49–59 percent; table 7).
- Most bachelor's degree holders who had completed a graduate or professional degree considered their course of study, instructional quality, interaction with faculty, internship and work opportunities, and social contacts while enrolled in their graduate program to be very important to their lives now (table 8). About four out of five (79 percent) said their course of study was very important to their lives now, and two-thirds (68 percent) reported that the quality of instruction was very important.
- Bachelor's degree recipients who had completed an advanced degree generally felt that their graduate education was very important preparation for many aspects of their lives now (table 9). For example, 89 percent felt their graduate education was very important preparation for their work and career, 77 percent felt it was very important for taking on new challenges, 70

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<sup>4</sup> The tables referenced in this section include people who had obtained an advanced degree at any time by 2003, and were enrolled in graduate education at some point since 1997. Thus, people who completed an advanced degree before 1997, but then enrolled in a graduate program since 1997 (whether or not they completed it), were asked these questions about their graduate education. People whose only graduate enrollment (whether or not they completed a program) was prior to 1997 are not included.

percent felt it was very important for establishing financial security, and 60 percent reported that it was very important preparation for helping them make informed choices.

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## Tables

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**Table 1. Percentage of 1992–93 bachelor’s degree recipients who reported that various characteristics of their undergraduate education were very important to their lives now, by education characteristics: 2003**

Education characteristics	Under-graduate major	Liberal arts courses	Under-graduate professional courses	Quality of instruction	Internship and other work opportunities	None
U.S. total (excluding Puerto Rico)	58.4	36.4	49.7	60.7	41.8	8.8
Total (50 states, D.C., and Puerto Rico)	58.3	36.3	49.8	60.7	41.8	8.8
Undergraduate major						
Professional fields	62.8	28.4	58.6	60.3	43.4	8.6
Business and management	58.3	25.0	56.3	55.8	35.5	11.1
Education	65.0	38.2	55.4	64.4	50.9	6.5
Health	73.8	20.9	72.5	67.7	55.9	4.3
Arts and sciences	55.5	42.2	42.7	61.3	39.2	8.8
Arts and humanities	52.4	60.9	34.9	66.5	34.1	8.2
Social and behavioral sciences	46.4	47.0	42.6	58.0	40.2	11.4
Science/math/engineering	66.4	25.6	47.6	61.2	41.5	6.7
Other	54.0	41.5	46.3	60.3	45.2	8.9
Cumulative undergraduate GPA						
Less than 2.75	55.0	34.1	49.4	57.6	40.2	10.2
2.75–3.74	60.3	38.1	50.5	64.3	44.1	7.2
3.75 or higher	68.4	38.7	51.2	64.5	43.3	6.7
Bachelor’s degree-granting institution						
Public 4-year	59.8	32.4	51.7	57.8	43.0	9.1
Private not-for-profit 4-year	55.6	46.0	46.4	67.5	39.4	7.1
Other	54.4	20.7	46.7	53.4	42.6	19.0
Highest degree attained as of 2003						
Bachelor’s degree <sup>1</sup>	56.6	34.5	50.6	58.6	41.3	9.5
Master’s degree	64.7	39.8	49.5	65.5	44.0	7.0
Doctoral/first-professional degree	59.3	48.4	41.6	71.4	41.1	5.7
Field of advanced degree <sup>2</sup>						
Business and management	54.7	32.1	47.7	62.4	35.1	10.7
Education	66.1	43.0	54.7	65.3	50.0	5.3
Health	57.6	30.6	51.7	68.0	43.9	7.7
Arts and humanities	55.3	71.7	36.5	76.1	38.0	7.6
Social and behavioral sciences	71.6	55.8	44.6	62.9	41.7	3.3
Science/math/engineering	77.9	33.6	45.0	73.4	51.6	4.3
Other	64.2	47.8	44.0	66.6	41.7	6.1

<sup>1</sup>Includes postbaccalaureate certificates.

<sup>2</sup>Only includes respondents who completed a master’s, doctoral, or first-professional degree.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1993/03 Baccalaureate and Beyond Longitudinal Study (B&B:93/03).

**Table 2. Percentage of 1992–93 bachelor’s degree recipients who reported that their undergraduate education was very important preparation for various areas of their lives now, by education characteristics: 2003**

Education characteristics	Work and career	Further education	Establishing financial security	None
U.S. total (excluding Puerto Rico)	78.5	55.9	57.1	8.0
Total (50 states, D.C., and Puerto Rico)	78.5	55.9	57.2	8.1
Undergraduate major				
Professional fields	82.2	52.9	60.5	7.1
Business and management	82.6	46.4	61.7	7.6
Education	79.8	60.5	53.3	7.1
Health	86.0	60.1	70.6	5.3
Arts and sciences	75.5	60.2	55.6	8.6
Arts and humanities	69.7	60.3	47.7	11.0
Social and behavioral sciences	71.0	61.0	50.7	11.1
Science/math/engineering	83.6	59.4	65.5	4.6
Other	76.7	51.6	52.1	9.4
Cumulative undergraduate GPA				
Less than 2.75	76.5	51.9	56.7	9.4
2.75–3.74	80.4	60.0	58.7	6.0
3.75 or higher	83.7	63.7	56.1	6.0
Bachelor’s degree-granting institution				
Public 4-year	78.9	54.8	58.2	7.9
Private not-for-profit 4-year	77.9	58.6	55.4	8.3
Other	76.7	52.2	53.2	9.5
Highest degree attained as of 2003				
Bachelor’s degree <sup>1</sup>	78.0	48.0	57.3	9.7
Master’s degree	81.0	76.7	58.1	3.4
Doctoral/first-professional degree	76.3	85.8	52.2	3.7
Field of advanced degree <sup>2</sup>				
Business and management	82.0	73.6	62.2	2.1
Education	83.5	75.3	59.1	3.7
Health	74.9	83.8	46.7	4.9
Arts and humanities	79.7	77.0	35.6	2.8
Social and behavioral sciences	74.5	88.4	47.2	1.7
Science/math/engineering	86.1	84.5	67.8	2.3
Other	75.5	79.0	58.4	5.4

<sup>1</sup>Includes postbaccalaureate certificates.

<sup>2</sup>Only includes respondents who completed a master’s, doctoral, or first-professional degree.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1993/03 Baccalaureate and Beyond Longitudinal Study (B&B:93/03).

**Table 3. Percentage of 1992–93 bachelor’s degree recipients who enrolled in subsequent undergraduate programs, and of those, percentage who completed such a program, by education characteristics: 2003**

Education characteristics	Percent who enrolled in				Of those enrolled, percent completed
	Technical diploma/certificate	Associate’s degree	Bachelor’s degree	Any	
U.S. total (excluding Puerto Rico)	2.2	1.9	5.7	9.3	58.4
Total (50 states, D.C., and Puerto Rico)	2.2	1.9	5.6	9.2	58.6
Undergraduate major					
Professional fields	1.6	1.7	5.1	7.7	63.3
Business and management	1.5	1.7	3.6	6.4	54.2
Education	1.7	1.6	7.2	9.9	73.0
Health	1.9	1.9	5.8	8.0	64.7
Arts and sciences	2.3	2.0	6.4	10.3	55.9
Arts and humanities	2.9	2.2	5.1	9.9	53.5
Social and behavioral sciences	2.7	3.0	6.9	12.1	51.8
Science/math/engineering	1.4	0.9	6.7	8.8	62.9
Other	3.8	2.3	5.1	10.4	56.5
Cumulative undergraduate GPA					
Less than 2.75	2.6	2.4	6.0	10.3	56.6
2.75–3.74	1.6	1.3	5.3	7.8	64.6
3.75 or higher	1.8	1.1	5.1	7.9	58.1
Bachelor’s degree-granting institution					
Public 4-year	2.4	2.3	6.9	10.9	59.5
Private not-for-profit 4-year	1.8	1.3	3.4	6.3	56.4
Other	1.3	0.4	2.0	3.7	‡
Highest degree attained as of 2003					
Bachelor’s degree <sup>1</sup>	2.6	2.2	6.1	10.2	57.7
Master’s degree	1.6	0.8	4.7	6.8	68.1
Doctoral/first-professional degree	#	2.1	3.7	5.8	‡
Field of advanced degree <sup>2</sup>					
Business and management	3.1	1.4	1.9	6.4	‡
Education	1.3	0.7	8.2	10.1	72.2
Health	0.5	0.8	4.9	6.2	‡
Arts and humanities	0.6	#	0.5	1.0	‡
Social and behavioral sciences	#	1.5	3.0	3.6	‡
Science/math/engineering	0.6	0.4	4.3	5.3	‡
Other	0.6	2.0	4.4	6.8	‡

#Rounds to zero.

‡Reporting standards not met (too few cases).

<sup>1</sup>Includes postbaccalaureate certificates.<sup>2</sup>Only includes respondents who completed a master’s, doctoral, or first-professional degree.

NOTE: Detail does not sum to totals because respondents could enroll in more than one type of program.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1993/03 Baccalaureate and Beyond Longitudinal Study (B&amp;B:93/03).

**Table 4. Percentage of 1992–93 bachelor’s degree recipients who took training or classes outside a postsecondary degree or certificate program, by education characteristics: 2003**

Education characteristics	Occupational license <sup>1</sup>	Professional certification <sup>1</sup>	Work-related classes <sup>2</sup>	Personal enrichment classes <sup>2</sup>
U.S. total (excluding Puerto Rico)	24.9	30.2	44.5	18.1
Total (50 states, D.C., and Puerto Rico)	25.1	30.2	44.5	18.2
Undergraduate major				
Professional fields	25.7	34.0	44.4	16.7
Business and management	21.5	25.5	41.3	13.6
Education	27.8	46.4	49.0	19.5
Health	36.4	39.3	46.2	21.5
Arts and sciences	24.7	26.9	44.3	18.7
Arts and humanities	20.6	27.2	39.1	21.4
Social and behavioral sciences	27.8	26.8	46.4	19.4
Science/math/engineering	24.4	26.9	45.3	16.3
Other	24.1	28.7	45.5	20.8
Cumulative undergraduate GPA				
Less than 2.75	24.5	29.2	43.7	16.1
2.75–3.74	25.4	31.0	43.6	20.4
3.75 or higher	26.5	33.7	49.5	22.5
Bachelor’s degree-granting institution				
Public 4-year	24.7	31.6	46.1	17.7
Private not-for-profit 4-year	25.8	27.7	41.2	18.8
Other	25.3	25.1	45.4	21.8
Highest degree attained as of 2003				
Bachelor’s degree <sup>3</sup>	22.4	28.5	42.7	17.8
Master’s degree	26.6	36.5	52.0	20.4
Doctoral/first-professional degree	53.8	30.9	42.8	15.7
Field of advanced degree <sup>4</sup>				
Business and management	17.5	23.4	44.7	16.9
Education	35.4	59.2	60.5	20.2
Health	55.8	44.6	47.2	20.5
Arts and humanities	17.7	24.2	45.8	17.5
Social and behavioral sciences	41.1	27.1	54.7	22.9
Science/math/engineering	14.5	21.6	48.1	20.9
Other	44.0	29.4	46.0	19.0

<sup>1</sup>Since 1993.<sup>2</sup>In the past 12 months.<sup>3</sup>Includes postbaccalaureate certificates.<sup>4</sup>Only includes respondents who completed a master’s, doctoral, or first-professional degree.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1993/03 Baccalaureate and Beyond Longitudinal Study (B&amp;B:93/03).

**Table 5. Percentage of 1992–93 bachelor’s degree recipients who enrolled in a postbaccalaureate certificate or advanced degree program, by education characteristics: 2003**

Education characteristics	Ever enrolled	Of those ever enrolled		
		Ever completed <sup>1</sup>	Never completed, no longer enrolled	Currently enrolled
U.S. total (excluding Puerto Rico)	42.5	63.4	23.5	17.2
Total (50 states, D.C., and Puerto Rico)	42.5	63.4	23.5	17.1
Undergraduate major				
Professional fields	37.4	60.7	24.8	18.3
Business and management	27.5	65.0	22.5	15.9
Education	54.6	56.5	27.1	20.4
Health	38.0	61.8	24.1	18.4
Arts and sciences	49.3	64.8	22.4	17.3
Arts and humanities	46.6	62.7	24.2	18.6
Social and behavioral sciences	49.3	62.2	22.5	19.9
Science/math/engineering	51.1	68.4	21.2	14.0
Other	36.1	65.7	24.4	13.4
Cumulative undergraduate GPA				
Less than 2.75	63.5	59.5	25.4	18.5
2.75–3.74	51.5	66.1	21.5	17.0
3.75 or higher	43.7	70.0	22.0	13.1
Bachelor’s degree-granting institution				
Public 4-year	40.6	61.2	24.6	18.0
Private not-for-profit 4-year	47.1	66.3	22.5	16.0
Other	33.7	75.3	11.3	14.3
Highest degree attained as of 2003				
Bachelor’s degree <sup>1</sup>	77.3	7.9	59.1	33.9
Master’s degree	100.0	100.0	#	7.1
Doctoral/first-professional degree	100.0	100.0	#	2.9
Field of advanced degree <sup>2</sup>				
Business and management	100.0	100.0	#	3.4
Education	100.0	100.0	#	7.4
Health	100.0	100.0	#	4.3
Arts and humanities	100.0	100.0	#	7.1
Social and behavioral sciences	100.0	100.0	#	9.2
Science/math/engineering	100.0	100.0	#	10.7
Other	100.0	100.0	#	4.5

#Rounds to zero.

<sup>1</sup>Includes postbaccalaureate certificates. People in this group could also be currently enrolled in another graduate program.<sup>2</sup>Only includes respondents who completed a master’s, doctoral, or first-professional degree. These graduates could also have left without completing, or be currently enrolled in, another graduate program.

NOTE: Columns are not mutually exclusive; bachelor’s degree recipients who are currently enrolled could have completed a prior graduate program.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1993/03 Baccalaureate and Beyond Longitudinal Study (B&amp;B:93/03).

**Table 6. Percentage distribution of 1992–93 bachelor's degree recipients' highest degree attained, by education characteristics: 2003**

Education characteristics	Bachelor's degree <sup>1</sup>	Advanced degree			
		Total	Master's degree	First-professional degree	Doctoral degree
U.S. total (excluding Puerto Rico)	74.4	25.6	19.7	4.0	1.9
Total (50 states, D.C., and Puerto Rico)	74.4	25.6	19.7	4.0	1.9
Undergraduate major					
Professional fields	78.7	21.3	19.0	1.8	0.5
Business and management	83.3	16.7	14.7	1.8	0.2
Education	71.1	28.9	26.3	1.5	1.1
Health	77.9	22.1	19.4	2.1	0.6
Arts and sciences	69.4	30.7	20.8	6.3	3.6
Arts and humanities	73.0	27.1	21.5	4.3	1.2
Social and behavioral sciences	70.8	29.2	21.1	6.1	2.0
Science/math/engineering	65.7	34.3	20.1	7.7	6.6
Other	77.6	22.4	18.0	3.4	1.0
Cumulative undergraduate GPA					
Less than 2.75	79.7	20.4	16.8	2.20	1.34
2.75–3.74	69.4	30.6	21.3	7.10	2.25
3.75 or higher	61.6	38.4	30.1	4.28	4.10
Bachelor's degree-granting institution					
Public 4-year	76.6	23.4	18.1	3.5	1.9
Private not-for-profit 4-year	70.0	30.0	22.7	5.3	2.0
Other	74.6	25.4	22.5	1.6	1.3
Highest degree attained as of 2003					
Bachelor's degree <sup>1</sup>	100.0	†	†	†	†
Master's degree	†	100.0	100.0	†	†
Doctoral/first-professional degree	†	100.0	†	67.5	32.5
Field of advanced degree <sup>2</sup>					
Business and management	†	100.0	98.4	#	1.6
Education	†	100.0	98.3	0.3	1.4
Health	†	100.0	48.7	48.1	3.2
Arts and humanities	†	100.0	86.6	3.6	9.9
Social and behavioral sciences	†	100.0	89.4	#	10.6
Science/math/engineering	†	100.0	76.3	#	23.7
Other	†	100.0	43.5	45.1	11.4

†Not applicable.

#Rounds to zero.

<sup>1</sup>Includes postbaccalaureate certificates.<sup>2</sup>Only includes respondents who completed a master's, doctoral, or first-professional degree.

NOTE: Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1993/03 Baccalaureate and Beyond Longitudinal Study (B&amp;B:93/03).



**Table 7. Among 1992–93 bachelor’s degree recipients with advanced degrees, percentage who reported being very satisfied with various characteristics of their graduate education, by education characteristics: 2003**

Education characteristics	Faculty/ teaching	Courses offered	Course availability	Career preparation	None
U.S. total (excluding Puerto Rico)	71.3	70.2	64.3	58.4	4.4
Total (50 states, D.C., and Puerto Rico)	71.2	70.3	64.2	58.5	4.4
Undergraduate major					
Professional fields	70.8	69.9	64.4	59.7	3.6
Business and management	68.0	67.6	61.2	53.0	5.5
Education	73.7	72.2	66.1	65.4	2.8
Health	70.2	69.7	67.6	61.8	1.1
Arts and sciences	72.6	71.8	64.9	59.5	4.7
Arts and humanities	76.4	75.0	65.2	56.2	6.4
Social and behavioral sciences	69.2	68.4	64.1	56.7	5.6
Science/math/engineering	73.6	73.0	65.4	63.3	3.3
Other	65.9	64.3	60.0	50.0	5.1
Cumulative undergraduate GPA					
Less than 2.75	70.2	71.6	67.4	54.6	4.0
2.75–3.74	73.4	71.1	60.7	62.7	4.3
3.75 or higher	69.9	67.9	63.3	59.7	4.9
Bachelor’s degree-granting institution					
Public 4-year	72.3	71.2	65.3	58.8	4.2
Private not-for-profit 4-year	70.9	70.3	62.5	57.7	4.7
Other	‡	‡	‡	‡	‡
Highest degree attained as of 2003					
Bachelor’s degree <sup>1</sup>	†	†	†	†	†
Master’s degree	69.8	70.6	65.8	55.3	4.0
Doctoral/first-professional degree	75.4	69.5	59.6	67.6	5.5
Field of advanced degree <sup>2</sup>					
Business and management	68.5	74.0	66.7	53.0	3.1
Education	69.4	68.0	67.0	59.2	5.2
Health	73.2	66.3	63.5	76.5	2.2
Arts and humanities	78.6	74.0	60.0	56.8	7.6
Social and behavioral sciences	61.5	65.0	57.4	54.8	7.8
Science/math/engineering	70.6	72.8	64.9	48.9	3.0
Other	75.2	70.0	62.1	58.7	5.0

†Not applicable.

‡Reporting standards not met (too few cases).

<sup>1</sup>Includes postbaccalaureate certificates.<sup>2</sup>Only includes respondents who completed a master’s, doctoral, or first-professional degree.

NOTE: Graduates whose only graduate education took place before 1997 were not asked about their satisfaction with that education.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1993/03 Baccalaureate and Beyond Longitudinal Study (B&amp;B:93/03).

**Table 8. Among 1992–93 bachelor’s degree recipients with advanced degrees, percentage who reported that various characteristics of their graduate education were very important to their lives now, by education characteristics: 2003**

Education characteristics	Course of study	Quality of instruction	Interaction with faculty	Internship and other work opportunities	Social contacts	None
U.S. total (excluding Puerto Rico)	78.5	67.6	57.5	54.9	57.1	4.4
Total (50 states, D.C., and Puerto Rico)	78.5	67.7	57.6	54.9	57.1	4.4
Undergraduate major						
Professional fields	75.0	66.9	55.6	51.4	53.7	5.0
Business and management	65.8	59.6	56.7	42.0	50.0	6.1
Education	83.6	71.6	52.2	55.9	56.7	4.1
Health	76.2	73.8	61.6	64.2	55.4	4.3
Arts and sciences	81.0	69.9	60.8	57.8	59.5	3.6
Arts and humanities	80.5	71.8	54.2	51.1	53.2	4.7
Social and behavioral sciences	79.4	64.8	59.5	63.7	64.4	3.3
Science/math/engineering	82.4	72.9	64.8	56.4	58.8	3.2
Other	78.2	59.5	49.0	52.2	56.4	6.5
Cumulative undergraduate GPA						
Less than 2.75	73.0	65.6	56.4	50.7	58.6	5.4
2.75–3.74	80.4	72.6	58.3	58.4	57.4	4.1
3.75 or higher	86.8	62.6	59.9	59.7	55.2	3.0
Bachelor’s degree-granting institution						
Public 4-year	79.1	68.2	59.3	55.6	58.3	3.5
Private not-for-profit 4-year	77.2	68.4	56.0	53.0	54.8	5.8
Other	‡	‡	‡	‡	‡	‡
Highest degree attained as of 2003						
Bachelor’s degree <sup>1</sup>	†	†	†	†	†	†
Master’s degree	76.9	65.5	54.4	49.6	55.9	4.7
Doctoral/first-professional degree	82.9	73.4	66.2	69.1	60.3	3.6
Field of advanced degree <sup>2</sup>						
Business and management	70.3	63.9	49.3	40.0	61.8	4.0
Education	77.4	65.8	55.4	54.8	54.8	6.1
Health	85.3	80.3	70.2	73.1	59.6	1.4
Arts and humanities	82.9	71.4	58.6	55.0	50.4	5.8
Social and behavioral sciences	83.3	56.8	65.4	67.4	69.4	1.5
Science/math/engineering	82.7	63.9	65.3	54.8	50.5	5.7
Other	80.7	69.6	55.6	57.9	55.3	4.3

†Not applicable.

‡Reporting standards not met (too few cases).

<sup>1</sup>Includes postbaccalaureate certificates.<sup>2</sup>Only includes respondents who completed a master’s, doctoral, or first-professional degree.

NOTE: Graduates whose only graduate education took place before 1997 were not asked about the relationship of that education to their lives in 2003.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1993/03 Baccalaureate and Beyond Longitudinal Study (B&amp;B:93/03).

**Table 9. Among 1992–93 bachelor’s degree recipients with advanced degrees, percentage who reported that their graduate education was very important preparation for various areas of their lives now, by education characteristics: 2003**

Education characteristics	Work and career	Establishing financial security	Establishing place in community	Taking on new challenges	Making informed choices	None
U.S. total (excluding Puerto Rico)	88.9	70.4	48.4	76.7	60.4	1.8
Total (50 states, D.C., and Puerto Rico)	89.0	70.5	48.4	76.8	60.4	1.8
Undergraduate major						
Professional fields	87.7	68.0	40.4	75.4	57.0	1.4
Business and management	84.6	65.8	28.2	69.3	55.5	2.7
Education	90.2	70.1	46.6	78.0	57.4	0.6
Health	89.3	68.4	54.9	84.2	60.0	#
Arts and sciences	90.1	74.1	54.7	78.6	63.1	1.5
Arts and humanities	86.0	62.2	54.5	74.5	61.9	3.4
Social and behavioral sciences	90.0	73.3	54.5	79.7	67.2	1.6
Science/math/engineering	92.0	80.1	55.0	79.7	60.5	0.6
Other	87.3	60.8	44.0	72.3	57.9	4.6
Cumulative undergraduate GPA						
Less than 2.75	88.4	68.1	48.4	77.5	63.5	1.7
2.75–3.74	89.9	75.0	49.0	74.3	57.1	2.0
3.75 or higher	88.1	70.0	47.8	80.3	60.6	1.7
Bachelor’s degree-granting institution						
Public 4-year	89.9	72.7	48.5	77.5	61.8	1.5
Private not-for-profit 4-year	86.8	67.0	49.1	75.2	59.5	2.5
Other	‡	‡	‡	‡	‡	‡
Highest degree attained as of 2003						
Bachelor’s degree <sup>1</sup>	†	†	†	†	†	†
Master’s degree	87.7	67.4	44.7	76.7	60.0	1.6
Doctoral/first-professional degree	92.3	78.6	58.3	76.9	61.3	2.4
Field of advanced degree <sup>2</sup>						
Business and management	81.7	67.5	33.0	76.3	60.9	3.2
Education	90.5	70.8	50.5	72.4	57.9	0.9
Health	96.3	82.4	63.7	79.9	59.3	#
Arts and humanities	83.4	44.5	56.0	81.4	64.9	1.9
Social and behavioral sciences	92.4	72.8	65.7	80.1	70.2	#
Science/math/engineering	92.8	73.2	40.7	76.4	52.1	2.1
Other	89.5	72.3	50.1	78.5	63.2	2.9

†Not applicable.

#Rounds to zero.

‡Reporting standards not met (too few cases).

<sup>1</sup>Includes postbaccalaureate certificates.<sup>2</sup>Only includes respondents who completed a master’s, doctoral, or first-professional degree.

NOTE: Graduates whose only graduate education took place before 1997 were not asked about the relationship of that education to their lives in 2003.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1993/03 Baccalaureate and Beyond Longitudinal Study (B&amp;B:93/03).

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# Appendix A—Glossary

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This glossary describes the variables used in this E.D. TAB. The items were taken directly from the NCES B&B:93/03 Data Analysis System (DAS), a web-based NCES analysis tool that generates tables from the B&B:93/03 data. (See appendix B for a description of DAS.) In the index below, the variables are listed in the order in which they are discussed in the text. The glossary is in alphabetical order by variable name (displayed in capital letters to the right of the label below).

## GLOSSARY INDEX

### FILTER VARIABLES

Prior attainment .....HIOTHDEG  
 Puerto Rico indicator .....COMPT087

### EDUCATION CHARACTERISTICS

Baccalaureate degree major ..... BAMAJOR  
 Cumulative undergraduate GPA ..... GPACUM  
 Type of institution..... SECTOR\_B  
 Highest degree attained as of 2003 ..... B3HDG03  
 Field of advanced degree ..... B3HDGMAJ

### IMPORTANCE OF UNDERGRADUATE EDUCATION

Aspects of undergraduate education that are very important now:  
 Major..... B3UGVLA  
 Liberal arts courses ..... B3UGVLB  
 Professional courses ..... B3UGVLC  
 Quality of instruction ..... B3UGVLD  
 Internship/other work opportunities ..... B3UGVLE  
 None ..... B3UGVLF

Undergraduate education was very important preparation for:

Work and career ..... B3UGPRA  
 Further education ..... B3UGPRB  
 Financial security ..... B3UGPRC  
 None ..... B3UGPRD

### UNDERGRADUATE EDUCATION AND OCCUPATIONAL TRAINING

Enrolled in diploma/certificate program since 1993 ..... B3ATTCT  
 Enrolled in associate’s degree program since 1993 ..... B3ATTAA  
 Enrolled in bachelor’s degree program since 1993 ..... B3ATTBA  
 Enrolled in any undergraduate program since 1993 ..... B3ATTUG  
 Completed undergraduate program since 1993 ..... B3CMPUG

Enrolled for occupational license ..... B3ENRLIC  
 Enrolled for professional certification..... B3ENRCT  
 Participated in work-related classes ..... B3WRKCLS  
 Took personal enrichment classes ..... B3ENRICH

### ENROLLMENT AND COMPLETION OF GRADUATE EDUCATION

Ever enrolled in a graduate degree program ..... B3ENRPG  
 Ever completed graduate degree ..... B3ATTEN  
 Currently enrolled in graduate program ..... B3ATTEN

### SATISFACTION AND IMPORTANCE OF GRADUATE EDUCATION

Very satisfied with graduate schools attended:  
 Faculty/teaching..... B3GSAFT  
 Courses offered..... B3GSACO  
 Course availability ..... B3GSACA  
 Career preparation ..... B3GSACP  
 None ..... B3GSANO

Aspects of graduate education that are very important now:

Course of study..... B3GRVLA  
 Quality of instruction..... B3GRVLB  
 Interaction with faculty..... B3GRVLC  
 Internship/other work opportunities ..... B3GRVLD  
 Social contacts ..... B3GRVLE  
 None ..... B3GRVLF

Graduate education was very important preparation for:  
 Work and career..... B3GRPRA  
 Establishing financial security ..... B3GRPRB  
 Establishing a place in community ..... B3GRPRC  
 Taking on new challenges..... B3GRPRD  
 Making informed choices ..... B3GRPRE  
 None ..... B3GRPRF

***Enrolled in associate's degree program since 1993***

**B3ATTAA**

Indicates whether the respondent ever enrolled in an associate's degree program after attaining the bachelor's degree in 1992–93 (yes/no).

***Enrolled in bachelor's degree program since 1993***

**B3ATTBA**

Indicates whether the respondent ever enrolled in another bachelor's degree program after completing the bachelor's degree in 1992–93 (yes/no).

***Enrolled in diploma/certificate program since 1993***

**B3ATTCT**

Indicates whether the respondent has enrolled in a technical diploma or certificate program since 1992–93 (yes/no).

***Ever completed graduate degree  
Currently enrolled in graduate program***

**B3ATTEN**

Indicates the respondent's current degree attainment status and enrollment status at the graduate level as of 2003.

Attained graduate degree, currently enrolled  
Attained graduate degree, not currently enrolled  
No graduate attainment, currently enrolled  
No graduate attainment, not currently enrolled

***Enrolled in any undergraduate program since 1993***

**B3ATTUG**

Indicates whether the respondent enrolled in, since the 1992–93 bachelor's degree, any of the following types of undergraduate degree or certificate programs: diploma or certificate, an associate's degree, or a bachelor's degree program (yes/no).

***Completed undergraduate program since 1993***

**B3CMPUG**

Indicates whether the respondent completed, since the 1992–93 bachelor's degree, any of the following types of undergraduate degree or certificate programs: diploma or certificate, an associate's degree, or a bachelor's degree program (yes/no).

***Enrolled for professional certification***

**B3ENRCT**

Indicates whether the respondent enrolled in a professional certification program after attaining the bachelor's degree in 1992–93 (yes/no).

***Took personal enrichment classes***

**B3ENRICH**

Response to the question "In the last twelve months, have you participated in any classes for personal enrichment?" (yes/no).

*DAS variable name*

***Enrolled for occupational license*** **B3ENRLIC**

Indicates whether the respondent enrolled in an occupational license program after attaining the bachelor's degree in 1992–93 (yes/no).

***Ever enrolled in a graduate degree program*** **B3ENRPG**

Indicates whether respondents had enrolled in a graduate degree program after attaining a bachelor's degree in the 1992–93 school year.

Never enrolled

Enrolled

***Graduate education very important preparation for:***

<b><i>Work and career</i></b>	<b>B3GRPRA</b>
<b><i>Establishing financial security</i></b>	<b>B3GRPRB</b>
<b><i>Establishing a place in community</i></b>	<b>B3GRPRC</b>
<b><i>Taking on new challenges</i></b>	<b>B3GRPRD</b>
<b><i>Making informed choices</i></b>	<b>B3GRPRE</b>
<b><i>None</i></b>	<b>B3GRPRF</b>

Respondents who had any graduate education since 1997 were asked, “For which of the following aspects of your life now would you say your graduate education was very important preparation?” (yes/no for each item).

B3GRPRF indicates respondents who did not say that their graduate education was very important preparation for any item listed.

***Aspects of graduate education that are very important now:***

<b><i>Course of study</i></b>	<b>B3GRVLA</b>
<b><i>Quality of instruction</i></b>	<b>B3GRVLB</b>
<b><i>Interaction with faculty</i></b>	<b>B3GRVLC</b>
<b><i>Internship/other work opportunities</i></b>	<b>B3GRVLD</b>
<b><i>Social contacts</i></b>	<b>B3GRVLE</b>
<b><i>None</i></b>	<b>B3GRVLF</b>

Respondents who had attended a graduate program since 1997 were asked to indicate whether various aspects of their graduate education were very important to their life now (yes/no for each item).

***Satisfied with graduate schools attended:***

<b><i>Faculty/teaching</i></b>	<b>B3GSAFT</b>
<b><i>Courses offered</i></b>	<b>B3GSACO</b>
<b><i>Course availability</i></b>	<b>B3GSACA</b>
<b><i>Career preparation</i></b>	<b>B3GSACP</b>
<b><i>None</i></b>	<b>B3GSANO</b>

Respondents who had enrolled in a postbaccalaureate certificate or an advanced degree program since 1997 were asked whether they were “very satisfied” with these aspects of their graduate education (yes/no for each item).

B3GSANO indicates respondents who did not report that they were very satisfied with any item listed.

*DAS variable name*

***Highest degree attained as of 2003***

**B3HDG03**

The highest degree the respondent had attained as of 2003.

- Bachelor's (includes postbaccalareate certificates)
- Master's (includes post-master's certificates)
- Doctoral/first-professional

***Field of advanced degree***

**B3HDGMAJ**

For respondents who completed a master's, doctoral, or first-professional degree, this variable indicates the respondent's major field of study for the highest degree program that the respondent completed. If the highest degree program information was collected in 2003, the major code was recoded to match the major codes collected in 1997. The major field for the most recent degree program was used if there were two or more programs that qualified for the highest degree.

- |                                 |   |
|---------------------------------|---|
| Business and management         | Includes business and public administration, marketing, accounting                |
| Education                       | Includes education, teaching, administration                                      |
| Health                          | Includes nursing, health sciences, medicine, other medical fields                 |
| Arts and humanities             | Includes library science, fine/applied arts, philosophy, religion, communications |
| Social and behavioral sciences  | Includes social work, psychology, other social sciences                           |
| Science/mathematics/engineering | Includes life sciences, mathematics, engineering, computer science                |
| Other                           | Includes law and all other fields not listed above                                |

***Undergraduate education was very important preparation for:***

- |                                  |                |
|----------------------------------|----------------|
| <b><i>Work and career</i></b>    | <b>B3UGPRA</b> |
| <b><i>Further education</i></b>  | <b>B3UGPRB</b> |
| <b><i>Financial security</i></b> | <b>B3UGPRC</b> |
| <b><i>None</i></b>               | <b>B3UGPRD</b> |

Response to the question "For which of the following aspects of your life now would you say your undergraduate education was very important preparation?" (Yes/no for each item.) B3UGPRD indicates respondents who reported that their undergraduate education was very important to none of these areas.

***Aspects of undergraduate education that are very important now:***

- |   |                |
|---|----------------|
| <b><i>Major</i></b>                               | <b>B3UGVLA</b> |
| <b><i>Liberal arts courses</i></b>                | <b>B3UGVLB</b> |
| <b><i>Professional courses</i></b>                | <b>B3UGVLC</b> |
| <b><i>Quality of instruction</i></b>              | <b>B3UGVLD</b> |
| <b><i>Internship/other work opportunities</i></b> | <b>B3UGVLE</b> |
| <b><i>None</i></b>                                | <b>B3UGVLF</b> |

Response to the question "Which of the following aspects of your undergraduate education would you consider to be very important to your life now?" (Yes/no for each item.) B3UGVLF indicates respondents who reported that none of these aspects of their undergraduate education were very important to their lives now.



	<i>DAS variable name</i>								
<b><i>Participated in work-related classes</i></b>	<b>B3WRKCLS</b>								
<p>Respondents were asked in 2003, “In the last twelve months, have you participated in any work-related training or other professional development classes?” (yes/no).</p>									
<b><i>Baccalaureate degree major</i></b>	<b>BAMAJOR</b>								
<p>Major field of study for the bachelor’s degree. “Other” includes such fields as agriculture, communications, consumer and personal services, home economics, interdisciplinary studies, industrial arts, and general or basic studies.</p>									
<ul style="list-style-type: none"> <li>Professional fields</li> <li>  Business and management</li> <li>  Education</li> <li>  Health</li> <li>  Arts and sciences</li> <li>  Arts and humanities</li> <li>  Social and behavioral sciences</li> <li>  Science/mathematics/engineering</li> <li>  Other</li> </ul>									
<b><i>Puerto Rico indicator</i></b>	<b>COMPTO87</b>								
<p>This variable identifies whether the institution at which the respondent was sampled was located in Puerto Rico or not (yes/no).</p>									
<b><i>Cumulative undergraduate GPA</i></b>	<b>GPACUM</b>								
<p>Self-reported student grade point average (GPA) on a 4.0 scale. The following categories are used:</p>									
<ul style="list-style-type: none"> <li>Less than 2.75</li> <li>2.75–3.74</li> <li>3.75 or higher</li> </ul>									
<b><i>Prior attainment</i></b>	<b>HIOTHDEG</b>								
<p>The highest degree the respondent had completed prior to completing the 1992–93 bachelor’s degree. This variable was used to restrict the sample used in the main analysis to those who did not hold a bachelor’s degree before the degree completed in 1992–93.</p>									
<table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">Held a bachelor’s degree</td> <td>Bachelor’s degree</td> </tr> <tr> <td>Did not hold a bachelor’s degree</td> <td>No prior attainment</td> </tr> <tr> <td></td> <td>Certificate or license</td> </tr> <tr> <td></td> <td>Associate’s degree</td> </tr> </table>		Held a bachelor’s degree	Bachelor’s degree	Did not hold a bachelor’s degree	No prior attainment		Certificate or license		Associate’s degree
Held a bachelor’s degree	Bachelor’s degree								
Did not hold a bachelor’s degree	No prior attainment								
	Certificate or license								
	Associate’s degree								
<b><i>Bachelor’s degree-granting institution</i></b>	<b>SECTOR_B</b>								
<p>Describes the type of institution from which respondents had received the 1992–93 bachelor’s degree. This variable takes into account both institutional level (the institution’s highest offering, length of program, and type of certificate, degree, or award), and control (the institution’s source of revenue and control of operations).</p>									

***Bachelor's degree-granting institution (continued)***

**SECTOR\_B**

Public 4-year	Public non-doctorate-granting 4-year, Public doctorate-granting 4-year
Private not-for-profit 4-year	Private not-for-profit non-doctorate-granting 4-year, Private not-for-profit doctorate-granting 4-year
Other	Private for-profit, unknown (a small percentage of respondents were selected from institutions that were not the bachelor's granting institution)

## Appendix B—Technical Notes and Methodology

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### The 2003 Baccalaureate and Beyond Longitudinal Study

The estimates and statistics reported in the tables and figures of this E.D. TAB are based on data from the first, second, and third follow-ups of the Baccalaureate and Beyond Longitudinal Study (B&B:93/94, B&B:93/97, and B&B:93/03), a study that tracks the experiences of a cohort of college graduates who received a baccalaureate degree during the 1992–93 academic year and were first interviewed as part of the National Postsecondary Student Aid Study (NPSAS:93), conducted by the U.S. Department of Education’s National Center for Education Statistics. NPSAS:93 is based on a nationally representative sample of all students in postsecondary education institutions, including undergraduate, graduate, and first-professional students. For NPSAS:93, information was obtained from more than 1,000 postsecondary institutions on approximately 50,000 undergraduates and over 13,000 graduate students. For B&B:93/03, those members of the NPSAS:93 sample who completed a bachelor’s degree between July 1, 1992, and June 30, 1993, were identified and contacted for a 1-year follow-up interview in 1994 (B&B:93/94). The second follow-up (B&B:93/97) of the B&B cohort occurred 4 years later in 1997. The final follow-up, 10 years later (B&B:93/03), is the focus of this E.D. TAB. The estimates are based on the results of surveys with approximately 9,000 bachelor’s degree recipients, representing about 1.2 million bachelor’s degree completers from 1992–93. For more information on the final 2003 data collected in the B&B series, consult the *1993/03 Baccalaureate and Beyond Longitudinal Study (B&B:93/03) Methodology Report* (Wine et al. forthcoming).

The NPSAS:93 sample, while representative and statistically accurate, was not a simple random sample. Instead, the survey sample was selected using a more complex three-step procedure with stratified samples and differential probabilities of selection at each level. Postsecondary institutions were initially selected within geographic strata. Once institutions were organized by zip code and state, they were further stratified by control (i.e., public, private not-for-profit, or private for-profit) and degree offering (less-than-2-year, 2- to 3-year, 4-year non-doctorate-granting, and 4-year doctorate-granting). For more information about the NPSAS:93 survey, refer to the 1992–93 NPSAS methodology report (Loft et al. 1995).

The B&B:93/94 survey was the first follow-up interview of NPSAS:93 participants who received their bachelor's degrees between July 1992 and June 1993. Of 12,500 NPSAS:93 respondents who were identified as potentially eligible for the first follow-up survey, about 1,500 were determined to be ineligible. A total of about 10,000 eligible individuals completed the 1994 interview. The B&B:93/97 survey was the second follow-up interview of the B&B cohort. Data collection for B&B:93/97 took place between April and December 1997. A total of over 11,000 individuals in the B&B cohort were determined eligible for follow-up in 1997. For the second follow-up, over 10,000 individuals completed the interview, yielding a response rate of 90 percent. For more information on procedures for the first and second follow-ups, consult their respective methodology reports (Green et al. 1996 for the first follow-up and Green et al. 1999 for the second follow-up).

In spring 2003, the third and final follow-up of the 1992–93 cohort of bachelor's degree recipients was conducted. For the first time, students were offered the opportunity to conduct their own B&B interview via the Internet. A single, web-based interview was designed and programmed for use as a self-administered interview, a telephone interview, and an in-person interview. All B&B:93/97 respondents were included for participation in B&B:93/03. A subsample of about one-third of the B&B:93/97 nonrespondents was also included, for a final sample of about 10,400. Almost 9,000 individuals responded, yielding a weighted overall response rate of 74 percent, reflecting an institution response rate (in 1992) of 88 percent and a student response rate (in 2003) of 83 percent. For more details about these and other methodological procedures, consult the methodology report (Wine et al. forthcoming).

The B&B:93/03 data provide a current profile of the 1992–93 cohort of college graduates, including degree recipients who have been enrolled sporadically over time as well as those who went to college right after completing high school. The dataset contains comprehensive data on graduate enrollment, attendance, attainment, and student demographic characteristics. It provides a unique opportunity to understand variations in labor force participation, career stability, and financial worth over the past 10 years. There are data limitations, however. This follow-up was the conclusion of a 10-year study, and some attrition from the study is to be anticipated, although bachelor's degree recipients are likely to be relatively easier to locate than other populations and considerable efforts were undertaken both to minimize the extent of this problem and to adjust for its effects in the data (see Wine et al. forthcoming). Second, the previous waves of data collection for B&B:93/03 collected detailed information about complete education and employment histories for periods of 1 and 3 years, respectively; the final follow-up collected information for a period of 6 years, from the second follow-up in 1997 to the third in 2003. To ease respondent burden, summary information about employment histories were collected rather than complete, detailed information about each job held in the interim. For information on steps

taken to ensure data quality by evaluating instrument usability, effectiveness of the instrument in different modes, and data collection design, see the methodology report (Wine et al. forthcoming).

## **Weighting**

All estimates in this E.D. TAB are weighted to compensate for unequal probability of selection into the B&B sample and to adjust for nonresponse. Two weights were developed. Cross-sectional weights were constructed for analyzing respondents to B&B:93/03. In addition, a panel (longitudinal) weight was constructed for analyzing those students who responded to all four surveys: B&B:93/03, B&B:93/97, B&B:93/94, and NPSAS:93 (computer-assisted telephone interview component). The weights for the B&B:93/03 respondents were constructed by applying a series of adjustments to the B&B:93/94 base weight. Specifically, adjustments were made to account for subsampling of the B&B:93/97 nonrespondents, for those not located, for refusals among those who were located, and for types of nonresponse other than refusals among those who were located and did not refuse. Construction of the panel (or longitudinal) weight to be used for analyzing those who responded to all three surveys consisted of an additional adjustment for nonresponse for the B&B:93/03 respondents who did not respond to all three of the previous surveys. The weight variable used in this E.D. TAB is WTC00. For more information on weighting, consult chapter 6, “Weighting and Variance Estimation,” of the 2003 methodology report (Wine et al. forthcoming).

## **Quality of Estimates**

Survey weights are computed with the goal of removing any bias that might result due to differential nonresponse and undercoverage. In order to measure the efficacy of bias-reducing adjustments, a series of analyses were conducted at the item and record levels. In the subsequent sections highlights of these analyses are summarized.

### ***Unit Response Rates and Bias Analysis***

For the approximately 10,400 sample students who were still eligible for B&B, the unweighted response rate was 86.3 percent, and the weighted response rate was 83.4 percent. For some items, the weighted response rate at the national level was also less than 85 percent. The effects of any potential bias due to nonresponse can influence overall data quality with greater proportions of missing information. Consequently, nonresponse bias analyses were conducted at

the student and item levels when the corresponding weighted response rates were below 85 percent.

The bias in an estimated mean based on respondents,  $\bar{y}_R$ , is the difference between this estimate and the target parameter,  $\mu$ , which is the mean that would result if a complete census of the target population was conducted and all units responded. This bias can be expressed as follows:

$$B(\bar{y}_R) = \bar{y}_R - \mu$$

However, for variables that are available from the frame and base year (NPSAS:93) respondents,  $\mu$  can be estimated by  $\hat{\mu}$  without sampling error, in which case the bias in  $\bar{y}_R$  can then be estimated by:

$$\hat{B}(\bar{y}_R) = \bar{y}_R - \hat{\mu}$$

Moreover, an estimate of the population mean based on respondents and nonrespondents can be obtained by:

$$\hat{\mu} = (1 - \hat{\eta}) \bar{y}_R + \hat{\eta} \bar{y}_{NR}$$

where  $\hat{\eta}$  is the weighted unit nonresponse rate, based on weights prior to nonresponse adjustment. Consequently, the bias in  $\bar{y}_R$  can then be estimated by:

$$\hat{B}(\bar{y}_R) = \hat{\eta} (\bar{y}_R - \bar{y}_{NR})$$

That is, the estimate of the nonresponse bias is the difference between the mean for respondents and nonrespondents multiplied by the weighted nonresponse rate, using the student base weight prior to nonresponse adjustment.

### *Student-Level Nonresponse Bias Analysis*

A student respondent is defined as any sample member who is determined to be eligible for the study and has valid data for the selected set of analytical variables. As noted earlier, the unweighted student response rate was 86.3 percent, and the weighted response rate was 83.4 percent. A nonresponse bias analysis was conducted as a part of the nonresponse adjustment for the analysis weight. The nonresponse bias was estimated for the variables known for both respondents and nonrespondents within each institution type. These variables included the following:

- Age in the base year (NPSAS:93),
- Race/ethnicity,

- Gender,
- U.S. citizenship status,
- Attendance status in the base year,
- Institution control,
- Bureau of Economic Analysis Code (OBE) Region,
- Type of institution/enrollment category,
- B&B institution stratum,
- B&B student stratum,
- Whether applied for aid in the base year,
- Receipt of federal aid in the base year,
- Receipt of Pell Grant in the base year,
- Receipt of Stafford Loan in the base year,
- Receipt of state aid in the base year,
- Receipt of institution aid in the base year,
- Receipt of any aid in the base year,
- Prior respondent to either B&B:93/94 or B&B:93/97,
- Income in the base year (parent income for dependent students and student income for independent students),
- Number of telephone numbers available during B&B:93/03 data collection,
- Number of times an answering machine was encountered during B&B:93/03, and
- Whether the student was located in a field cluster for B&B:93/03.

The steps for nonresponse bias analysis included estimating the nonresponse bias and testing (adjusting for multiple comparisons) to determine if the bias is significant at the .05 level. Second, nonresponse adjustment factors were computed using a subset of variables listed above. The nonresponse adjustments were designed to significantly reduce or eliminate nonresponse bias for variables included in the corresponding models. Third, after the weights were computed, any remaining bias was estimated for the variables listed above and statistical tests were performed to determine the significance of any remaining nonresponse bias.

The weighting adjustments reduced, and in some cases eliminated, bias for students. Prior to the nonresponse weighting adjustment, the response bias was statistically significantly different from zero for 21 percent of the variables; the mean of the absolute values of the biases was 0.40 and the median was 0.20. After the nonresponse weighting adjustment, none of the biases were significantly different from zero; the mean of the absolute values of the biases was 0.01 and median was 0.002.

### *Item-Level Bias Analysis*

Item response rates (*RRI*) are calculated as the ratio of the number of respondents for whom an in-scope response was obtained ( $I^x$  for item  $x$ ) to the number of respondents who are asked to

answer that item. The number asked to answer an item is the number of unit level respondents ( $I$ ) minus the number of respondents with a valid skip item for item  $x$  ( $V^x$ ).

$$RRI^x = \frac{I^x}{I - V^x}$$

As indicated above, nonresponse bias analysis was conducted for the variables with item response rates below 85 percent. This analysis was further restricted to items with at least 50 students who were either eligible to answer the item based on their response to the gate question, or did not respond to the gate question for an item. This bias analysis compared the distributions of respondents and nonrespondents to the item for the variables age, race/ethnicity, gender, control of the base year institution, and OBE region of the base year institution. Overall, item nonresponse analysis was conducted for 117 items, but 106 of these had response rates below 85 percent because the respondent did not respond to the gate question. The nonresponse bias analysis indicated that some items do have statistically significant bias due to item nonresponse, but the magnitude of the bias is generally small. None of the 117 items were used in this publication. For detailed information about the items analyzed for nonresponse bias, see the B&B:93/03 methodology report (Wine et al. forthcoming).

## Imputation

Selected variables from the 2003 interview had missing values imputed for nonresponse. The imputations were performed in three steps. In the first step, the interview variables were imputed using the procedures described in the next section. Then, using the interview variables, including the newly imputed variable values, the set of derived variables was constructed. In the final step, the derived variables were imputed again, using the procedures described below. Table B-1 lists the 11 interview variables and the three derived variables used in the E.D. TAB that were imputed, with the percentage of cases imputed.

Sequential hot deck imputation, a common procedure for managing item nonresponse, uses respondent data as donors to provide surrogate values for records with missing data. In sequential hot deck imputation, imputation classes are defined, generally consisting of a cross-classification of covariates, and then missing values are replaced sequentially from a single pass through the data within the imputation classes. A related procedure, weighted sequential hot deck imputation, takes into account the unequal probabilities of selection into the original sample by using the sampling weights to specify the expected number of times a particular respondent's answer will be used to replace a missing item. The expected selection frequencies are specified such that, over repeated applications of the algorithm, the expected value of the weighted



distribution of the imputed values will equal in expectation, within imputation class, the weighted distribution of the reported answers.

**Table B-1. B&B:93/03 variables in this publication that were imputed, with percentage of cases that were imputed**

Variable label (variable name)	Percent imputed
<i>Interview variables</i>	
Undergraduate value: particular major(s) chosen (B3UGVLA)	0.02
Undergraduate value: professional courses taken (B3UGVLC)	0.02
Undergraduate value: quality of instruction (B3UGVLD)	0.02
Undergraduate value: internship and other work (B3UGVLE)	0.02
Undergraduate value: none of the above (B3UGVLF)	0.02
Undergraduate preparation: work and career (B3UGPRA)	0.02
Undergraduate preparation: further education (B3UGPRB)	0.02
Undergraduate preparation: financial security (B3UGPRC)	0.02
<i>Derived variables</i>	
Highest degree attained (B3HDG03)	1.95
Had ever enrolled in a degree program after BA in 1993	6.53

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1993/03 Baccalaureate and Beyond Longitudinal Study (B&B:93/03).

Weighted sequential hot deck imputation was selected for B&B:93/03 in part because it has the advantage of controlling the number of times a respondent record can be used for imputation and gives each respondent record the chance to be selected for use as a hot deck donor. To implement the procedure, imputation classes and sorting variables relevant to each item being imputed were defined. If more than one sorting variable was used, a serpentine sort was performed in which the direction of the sort (ascending or descending) changed each time the value of the previous sorting variable changed. The serpentine sort minimized the change in student characteristics every time one of the sorting variables changed its value.

Imputation classes for the B&B:93/03 interview variables, and some of the derived variables, were developed using a Chi-Square Automatic Interaction Detector (CHAID) analysis where only respondent data were modeled (Kass 1980). The CHAID segmentation process first divided the data into groups based on categories of the most significant predictor of the item being imputed, and then split each of the groups into smaller subgroups based on the other predictor variables. The CHAID process also merged categories for variables found not to be significantly different. This splitting and merging process continued until no additional statistically significant predictors were found. Imputation classes for B&B:93/03 were then defined from the final CHAID segments.

### ***Imputation of Interview Variables***

The B&B:93/03 computer-assisted telephone interviewing (CATI) variables were separated into two groups depending on the respondent base (or variable conditions). The first, unconditional group consisted of variables that applied to all respondents. The second, conditional group consisted of variables that applied to only a subset of respondents. Within the unconditional group, variables were sorted by percentage missing and then imputed in order, from lowest percentage missing to highest. Within the conditional group, the variables were first sorted by conditionality and percentage missing, then imputed in the appropriate sequence. A constant set of predictor variables was used in a CHAID analysis to determine imputation classes for each imputation variable. The analysis used the following set of predictor variables: age, gender, race/ethnicity, U.S. citizenship, dependency status, prior respondent, receipt of federal aid, and institutional region, institutional type, and institutional level. Some of these predictor variables were missing for a small percentage of cases and were imputed first with a weighted sequential hot deck imputation.

### ***Imputation of Derived Variables***

Selected derived variables (those created by combining information from two or more interview variables) for B&B:93/03 were imputed sequentially in four batches, using a specific order determined by the variable conditions resulting from the longitudinal nature of this study. Imputing sequentially allowed these derived variables (or further derived variables resulting from them) to be used as class variables for imputing variables in subsequent batches. The process helped to ensure consistency across derived variables.

Most of the derived variables had several constraints defined by different combinations of data collected in prior rounds of the study. Therefore, a procedure for finding appropriate donor cases was developed before the imputation was performed. The procedure involved defining mutually exclusive groups or classes of respondents that met the constraints. The groups were used as the imputation classes for the weighted sequential hot deck imputation procedure. For the derived variables that did not have any constraints, a CHAID analysis was performed. The predictor variables included any prior imputed variables, including interview variables.

### ***Evaluation of Imputations***

Comparing imputation distributions within imputation classes is a key measure for determining whether or not the weighted sequential hot deck imputation procedure produced acceptable results. The more similar the distributions, the more successful the imputation process. For evaluation of the B&B:93/03 imputation results, distributions were considered to be

similar when absolute differences were less than 5 percent. Absolute difference was calculated by subtracting the before-imputation weighted percentage from the after-imputation weighted percentage. If absolute differences greater than 5 percent were found, then the unweighted distributions were examined to see if the large differences were due to small sample sizes. No absolute differences greater than 5 percent were found for any comparison.

After imputation, weighted item response rates were calculated for *all* the variables used in this E.D. TAB by dividing the weighted number of valid responses by the weighted population for which the item was applicable. All of the items used in this E.D. TAB had weighted item response rates above 90 percent.

## Data Analysis System

The estimates presented in this E.D. TAB were produced using the B&B:93/03 Data Analysis System Online (DAS) which includes data from NPSAS:93, B&B:93/94, B&B:93/97, and B&B:93/03. The DAS application on the Web makes it possible for users to specify and generate their own tables. With DAS, users can replicate or expand upon the tables presented in this E.D. TAB. In addition to the table estimates, DAS calculates proper standard errors<sup>1</sup> and weighted sample sizes for these estimates. For example, table B-2 contains standard errors that correspond to estimates in table 1. If the number of valid cases is too small to produce a reliable estimate (fewer than 30 cases), DAS prints the message “low-N” instead of the estimate. All standard errors for estimates presented in this E.D. TAB can be viewed at <http://nces.ed.gov/DAS/library/reports.asp>. In addition to tables, DAS will also produce a correlation matrix of selected variables to be used for linear regression models. Included in the output with the correlation matrix are the design effects (DEFTs) for each variable in the matrix. Since statistical procedures generally compute regression coefficients based on simple random sample assumptions, the standard errors must be adjusted with the design effects to take into account the stratified sampling method used in the survey.

The DAS can be accessed electronically at <http://nces.ed.gov/DAS/>. For more information about the B&B:93/03 Data Analysis System, contact:

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<sup>1</sup> The B&B sample is not a simple random sample, and therefore, simple random sample techniques for estimating sampling error cannot be applied to these data. The DAS takes into account the complexity of the sampling procedures and calculates standard errors appropriate for such samples.

**Table B-2. Standard errors for table 1: Percentage of 1992–93 bachelor’s degree recipients who reported that various characteristics of their undergraduate education were very important to their lives now, by education characteristics: 2003**

Education characteristics	Under-graduate major	Liberal arts courses	Under-graduate professional courses	Quality of instruction	Internship and other work opportunities	None
U.S. total (excluding Puerto Rico)	0.83	0.96	0.84	0.73	0.76	0.43
Total (50 states, D.C., and Puerto Rico)	0.83	0.96	0.83	0.72	0.76	0.43
Baccalaureate degree major						
Professional fields	1.24	1.28	1.08	1.11	1.53	0.77
Business and management	1.92	1.71	1.52	1.61	1.93	1.17
Education	1.51	1.76	1.73	1.42	1.99	0.98
Health	2.13	2.00	1.92	2.37	3.75	0.97
Arts and sciences	1.19	1.28	1.07	1.00	1.07	0.59
Arts and humanities	2.57	2.70	2.18	2.10	2.21	1.89
Social and behavioral sciences	1.77	1.90	1.71	1.54	1.37	1.13
Science/math/engineering	1.85	1.58	1.61	2.00	1.86	0.72
Other	2.16	2.03	1.81	2.13	1.93	1.08
Cumulative undergraduate GPA						
Less than 2.75	1.11	1.05	1.06	0.97	1.17	0.47
2.75–3.74	1.25	1.71	1.51	1.58	1.11	0.81
3.75 or higher	1.70	2.41	2.08	2.15	2.51	1.20
Bachelor’s degree-granting institution						
Public 4-year	0.81	0.99	0.92	0.88	0.92	0.47
Private not-for-profit 4-year	1.70	2.00	1.43	1.14	1.07	0.70
Other	6.73	4.69	7.54	7.57	4.99	6.68
Highest degree attained as of 2003						
Bachelor’s degree	1.77	2.07	2.08	2.11	1.97	1.24
Master’s degree	0.96	1.14	0.92	0.94	1.07	0.60
Doctoral/first-professional degree	1.54	1.65	1.56	1.23	1.46	1.11
Field of advanced degree						
Business and management	3.58	3.72	3.60	3.06	3.16	2.38
Education	2.39	3.70	2.72	2.64	2.35	1.22
Health	2.96	3.32	3.91	3.56	4.17	1.28
Arts and humanities	4.59	4.40	4.30	4.69	4.66	2.81
Social and behavioral sciences	3.51	4.50	4.66	4.64	3.86	1.39
Science/math/engineering	3.15	3.56	3.40	3.74	3.67	1.90
Other	2.16	3.34	3.04	2.96	3.26	1.62

NOTE: Standard error tables for the remaining report tables are available at <http://nces.ed.gov/DAS/library/reports.asp>.  
 SOURCE: U.S. Department of Education, National Center for Education Statistics, 1993/03 Baccalaureate and Beyond Longitudinal Study (B&B:93/03).

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## Statistical Procedures

Two types of statistical procedures were used in this report: testing differences between means (or proportions) and testing linear trends. Each procedure is described below.

### *Differences Between Means*

The descriptive comparisons were tested in this E.D. TAB using Student's  $t$  statistic. Differences between estimates are tested against the probability of a Type I error,<sup>2</sup> or significance level. The significance levels were determined by calculating the Student's  $t$  values for the differences between each pair of means or proportions and comparing these with published tables of significance levels for two-tailed hypothesis testing.

Student's  $t$  values may be computed to test the difference between estimates with the following formula:

$$t = \frac{E_1 - E_2}{\sqrt{se_1^2 + se_2^2}}$$

where  $E_1$  and  $E_2$  are the estimates to be compared and  $se_1$  and  $se_2$  are their corresponding standard errors. This formula is valid only for independent estimates. When estimates are not independent, a covariance term must be added to the formula:

$$t = \frac{E_1 - E_2}{\sqrt{se_1^2 + se_2^2 - 2(r)se_1 se_2}}$$

where  $r$  is the correlation between the two estimates.<sup>3</sup> This formula is used when comparing two percentages from a distribution that adds to 100. If the comparison is between the mean of a subgroup and the mean of the total group, the following formula is used:

<sup>2</sup> A Type I error occurs when one concludes that a difference observed in a sample reflects a true difference in the population from which the sample was drawn, when no such difference is present.

<sup>3</sup> U.S. Department of Education, National Center for Education Statistics, *A Note from the Chief Statistician*, no. 2, 1993.

$$t = \frac{E_{sub} - E_{tot}}{\sqrt{se_{sub}^2 + se_{tot}^2 - 2p se_{sub}^2}}$$

where  $p$  is the proportion of the total group contained in the subgroup.<sup>4</sup> The estimates, standard errors, and correlations can all be obtained from DAS.

There are hazards in reporting statistical tests for each comparison. First, comparisons based on large  $t$  statistics may appear to merit special attention. This can be misleading since the magnitude of the  $t$  statistic is related not only to the observed differences in means or percentages but also to the number of respondents in the specific categories used for comparison. Hence, a small difference compared across a large number of respondents would produce a large  $t$  statistic.

A second hazard in reporting statistical tests is the possibility that one can report a “false positive” or Type I error. In the case of a  $t$  statistic, this false positive would result when a difference measured with a particular sample showed a statistically significant difference when there is no difference in the underlying population. Statistical tests are designed to control this type of error, denoted by alpha. The alpha level of .05 selected for findings in this E.D. TAB indicates that a difference of a certain magnitude or larger would be produced no more than one time out of 20 when there was no actual difference in the quantities in the underlying population. When we test hypotheses that show  $t$  values at the .05 level or smaller, we treat this finding as rejecting the null hypothesis that there is no difference between the two quantities. Failing to detect a difference, however, does not necessarily imply the values are the same or equivalent.

### ***Linear Trends***

While many descriptive comparisons in this report were tested using Student’s  $t$  statistic, some comparisons across categories of an ordered variable involved a test for a linear trend across all categories, rather than a series of tests between pairs of categories. In this report, when differences among percentages were examined relative to one of these variables, Analysis of Variance (ANOVA) was used to test for a linear relationship between the two variables. To do this, ANOVA models included orthogonal linear contrasts corresponding to successive levels of the independent variable. The squares of the standard errors, the variance between the means, and the unweighted sample sizes were used to partition total sum of squares into within- and between-group sums of squares. These were used to create mean squares for the within- and between-group variance components and their corresponding  $F$  statistics, which were then

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<sup>4</sup> Ibid.

compared with published values of  $F$  for a significance level of .05.<sup>5</sup> Significant values of both the overall  $F$  and the  $F$  associated with the linear contrast term were required as evidence of a linear relationship between the two variables. Means and standard errors were calculated by DAS. Unweighted sample sizes were provided by NCES through a restricted use data license agreement.

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<sup>5</sup> More information about ANOVA and significance testing using the  $F$  statistic can be found in any standard textbook on statistical methods in the social and behavioral sciences.