Occupational and Educational Aspirations and Attainment of Young Adults With and Without LD 2 Years After High School Completion

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Abstract

A national longitudinal database was used to compare the aspirations and attainment of individuals with and without learning disabilities (LD) 2 years after high school completion. Analyses revealed that individuals with LD reported lower graduation rates, were more likely to aspire to moderate- (men) or low-prestige (women) occupations, and were more likely to be employed and less likely to be enrolled in some type of postsecondary education program than their nondisabled peers. High educational aspirations in Grade 12 and successful completion of an academic or college-prep high school program were equally important in predicting 2-year postsecondary status for adolescents enrolled in postsecondary education regardless of disability status. However, depending on disability status, different predictors were identified for individuals who were either employed or out of the workforce. These results point to a continued need for transition planning and support for young adults with LD and suggest ways in which professionals can anticipate and adjust for identified differences in aspirations and postsecondary attainment.

Despite tremendous strides made in recent years, adolescents with learning disabilities (LD) still struggle in preparing for and successfully completing the transition from high school to postsecondary education or work and ultimately adult life (Edgar, 1987; Fairweather & Shaver, 1991). Although conflicting data exist in some published reports (Adelman & Vogel, 1990), numerous investigations (e.g., Haring, Lovett, & Smith, 1990; Miller, Snider, & Rzonca, 1990; Sitlington, Frank, & Carson, 1994; Wagner, Blackorby, Cameto, & Newman, 1993; Zigmond & Thorton, 1985) have described generally disappointing levels of educational and occupational *attainment* for young adults with LD. Problems with delayed or impaired career development (Rojewski, 1993, 1996a) and lowered academic performance (Dalke & Schmitt, 1987) of individuals with LD during early adolescence may contribute to lower rates of eventual enrollment in postsecondary education programs (e.g., 2-year vocational or 4-year college/university-based programs), lowered levels of employment, and less overall satisfaction in employment than found for nondisabled peers.

Problems with career choice and development experienced during adolescence are reflected in the reported higher rates of unemployment and underemployment of adults with LD (Adelman & Vogel, 1993; Dowdy, Carter, & Smith, 1990). Although nationwide figures are not available, studies have reported unemployment rates for young adults with LD ranging from 20% to more than 60%. Unemployment figures for women with LD tend to be higher than those for men (Fourqurean, Meisgeir, Swank, & Williams, 1991; Miller et al., 1990; Sitlington & Frank, 1990). Differences also appear to exist in the types of employment held by persons with and without LD. Adults with LD tend to have jobs that hold fewer opportunities for advancement, require lower levels of skills, are more likely to be only part-time, provide lower pay, and are concentrated in lower prestige occupations including service, sales, and managerial fields (D'Amico, 1991; deBettencourt, Zigmond, & Thorton, 1989; Gottfredson, Finucci, & Childs, 1984; Patton & Polloway, 1992).

Problems with occupational—and to a lesser extent educational—attainment of adults with LD is consistent with the types of problems they experience as adolescents. Studies have shown that, as a group, adolescents with LD tend to be less mature in their attitudes toward work and the competencies needed to successfully identify and attain desired career options

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than their nondisabled peers (Biller, 1985; Rojewski, 1993). As a result, many adolescents with LD display career exploration and career choice patterns that are different from nondisabled adolescents. Rojewski (1996a) reported that adolescents with LD in Grades 8 and 10 were less likely to aspire to high-prestige occupations and were more likely to be inconsistent or indecisive about their future occupational alternatives than nondisabled peers. Women with LD appeared particularly at risk for limiting their occupational aspirations. Similarly, when the occupational and educational aspirations of high school seniors with LD were investigated, Rojewski (1996b) found them three times more likely to report no aspirations for postsecondary education and twice as likely to aspire to a postsecondary vocational school experience than adolescents without disabilities. Moreover, these students were less likely to aspire to high-prestige occupations than their nondisabled peers.

Fairweather and Shaver (1991) noted that "a major factor in the transition from high school to adulthood is access to and success in postsecondary education and training" (p. 264). Although exact figures vary, evidence suggests that the enrollment of adolescents with LD in postsecondary educational programs has increased dramatically in recent years (Nelson & Lignugaris-Kraft, 1989; Vogel & Adelman, 1992). Even so, the rate of enrollment in postsecondary education for individuals with LD is still considerably lower than that of their nondisabled peers. Butler-Nadin and Wagner (1991) reported that 23% of adolescents with LD enrolled in postsecondary education programs immediately after high school graduation, compared with 56% of the general student population. Fairweather and Shaver found similar, albeit slightly lower, results. They reported that 17.1% of their nationally representative group of adolescents with LD participated in some type of postsecondary education, including 8.5% in vocational programs, 6.8% in 2-year community colleges, and 1.8% in 4-year colleges or universities. In a follow-up study of high school graduates with LD, Haring et al. (1990) reported that 35% had enrolled in some type of postsecondary education, with a majority (18 of 22 individuals) enrolled in vocational training programs offered through postsecondary technical institutes.

Although investigations have begun to provide clearer patterns of occupational and educational attainment for individuals with LD 3 to 5 years following high school completion (e.g., Blackorby & Wagner, 1996; Wagner & Blackorby, 1996), additional information is needed about the occupational and educational attainment of this group in comparison to their nondisabled peers in the 2 years immediately following high school completion (D'Amico & Marder, 1991). This type of information is potentially important for several reasons such as explaining how Grade 12 occupational and educational aspirations influence eventual career attainment, identifying the mechanisms involved in career and educational compromise for individuals with LD, and understanding how educational and occupational careers evolve for individuals with LD during the first 2 years following high school completion. Thus, this study sought to describe and compare the occupational and educational status of young adults with and without LD 2 years after high school completion. Furthermore, the predictive value of selected factors obtained from participants in Grade 12 on their status 2 years after high school completion was determined.

Method

Population and Sample

Database. The *National Education Longitudinal Study: 1988–1994* (NELS: 88; 1996), a national probability sample administered by the National Center for Educational Statistics of the U.S. Department of Education, was used. The NELS:88 database is the third in an ongoing series of major, nationally representative, longitudinal studies sponsored by the federal government to study the educational, vocational, and personal development of adolescents and young adults. This data set represents an initial sample of approximately 25,000 adolescents attending 1,052 schools (815 public and 237 private) across the nation who have been followed at 2-year intervals since 1988 (base year—8th grade, first followup—10th grade, second followup—12th grade, third followup—2 years postsecondary). Students have also been added at each 2-year data collection point to allow analysis from cross-sectional or longitudinal perspectives. Data have been gathered from a variety of sources at each collection point, including school administrators, parents, teachers, and students (Ingels & Scott, 1993; Nichols, 1992).

Initial selection of NELS:88 participants was based on a two-stage stratified sample, with schools as the first-stage unit and a random sample of students within each school as the second-stage unit. Schools with high minority student enrollment were oversampled to ensure that certain subgroups of students (particularly African American, Hispanic, Asian/Pacific Islander, and limited English–proficient youth) would be adequately represented. In most schools, 24 students were randomly selected from all eighth graders plus, on average, two additional students from oversampled groups. In schools with fewer than 24 eighth graders, all eligible students were selected. Ingels, Dowd, et al. (1994) reported that the average within-school sample size for the base year was 25 students.

Because initial school selection was based on unequal probabilities, to obtain adequate numbers of underrepresented student groups, normalized sampling weights were needed to obtain unbiased population estimates. NELS:88 researchers employed

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a two-stage weighting process that calculated unadjusted weights as the inverse of the probabilities of selection accounting for the sample selection process and then adjusted initial weights to compensate for nonresponse. For this analysis, the relative weight of applicable cross-sectional and longitudinal (panel) weights, supplied by NELS:88 researchers, was calculated and applied. Additional details about the database can be found in NELS:88 user's manuals and technical reports (e.g., Ingels, Dowd, et al., 1994; Owings et al., 1994).

Sample Identification. The sample for this investigation consisted of individuals who had participated in all four rounds of data collection. At the time of the most recent data collection (1994), the student cohort had been out of high school for a period of 2 years. Most participants were between 19 and 21 years of age. Potential participants were eliminated from the final data pool for reasons including questionnaire nonresponse, dropping out of school prior to the 12th grade, or being added to the database during subsequent rounds of data collection to provide national representation. The presence or absence of LD was determined by a response from parents in the base year (Grade 8) to a question about whether their child was receiving special education services for a specific learning disability. This particular question was used because no comparable question on disability status was available from later questionnaires. The selection process resulted in a total weighted data pool of 11,178 participants, which included 441 young adults with LD (3.9% of available data pool) and 10,737 young adults without LD.

Sample Identification Issues and Potential Bias. Two issues regarding sample identification are acknowledged. First, Ingels, Dowd, et al. (1994) reported significant undercoverage in the NELS:88 database for "that portion of the special education population that is most severely mentally or physically disabled" (p. 95). Initially, the NELS:88 base year sample excluded 5.3% of all possible participants for whom the survey instruments were considered unsuitable—57% of excluded students were diagnosed with severe mental disability, 8% identified with a severe physical disability, and 35% had significant language barriers.

The coverage of students with disabilities was substantially improved by the reassessment, reclassification, and integration of some students initially excluded from participation during the base year (Grade 8). Ingels, Dowd, et al. (1994) reported that 140 of the 322 students initially excluded from participation because of "mental barriers" (p. 95) were reclassified as eligible. The reclassification process involved taking a second look at each student deemed ineligible and aggressively pursuing status information from their special education teachers regarding their ability to complete study questionnaires. Reclassified students were primarily diagnosed with LD or emotional disturbance rather than mental retardation. School enrollment status, basic demographic characteristics, and questionnaire data were obtained from reinstated students and incorporated into the final versions of databases released for public analysis.

Thus, students with severe–profound mental retardation or physical disabilities are not represented in the NELS:88 data. However, Ingels and Scott (1993) concluded that the overall biasing effect caused by under-coverage for individuals with less severe disabilities (such as LD) was small, due in large measure to reported reclassification and inclusion efforts. Even so, the possibility exists that some school-identified students with LD have been excluded from NELS:88 participation. Because the ability to produce reliable national estimates is thus compromised, caution is urged in generalizing these findings.

Second, an inherent bias exists when using school-identified samples of students with LD (i.e., using involvement in special education for identification) as opposed to research-identified samples. School-identified samples often contain increased within-group and between-group variability resulting from ambiguities and lack of consistency in current state definitions of LD and from the use of contextual and subjective criteria in making eligibility decisions (Morris et al., 1994). School-identified samples of adolescents with LD are more likely to contain individuals who display inappropriate behavior such as hyperactivity, aggression, and attention deficits as well as academic difficulties (Lyon, 1987; Moats & Lyon, 1993; Vaughn & Lyon, 1994). Women who are school-identified with LD are more likely to have lower intelligence scores, more severe academic impairments, and greater academic discrepancies than men with LD (Vogel, 1990).

Description of Research Sample. The threats to replication and generalization of research findings of using school-identified samples of students with LD have been discussed extensively in the literature (see for example Moats & Lyon, 1993; Morris et al., 1994; Rosenberg et al., 1992). Vaughn and Lyon (1994) argued that "investigators must strive to account for sample heterogeneity and to increase awareness of sample distinctiveness. One way to do this is to provide descriptive benchmarks that allow determination of similarities and differences of subjects across research samples" (p. 320). For this study, sample heterogeneity was accounted for, at least in part, by providing descriptive benchmarks (i.e., marker variables) that allow determinations to be made about the similarities and differences of participants across samples (Durrant, 1994; Keogh, Major-Kingsley, Omori-Gordon, & Reid, 1982; Morris et al., 1994; Rosenberg et al., 1992; Vaughn & Lyon, 1994).

A review of demographic, academic achievement, and personality data in two prior studies using the NELS:88

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database (Rojewski, 1996a; 1996b) revealed distinct and significantly different demographic characteristic patterns for adolescents with and without LD, which were also reflected in the present sample (see Table 1). Although not conclusive, students with LD exhibited lower academic achievement in all areas examined—problems with academic skills and performance are hallmarks of LD (Dalke & Schmitt, 1987).

The academic achievement and personality variables used in this study have been analyzed in a previous study that contained a similar—although not identical—data pool (see Rojewski, 1996b). As in the previous study, a series of one-way analysis of variance (ANOVA) procedures was used to compare individuals with and without LD on academic achievement and personality variables. The magnitude (practical significance) of observed differences was determined by calculating effect size coefficients, which measure the difference between two or more mean scores expressed in terms of standard deviations (Cohen, 1988).

Statistically significant differences existed between individuals with and without LD in Grade 12 on all five measures, including reading achievement, $F(1, 11176) = 305.95$, $p < .00001$, mathematics achievement, $F(1, 11176) = 330.10$, $p < .00001$, science achievement, $F(1, 11176) = 195.16$, $p < .00001$, self-esteem, $F(1, 11176) = 31.19$, $p < .00001$, and locus of control, $F(1, 11176) = 69.89$, $p < .00001$. Effect size coefficients for reading achievement ($ES = .84$), mathematics achievement ($ES = .87$), and science achievement ($ES = .67$) indicated that the observed statistical differences were also of considerable practical importance. Assuming that academic achievement is normally distributed, approximately three fourths of the individuals with LD in this sample scored below the academic achievement mean scores of their nondisabled peers in Grade 12. Individuals with LD also reported lower self-esteem and more external locus of control than nondisabled peers. Effect size coefficients for the two personality variables (self-esteem, $ES = .27$; locus of control, $ES = .41$) revealed the magnitude of statistical differences to be of minimal to moderate practical importance.

TABLE 1
Demographic, Academic, and Personality Characteristics of Participants

Measure	Adolescents with LD		Adolescents without LD	
	n	%[a]	*n*	%[a]
Gender				
Men	272	61.6	5,253	48.9
Women	169	38.4	5,484	51.1
Ethnicity				
Asian American	6	1.4	348	3.2
African American	52	11.7	1,307	12.2
Hispanic	39	8.9	995	9.3
White	340	77.2	7,996	74.5
Other	4	0.9	91	0.8
Socioeconomic status				
Quartile 1 (low)	133	30.2	2,309	21.5
Quartile 2	139	31.5	2,631	24.5
Quartile 3	97	22.0	2,823	26.3
Quartile 4 (high)	72	16.3	2,975	27.7
Measure	***M***	***SD***	***M***	***SD***
Reading achievement[b]	40.89	6.66	48.88	9.49
Mathematics achievement	40.79	6.02	49.05	9.47
Science achievement	43.47	6.69	49.55	9.03
Composite academic achievement	40.25	5.99	48.99	9.61
Educational aspirations	5.66	2.08	6.63	1.90
Self-concept	−0.18	0.67	0.00	0.67
Locus of control	−0.23	0.70	0.03	0.62

Note. Totals may not equal 100.0% due to missing or incomplete data.
[a]Percentages reflect column totals. [b]Reading achievement scores ranged from 29.12 to 68.09 for LD and non-LD samples.

Variable Conceptualization and Specification

Descriptive and Background Variables. Demographic data included in this analysis are displayed in Table 1. Socioeconomic status (SES) reflects a composite of five separate variables developed by NELS:88 researchers including family income, parents' education levels, and parents' occupations. Responses to each item were standardized to a mean of 0 and a standard deviation of 1. Nonmissing standardized components were then averaged to yield an SES composite score for each participant.

NELS:88 researchers originally devised six separate response categories to describe possible secondary education outcomes. These six categories were collapsed into three major outcomes for the purpose of this analysis and include *successful attainment* (receipt of a high school diploma, general equivalency diploma [GED], or certificate of attendance), *working toward completion* (currently in high school or working toward a GED), and *unsuccessful/not trying* (did not graduate from high school and not working toward diploma or GED). Although the combination of persons receiving a high school diploma with those attaining a GED or certificate emphasizes the successful attainment of mini-

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mum educational standards, caution must be taken not to directly compare data from this analysis with other data that focus exclusively on high school graduation rates for persons with LD. Although speculative, it is probable that the rate reported for successful attainment of a high school diploma or equivalent for participants with LD is slightly inflated because of the inclusion of GED and certificate holders.

Eight categorical response options were available to NELS:88 participants to describe their educational or occupational status 2 years following high school. Responses were grouped into three status options including *enrollment in postsecondary education* (primary focus on being a student, regardless of employment status), *employed in workforce* (primary focus on work activities, regardless of length of employment or educational involvement), and *unemployed* (either unemployed and not in school or out of the workforce).

Measures of Personality. Measures of self-concept and locus of control at Grade 12 also reflect composite scores of scale items specifically developed by NELS:88 researchers to assess these constructs. The self-esteem scale contained 7 items measuring individuals' thoughts and feelings about themselves (Kanouse et al., 1980). Examples of items include, "I feel good about myself," "I am able to do things as well as most other people," and "I feel I am a person of worth, the equal of other people." Level of agreement with each item was indicated using a 4-point Likert-type scale (*strongly disagree, disagree, agree,* and *strongly agree*). NELS:88 researchers standardized each item to a mean of 0 and a standard deviation of 1. Individual standardized item scores were averaged to yield a composite self-esteem score.

The measure of locus of control was calculated from 6 separate items that were similar to items used by Rotter (1966). Examples of items include, "In my life, good luck is more important than hard work for success," "My plans hardly ever work out, so planning only makes me unhappy," and "Every time I try to get ahead, something or somebody stops me." A 4-point Likert-type scale was used to record students' level of agreement to each item (*strongly disagree, disagree, agree,* and *strongly agree*). NELS:88 researchers standardized each locus of control item using a mean of 0 and a standard deviation of 1. Individual standardized item scores were averaged to yield a composite score.

The validity and reliability of the self-esteem and locus of control scales has been extensively examined and confirmed over the past 25 years. Validity was initially determined by a combination of evidence already available from existing scales (e.g., Rosenberg, 1965; Rotter, 1966) and results of several principal component factor analyses that confirmed the existence of two distinct measures (Conger, Conger, & Riccobono, 1976; Conger, Dunteman, & Dunteman, 1977; Kanouse et al., 1980). These two scales have demonstrated acceptable levels of reliability. Ingels, Scott, Lindmark, Franekel, and Myers (1992) reported a Cronbach alpha reliability of .81 for the self-esteem composite scale and .71 for the locus of control composite scale. These coefficients compare favorably to previous scales used in national data gathering projects, as well as to the original scale items.

Academic Achievement. Standardized Grade 12 reading, mathematics, and science achievement scores were used for descriptive purposes. A composite measure of academic achievement calculated by NELS:88 researchers was also used for the predictive analysis. Achievement tests consisted of multiple choice items and were timed and normed (Owings et al., 1994). Reading achievement tests contained 21 multiple choice items. Participants were given a time limit of 21 minutes to complete the test, which contained five separate reading passages ranging in length from a single paragraph to one half page. Each passage was followed by 3 to 5 response items. The test addressed individuals' ability to reproduce the details of text, translate verbal statements into concepts (comprehension), and draw conclusions (inference/evaluation). Two forms of the reading achievement test were devised and used—an easier and a harder version. Both versions maintained the same format. More difficult reading tests were distributed to students who had scored at or above the reading test mean score at the previous data collection year (Grade 10), whereas the easier version was given to those who had scored below the mean score. Rock and Pollack (1991) reported a Cronbach alpha reliability of .84 for the base year administration of the reading achievement test.

The Grade 12 mathematics achievement test contained 40 multiple choice items with a time limit of 30 minutes for completion. The test contained a mix of word problems, diagrams, and calculations covering a range of mathematical concepts such as algebra, arithmetic, geometry, probability, and advanced mathematics topics. A Cronbach alpha reliability of .90 was obtained for the base year administration (Rock & Pollack, 1991). Three forms of the mathematics achievement test were used—easy, moderate, and difficult. Each version maintained the same format. The easiest and most difficult tests were distributed to students who had previously scored in the lowest and highest quartiles, respectively. The middle half of the distribution from the previous data collection was given the moderately difficult test.

Only one version of the science achievement test was used, containing 25 multiple choice items with a time limit of 20 minutes for completion. The test contained verbal descriptions of a situation or charts and graphs followed by questions based on the introduced premise. A reliability coefficient of .75 was reported for the base year administration of the science achievement test (Rock & Pollack, 1991).

Several reports have extensively documented the psychometric prop-

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erties of NELS:88 measures (see Ingels, Scott, Rock, Pollack, & Rasinski, 1994; Kaufman, Rasinski, Lee, & West, 1991; Rock & Pollack, 1991). Kaufman et al. (1991) used several indicators to determine the validity and reliability of cognitive test batteries and personality scales, including the consistency among student responses to related items and the internal consistency reliability of scalable survey responses. They concluded that these measures exhibited acceptable validity and reliability. Ingels et al. (1992) reported acceptable Cronbach alpha coefficients for the cognitive tests, including .78 to .84 for reading achievement, .79 to .90 for mathematics achievement, and .75 to .83 for science achievement tests.

Rather than delete cases that contained missing data on key variables (e.g., reading, mathematics, and science achievement; self-concept; locus of control), missing values were imputed from existing data (Owings et al., 1994). The imputation method employed for this study involved the substitution of group mean values for missing data. Separate mean values were calculated for and applied to each of four groups developed on the basis of gender and disability status.

Educational Aspirations. Educational aspirations were determined by asking respondents to denote the highest level of education they thought they would achieve. For analysis, educational aspiration was conceptualized as an interval-level construct (Haller & Virkler, 1993) with a low score of 1 representing aspirations *less than high school* and a high score of 9 representing aspirations for a *PhD, MD, or equivalent*.

Occupational Aspirations. Occupational aspirations were assessed at Grade 12 and 2 years after high school by asking participants to indicate the job or occupation they expected to have at 30 years of age from a listing of 17 separate occupational categories. These categories represented the major occupational groupings typically used by government agencies such as the U.S. Bureau of the Census and the U.S. Department of Commerce (Stevens & Cho, 1985). Occupational categories were collapsed into three groups that reflected high, medium, and low levels of education, prestige, and status attributed to these occupations (Gregory, Shanahan, & Walberg, 1986; Haller & Virkler, 1993). Occupational categories requiring a college degree and providing high prestige included high professional (e.g., doctor, accountant, scientist, lawyer), lower professional (e.g., social worker, clergy, registered nurse), schoolteacher, technical occupations (e.g., medical technician, computer programmer), and managerial positions. Moderate-prestige occupations, requiring a high school diploma or some college education, included small-business owner and positions in sales, office or clerical, trades (e.g., auto mechanic, baker, carpenter), and military or protective services. Categories requiring less than a high school diploma for initial entry and offering low prestige included full-time homemaker, service positions (e.g., childcare, waiter), machine operators (e.g., assembler, welder, bus driver), and laborers (e.g,. construction worker). Although I was not strictly testing a sociological or status attainment model, categorization according to prestige was chosen to code occupational aspirations because prestige levels influence people's perceptions about the relative worth, power, and status of occupations (Kraus, Schild, & Hodge, 1978; Stevens & Cho, 1985) and prestige categories reflect status expectations and ability estimates that can be used in considering individual and societal constraints on career choice (Hotchkiss & Borow, 1996; Saltiel, 1988).

Data Analysis

Log-Linear Analysis. Asymmetrical log-linear analysis was used to examine the potential interactive effects of gender and disability status on the successful attainment of a high school diploma or equivalent, on status 2 years postsecondary, and on occupational aspirations. Historically, the primary focus of this technique has been on model building or symmetrical analysis, which has been used to study simple and interactive relationships or associations between two or more categorical variables. More recently, the use of log-linear analysis in a hypothesis testing or asymmetrical mode has been advocated (Busk & Marascuilo, 1989; Kennedy, 1992). When using a hypothesis testing approach, two sets of variables are established—independent and dependent (response) variables. This approach is similar to analysis of variance (ANOVA), except that the absence of an error term requires that differential models are compared to determine statistical significance (Marascuilo & Busk, 1987). Asymmetrical log-linear analysis focuses on independent variables related to a dependent variable, not on the interrelationships of independent variables (Kennedy, 1988; Rojewski & Bakeman, 1997; Wilson & Moore, 1989).

A useful feature of the model building used in log-linear analysis is adherence to the hierarchy principle. "Models are hierarchical in the sense that, if a higher order term appears in a model (e.g., AC), its corresponding lower order relatives also appear in the model (e.g., A and C)" (Kennedy, 1988, p. 7). The specific order in which terms are deleted is decided a priori, based on previous investigations, theory, and researcher interest (Wilson & Moore, 1989). In this study, I was interested in first determining the effect of disability status, followed by any additional effect of gender, on career aspirations.

Log-linear analysis assesses differences between observed and expected frequencies with the likelihood ratio chi-square (G^2). The G^2 statistic can be partitioned into unique components that have additive properties similar to sums of squares in ANOVA (Marascuilo & Busk, 1987; Wilson & Moore, 1989). Another statistic, ΔG^2 (delta G^2),

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represents the difference between two G^2 or, more specifically, the importance of the term just deleted from the model. The Q^2 statistic (Bakeman & Robinson, 1994) provides an assessment of the magnitude of a particular model and is an analog to the more familiar R^2 statistic used in multiple regression. Menard (1995) suggested the use of the notation, R^2_L, to signify this connection. The Q^2 (or R^2_L) for a particular model is calculated using likelihood ratio chi-square statistics in the formula: $Q^2_{model} = (G^2_{base} - G^2_{model}) / G^2_{base}$. Knoke and Burke (1980) suggested that any model with a Q^2 greater than .90 provides an acceptable fit to the data, even if the chi-square is significant. This is especially important to consider when extremely large data sets are analyzed. All calculations were made using ILOG (Bakeman & Robinson, 1994), an interactive log-linear analysis program.

Predictive Discriminant Analysis. Predictive discriminant analysis (PDA) was used to classify the status of sample members 2 years after high school based on eight predictor variables. Categorical predictor variables included occupational aspirations (1 = *low prestige*, 2 = *moderate prestige*, 3 = *high prestige*), socioeconomic status (1 = *lowest quartile*, 4 = *highest quartile*), high school program (1 = *academic/college prep track*, 2 = *vocational or general education track*), and high school outcome (1 = *attainment of diploma or equivalent*, 2 = *working toward a diploma*, 3 = *unsuccessful/not trying*). Continuous variables included composite academic achievement, self-esteem, locus of control, and educational aspirations.

The basic purposes of PDA are to determine a prediction rule, to estimate classification accuracy of the rule, and to assess the quality of the classification rule accuracy relative to chance. A classification rule is calculated for each criterion subgroup and used to classify individual cases (Huberty, 1994; Huberty & Wisenbaker, 1992). The dependent variable—current status—was organized into three possibilities: primarily in school, primarily working, or unemployed/out of the work force.

An internal linear classification rule (i.e., using prediction rules built from the same sample) was chosen to classify individuals with or without LD into one of the three constructed status groups. Although an internal classification rule minimizes the proportion of misclassification errors, the results in terms of hit rates are somewhat positively biased. This positive bias should be acknowledged when interpreting these findings. The decision to use a linear rather than a quadradic classification rule was based on the assumptions that selected variables reflected multivariate normal distributions and that criterion groups had equal population covariance matrices (Huberty, 1994; Norusis, 1988).

The relative contribution of each predictor variable to overall classification accuracy was calculated by "deleting each predictor variable in turn and determining the predictive accuracy of the remaining set of predictors" (Huberty & Wisenbaker, 1992, p. 196). In this *delete-one-variable* approach, the most important variable causes the largest decrease in group hit rate when deleted. The calculation of $Z_{(i)}$ values—transformed hit rates reflecting variable importance—for each criterion group was also performed to help determine the importance of individual predictors. Variables not decreasing all-variable hit rates were ignored in the final ranking process (Huberty, 1994). The DISCRIMINANT program, contained in the SPSS for Windows, Release 6.0 statistical package, was used to run the predictive discriminant analyses.

Results

Attainment 2 Years After High School

High School Graduation Rates. Only the saturated model—gender [G] × disability status [D] on occupational aspirations [O]—sufficiently fit the data. A model is saturated when it includes all possible (i.e., main and interaction) effects and predicts frequencies identical to those observed (Bakeman & Robinson, 1994). In this case, removal of the interaction term resulted in significant deterioration in overall goodness of fit, $G^2(2) = 22.1$, $p < .01$ (see Table 2). Thus, educational attainment measured 2 years after high school was dependent on both gender and disability status.

A complex model best described the educational outcomes. Therefore, two constituent 2-way tables were constructed and analyzed to determine the location of specific differences (see Table 3). Because statistical assumptions are rarely met, claims of significance are usually avoided in a log-linear analysis. However, critical values are still used to determine the meaningfulness of results such as adjusted residuals. A critical value of 2.58 was selected, which is the value that under ideal circumstances would allow a claim of $p < .01$ (Bakeman & Robinson, 1994; Rojewski & Bakeman, 1997).

One post hoc analysis focused on the potential differences in outcomes based on disability status with gender effects removed. A greater proportion of men with LD graduated from high school than women with LD (81.2% vs. 68.0%). Comparable numbers of men and women with LD had not received a high school degree (12.2% vs. 12.6%), although a greater percentage of women reported working toward their high school degree or equivalent. Although adjusted residuals for participants without LD exceeded established critical values, Bakeman and Robinson (1994) recommended that other factors such as trends, anomalous cells, and the extent of differences be also examined in post hoc analyses to determine the meaningfulness of identified differences. In this case, men and women without LD appeared to experience very similar rates of successful and unsuccessful secondary educational outcomes.

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TABLE 2
Hierarchical Asymmetrical Log-Linear Analyses

Model	R^2_L	ΔR^2_L	G^2	*df*	Term deleted	ΔG^2	Δdf
Secondary education outcomes							
Saturated model [GDO]	1.00		0.0	0			
Interaction of gender and disability status on educational outcomes [GD][GO][DO]	.80	.20	22.1	2	[GDO]	22.1	2
Effects of disability status on educational outcomes [GD][GO]	.08	.72	100.8	4	[DO]	78.7	2
Effects of gender on educational outcomes independent of disability status [GD][GO]	.00	.08	109.7	6	[GO]	8.9	2
Current educational/occupational status							
Saturated model [GDS]	1.00		0.0	0			
Interaction of gender and disability status on current status [GD][GS][DS]	.92	.08	17.5	2	[GDS]	17.5	2
Effects of disability status on current status [GD][GS]	.45	.47	128.1	4	[DS]	110.6	2
Effects of gender on current status independent of disability status [GD][S]	.00	.45	233.2	6	[GS]	105.1	2
Occupational aspirations							
Saturated model [GDA]	1.00		0.0	0			
Interaction of gender and disability status on aspirations [GD][GA][DA]	1.00	.00	2.0	2	[GDA]	2.0	2
Effects of disability status on aspirations [GD][GA]	.79	.21	128.6	4	[DA]	126.6	2
Effects of gender on aspirations independent of disability status [GD][A]	.00	.79	602.3	6	[GA]	473.7	2

Note. G = gender, D = disability status, O = outcomes 2 years postsecondary, S = status 2 years postsecondary, A = occupational aspirations at age 30 expressed 2 years postsecondary.

When differences based on gender were examined, men without LD successfully completed high school at a slightly higher rate than their peers with LD (90.1% vs. 81.2%). However, men with LD were twice as likely to report not attaining a high school diploma. Differences between women with and without LD appeared to be more dramatic. Only two thirds of women with LD (68.0%) had graduated from high school, compared to 91.9% of nondisabled women. Women with LD were five times more likely to be working on their high school diploma (19.4% vs. 3.6%) and three times less likely to have attained a high school diploma 2 years after high school (12.6% vs. 4.5%) than nondisabled women.

Current Education/Employment Status. Log-linear analysis was conducted to determine whether differences existed in the education or employment experiences of young adults based on gender and presence of LD. Elimination of the interaction term [GDS]—gender × disability status (G × D) on current status—from the log-linear model resulted in an R^2_L value of .92, indicating no interaction effect. The R^2_L statistic can be interpreted as the amount of variance explained by the remaining model (Bakeman & Robinson, 1994). The [GD][GS][DS] model provided the most parsimonious and best fitting model (see Table 4), which indicated main gender [GS] and disability effects [DS].

When the effect of the presence of LD was considered, several interesting results emerged. First, slightly less than one third of men with LD were enrolled in some type of postsecondary education, compared to one half of men without LD. Almost two thirds of men with LD were in the workforce 2 years after high school, compared to less than one half (45.2%) of men without LD. Women without LD were twice as likely as women with LD to participate in postsecondary education (55.6% vs. 24.6%). In contrast, women with LD were more likely to be in the workforce. One quarter of all women with LD reported being either unemployed or out of the workforce—four times the rate of nondisabled women.

Women with LD did not fare better when the effect of gender was considered. In fact, women with LD were six times more likely to be unemployed than men with LD (24.5% vs. 4.7%). Although adjusted residuals exceeded established critical values, the large sample size most likely influenced these larger obtained values. Even so, it appears that men without LD were more likely to be in the workforce than women without LD.

Occupational Aspirations

A third log-linear analysis was performed to examine the potential interaction and main effects of disability status and gender on occupational aspirations expressed by participants 2 years after high school. Results, as

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TABLE 3
Post Hoc Analysis: High School Outcomes

High school outcomes	Men						Women					
	With LD			Without LD			With LD			Without LD		
	Observed frequencies	Expected frequencies	Adjusted residuals	Observed frequencies	Expected frequencies	Adjusted residuals	Observed frequencies	Expected frequencies	Adjusted residuals	Observed frequencies	Expected frequencies	Adjusted residuals
Effects of disability (gender effects removed)												
Successful attainment	221 (81.2)	243.8	−4.65	4,731 (90.1)	4,708.2	4.65	115 (68.0)	154.2	−10.81	5,041 (91.9)	5,001.8	10.81
Working toward a diploma	18 (6.5)	12.5	1.65	235 (4.5)	240.5	−1.65	33 (19.4)	6.9	10.29	198 (3.6)	214.1	−10.29
Unsuccessful/ not trying	33 (12.2)	15.8	4.59	287 (5.5)	304.2	−4.59	21 (12.6)	7.9	4.83	244 (4.5)	257.1	−4.83
Effects of gender (disability effects removed)												
Successful attainment	221 (81.2)	207.2	3.16	4,731 (90.1)	4,781.3	−3.40	115 (68.0)	128.8	−3.16	5,041 (91.9)	4,990.7	3.40
Working toward a diploma	18 (6.5)	31.5	−4.12	235 (4.5)	211.9	2.27	33 (19.4)	19.5	4.12	198 (3.6)	221.1	−2.27
Unsuccessful/ not trying	33 (12.2)	33.3	−0.09	287 (5.5)	259.8	2.42	21 (12.6)	20.7	0.09	244 (4.5)	271.2	−2.42

Note. Adjusted residual values greater than or equal to absolute 1.96 and 2.58 are significant at $p < .05$ and $p < .01$, respectively.

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TABLE 4
Post Hoc Analysis: Current Educational/Occupational Status

Current status	Men						Women					
	With LD			Without LD			With LD			Without LD		
	Observed frequencies	Expected frequencies	Adjusted residuals	Observed frequencies	Expected frequencies	Adjusted residuals	Observed frequencies	Expected frequencies	Adjusted residuals	Observed frequencies	Expected frequencies	Adjusted residuals
Effects of disability (gender effects removed)												
Primarily school	82 (30.5)	133.2	−6.42	2,647 (50.7)	2,595.8	6.42	40 (24.6)	89.2	−7.86	3,028 (55.6)	2,978.8	7.86
Primarily work	174 (64.8)	123.7	6.32	2,360 (45.2)	2,410.3	−6.32	83 (51.0)	62.0	3.44	2,050 (37.7)	2,071.0	−3.44
Unemployed/ out of workforce	12 (4.7)	11.0	0.30	214 (4.1)	215.0	−0.30	40 (24.5)	11.8	8.65	366 (6.7)	394.2	−8.65
Effects of gender (disability effects removed)												
Primarily school	82 (30.5)	75.9	1.35	2,647 (50.7)	2,778.2	−5.09	40 (24.6)	46.1	−1.35	3,028 (55.6)	2,896.8	5.09
Primarily work	174 (64.8)	159.8	2.87	2,360 (45.2)	2,158.2	7.91	83 (51.0)	97.2	−2.87	2,050 (37.7)	2,251.1	−7.91
Unemployed/ out of workforce	12 (4.7)	32.8	−6.20	214 (4.1)	283.9	−5.97	40 (24.5)	19.7	6.20	366 (6.7)	296.1	5.97

Note. Adjusted residual values greater than or equal to absolute 1.96 and 2.58 are significant at $p < .05$ and $p < .01$, respectively.

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indicated by a nonsignificant G^2 value, failed to reveal an interaction effect between gender and disability status (see Table 5). However, main gender and disability effects were detected; an R_L^2 value of .79 was obtained when the effect of disability [DA] was removed from the model, thus resulting in adoption of the [GD][GA][DA] model.

One post hoc analysis examined the main effects of disability status on occupational aspirations. Here, almost three quarters of all men with LD (72.7%) expressed moderate-prestige aspirations, compared to slightly more than one half of their nondisabled peers (55.9%). Men without LD were twice as likely to aspire to high-prestige occupations as their peers with LD, whereas men with LD were twice as likely to report low-prestige occupational aspirations. Women without LD were more likely to hold high-prestige aspirations than women with LD (56.1% vs. 30.6%). Conversely, a greater proportion of women with LD expressed moderate-prestige aspirations. Almost one quarter of all women with LD (22.4%) expressed low-prestige occupational aspirations. Proportionately, this figure was three times higher for women with LD than for women without LD.

When the effects of disability were removed, several interesting gender effects were also observed. Women with LD were twice as likely to aspire to high- (30.6% vs. 15.5%) and low-prestige occupations (22.4% vs. 11.9%) than men with LD. On the other hand, men with LD were more likely to report moderate-prestige aspirations. Women without LD were more likely to aspire to high-prestige occupations, whereas a greater proportion of men without LD reported moderate-prestige occupational aspirations.

Predicting Occupational Status

Individuals with LD. Separate analyses were conducted for individuals with and without LD because of identified differences in the status of young adults 2 years after high school based on disability status. Descriptive statistics for individuals cross-tabulated on disability status and current status revealed two general trends (see Table 6). First, a general decrease was noticed in each of the eight measures from participants primarily in a 2-year or 4-year academic institution (highest scores) to those who were either unemployed or out of the workforce (lowest scores). Second, more positive scores were observed in each of the three groups without LD than in the groups of young adults with LD, regardless of status.

The results of the linear classification rule provided an estimate of the PDA hit rate. A hit results "when a case originating from a particular group is assigned to that same group by using a developed prediction rule" (Huberty & Barton, 1989, p. 161). The PDA equation resulted in the accurate classification of 56.69% of all individuals with LD into correct status categories (see Table 7). This mediocre result was disappointing, although the hit rate accuracy for each of the three categories differed considerably—77.9% correct classification for individuals primarily in school, 48.3% correct classification for young adults primarily working, and 59.6% for respondents who were unemployed or out of the workforce.

Table 8 displays the results of the analysis used to determine the relative contribution of each variable to predictive accuracy. Prior probabilities used in calculating $Z_{(f)}$ values for the three criterion groups—primarily school = .20, primarily work = .65, neither = .15—were established based on extant literature (e.g., Fairweather & Shaver, 1991; Michaels, 1994; Wagner, 1993) and considered to be conservative. $Z_{(f)}$ values were calculated using the formula provided by Huberty (1994) and reflect the classification accuracy for each criterion group. The best predictor is the variable associated with the lowest $Z_{(f)}$ values.

The accuracy of the all-variable hit rates for the LD sample included primarily school = .779, primarily work = .483, and neither = .596. Overall, the classification rule predicted group classification only slightly better than expected by chance. Two variables—educational aspirations and high school program—were most important to the accuracy of the all-variable classification rule. Other variables were deemed unimportant and can be ignored in the final interpretation, as they increased the hit rate when deleted from classification attempts. Huberty (1994) pointed out that in predictive discriminant analysis, unlike multiple regression, "it may very well happen that as p [the number of predictor variables] is increased, the hit rates (separate group and/or total-group) will decrease" (p. 117).

Although none of the variables provided an extremely large reduction in classification accuracy, educational aspirations in Grade 12 represented an important variable in predicting which individuals were primarily at school or at work. Two additional variables—high school program and high school outcome—contributed to prediction accuracy for individuals enrolled in some form of post-secondary education. The remaining variables did not contribute to the accuracy of the classification rule for individuals with LD in these two status categories. In fact, removal of most of the remaining variables in the delete-one-variable approach actually enhanced prediction accuracy.

Although much smaller in total number, a different classification rule pattern was observed for individuals who were unemployed or out of the workforce. For persons in the unemployed group, self-esteem and socioeconomic status were the most important variables to accurate classification. These two variables were unimportant for individuals with LD classified in school and working groups.

Individuals Without LD. The PDA results for individuals without LD re-

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TABLE 5
Post Hoc Analysis: Occupational Aspirations

Occupational aspirations	Men						Women					
	With LD			Without LD			With LD			Without LD		
	Observed frequencies	Expected frequencies	Adjusted residuals	Observed frequencies	Expected frequencies	Adjusted residuals	Observed frequencies	Expected frequencies	Adjusted residuals	Observed frequencies	Expected frequencies	Adjusted residuals
Effects of disability (gender effects removed)												
High prestige	42 (15.5)	101.6	−7.67	2,030 (38.6)	1,970.4	7.67	52 (30.6)	93.6	−6.53	3,079 (56.1)	3,037.4	6.53
Moderate prestige	197 (72.7)	153.7	5.45	2,935 (55.9)	2,978.3	−5.45	79 (47.0)	61.2	2.88	1,970 (35.9)	1,987.8	−2.88
Low prestige	32 (11.9)	15.7	4.35	288 (5.5)	304.3	−4.35	38 (22.4)	14.2	6.72	436 (7.9)	459.8	−6.72
Effects of gender (disability effects removed)												
High prestige	42 (15.5)	57.9	−3.80	2,030 (38.6)	2,499.3	−18.14	52 (30.6)	36.1	3.80	3,079 (56.1)	2,609.7	18.14
Moderate prestige	197 (72.7)	170.0	5.48	2,935 (55.9)	2,399.5	20.75	79 (47.0)	106.0	−5.48	1,970 (35.9)	2,505.5	−20.75
Low prestige	32 (11.9)	43.1	−2.98	288 (5.5)	354.2	−5.09	38 (22.4)	26.9	2.98	436 (7.9)	369.8	5.09

Note. Adjusted residual values greater than or equal to absolute 1.96 and 2.58 are significant at $p < .05$ and $p < .01$, respectively. Percentages reflect row totals and may not total 100% due to rounding error.

sulted in a more accurate prediction rule. In fact, a full two thirds (67.14%) of the nondisabled group was correctly classified using the eight predictor variables. Prior probabilities in calculating $Z_{(f)}$ values were primarily school = .60, primarily school = .35, and neither = .05. However, the classification accuracy for each of the three status categories varied substantially. The correct hit rate for individuals primarily in school was 79.6%—roughly comparable to the LD group. The accuracy prediction rate of 55.6% for individuals who were primarily working was slightly higher than the one calculated for peers with LD. The third classification rule for individuals who were unemployed or out of the workforce correctly classified only 41.6% of group members, 18% less than for peers with LD.

The most important variables for individuals without LD who were enrolled in a 2- or 4-year postsecondary educational program were identical to those established for peers with LD—educational aspirations at Grade 12, high school program, and successful attainment of high school diploma or equivalent. Nondisabled individuals who expressed high educational aspirations and successfully graduated from an academic or college-prep curriculum in high school were most likely to be enrolled in postsecondary education. Composite academic achievement and self-esteem were the least important contributors to success-

TABLE 6
Predictor Variables Used for Predictive Discriminant Analyses

	Primarily school				Primarily work				Neither			
	LD		No LD		LD		No LD		LD		No LD	
Discriminant variables	***M***	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***
Composite academic achievement	42.86	6.91	52.56	9.59	39.47	5.47	45.07	7.86	38.08	4.25	42.80	7.22
Occupational aspirations	2.24	0.54	2.63	0.53	2.02	0.45	2.20	0.55	1.96	0.49	2.18	0.49
Educational aspirations	6.90	1.70	7.43	1.31	5.10	2.00	5.76	2.07	5.50	2.12	5.43	1.93
Socioeconomic status	2.87	1.12	3.02	1.02	2.06	0.93	2.15	1.00	1.62	0.82	2.02	1.09
Self-esteem	0.03	0.64	0.06	0.67	−0.18	0.63	−0.05	0.66	−0.55	0.74	−0.13	0.66
Locus of control	0.00	0.79	0.14	0.59	−0.24	0.60	−0.07	0.62	−0.51	0.63	−0.26	0.68
High school program	1.35	0.48	1.18	0.39	1.69	0.46	1.49	0.50	1.73	0.45	1.61	0.49
High school outcome	1.04	0.19	1.01	0.14	1.43	0.75	1.24	0.59	1.74	0.84	1.56	0.80

TABLE 7
Internal Classification Results for Predictive Discriminant Analyses

	Predicted group membership		
Actual group membership	**Primarily school**	**Primarily work**	**Neither**
Individuals with LD[a]			
Primarily school (n = 122)	95 (77.9)	16 (13.1)	11 (9.0)
Primarily work (n = 257)	56 (21.8)	124 (48.3)	77 (30.0)
Neither (n = 52)	6 (11.5)	15 (28.9)	31 (59.6)
Individuals without LD[b]			
Primarily school (n = 5,675)	4,517 (79.6)	1,104 (19.5)	54 (1.0)
Primarily work (n = 4,409)	1,217 (27.6)	2,451 (55.6)	741 (16.8)
Neither (n = 580)	74 (12.7)	265 (45.7)	241 (41.6)

Note. Percentages reflect row totals and may not equal 100.0% due to missing data or rounding error. Separate hit rates are given in parentheses.
[a]Overall hit rate for individuals with LD is 250/441 = 56.69%. [b]Overall hit rate for individuals without LD is 7,209/10,737 = 67.14%.

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ful classification for individuals without LD.

The established classification rule for individuals primarily in the workforce resulted in an accuracy rate of 55.6%. Four variables were considered most useful for prediction—high school program, academic achievement, socioeconomic status, and occupational aspirations at Grade 12. Individuals in this group were more likely to be in a vocational or general education program, scored lower on academic achievement tests, were poorer, and held lower occupational aspirations than their nondisabled peers enrolled in postsecondary education. Interestingly, the predictors found important for nondisabled participants were not the same as for young adults with LD.

The linear classification function calculated for nondisabled individuals who were either unemployed or out of the workforce correctly predicted 41.6% of cases. The overall classification rate for this group was considerably less than what could be expected by chance and lower than that established for the LD group. The most important variables were locus of control (more external), and Grade 12 educational aspirations (low). These two variables were not similarly important for individuals with LD in the same status category.

Discussion

The 2 years immediately following high school are a critical, albeit somewhat unstable, time in the lives of many adolescents, including those with LD. Halpern (1992) explained that after high school persons with LD typically experience "a period of floundering that occurs for at least the first several years after leaving school as adolescents attempt to assume a variety of adult roles" (p. 203). Blackorby and Wagner (1996) used this fact to recommend that research on postschool outcomes for individuals with disabilities not be limited to the first few years following school completion, but reflect a longer range perspective—3 to 5 years postsecondary—"to have an accurate picture of youth accomplishments" (p. 400). Indeed, data from the National Longitudinal Transition Study (NLTS) of Special Education Students (Wagner, 1993; Wagner et al., 1993) have indicated that adolescents with LD do show significant gains in postsecondary school enrollment and employment in the period 3 to 5 years after high school. Therefore, these findings must be interpreted with an under-

TABLE 8
Hit Rates of Linear Classifications Using Delete-One-Variable Method

Predictor variable deleted	Number of hits: Primarily school n	Primarily school $Z_{(i)}$	Primarily work n	Primarily work $Z_{(i)}$	Neither n	Neither $Z_{(i)}$	Overall n	Overall %	Rank based on $Z_{(i)}$ values: Primarily school	Primarily work	Neither	Overall
Individuals with LD												
Composite academic achievement	98	16.65	125	4.58	30	8.60	253	58.70	6	4	4.5	5.5
Occupational aspirations	95	15.97	128	5.00	32	9.38	255	59.17	6	7.5	7.5	5.5
Educational aspirations	91	15.07	107	2.22	32	9.38	230	53.36	2[a]	1[a]	7.5	1[a]
Socioeconomic status	95	15.97	128	5.00	28	7.83	251	58.24	6	7.5	1.5[a]	5.5
Self-esteem	98	16.65	127	4.84	27	7.44	252	58.47	6	4	1.5[a]	5.5
Locus of control	95	15.97	125	4.58	30	8.60	250	58.00	6	4	4.5	5.5
High school program	90	14.84	122	4.19	30	8.60	242	56.15	2[a]	4	4.5	2[a]
High school outcome	93	15.52	127	4.84	31	8.99	251	58.24	2[a]	4	4.5	5.5
Individuals without LD												
Composite academic achievement	4,618	32.86	2,312	24.28	237	39.66	7,167	66.75	8	2.5[a]	4	7
Occupational aspirations	4,478	29.08	2,399	27.02	236	39.44	7,113	66.25	5	4[a]	4	4.5
Educational aspirations	4,327	24.99	2,471	29.51	215	35.43	7,013	65.32	1[a]	7	2[a]	2.5[a]
Socioeconomic status	4,485	29.26	2,315	24.38	240	40.19	7,040	65.57	5	2.5[a]	6.5	2.5[a]
Self-esteem	4,514	30.04	2,448	28.58	240	40.19	7,202	67.08	7	5.5	6.5	7
Locus of control	4,494	29.51	2,496	30.09	208	33.83	7,198	67.04	5	8	1[a]	7
High school program	4,443	28.12	1,342	−6.35	350	61.38	6,135	57.14	2.5[a]	1[a]	8	1[a]
High school outcome	4,444	28.14	2,441	28.35	237	39.62	7,122	66.33	2.5[a]	5.5	4	4.5

[a]Indicates predictor variables that decreased hit rate accuracy when deleted and were considered important to overall classification. Although ranked, other variables were ignored in the ranking and interpretation process.

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standing that future positive gains in postsecondary school participation and employment are likely for young adults with LD, although these gains are likely to remain lower than those of nondisabled peers (Michaels, 1994).

The results of this particular investigation may contribute to the literature in several ways. First, the use of a large, nationally representative database provides a much broader perspective and larger numbers of participants with LD than typically studied; the National Longitudinal Transition Study of Special Education Students (see Wagner, 1993) is a notable exception to this claim. Although broader scope is a positive attribute, the results should be viewed with caution given the reliance on school identification methods to determine the presence of LD. I tried to counter this potential concern by providing descriptive benchmarks that can be used to ascertain the relative similarities between this and other studies of persons with LD (Durrant, 1994; Morris et al., 1994; Vaughn & Lyon, 1994). Second, the longitudinal nature of the NELS:88 database allows information obtained during high school to be applied to participants' status 2 years after high school completion. As a result, the predictive value of selected variables on early postsecondary educational and employment status and attainment can be determined (Wong, 1994). Third, this study compares the aspirations and attainment of individuals with *and* without LD. Adelman and Vogel (1993) noted that "without appropriate control or comparison groups, it is impossible to determine the effects of learning disabilities on adult adjustment and attainment" (p. 227). Finally, information about the educational and occupational aspirations and attainment of young adults with LD 2 years after high school can expand our understanding of the influence these factors have on adolescents' transition to adult life. Focusing on a period of development when adolescents begin to adopt adult roles can be particularly helpful in identifying the short-term influence of LD and in clarifying how the presence of LD affects career decision making and career circumscription and compromise processes (Rojewski, 1994).

Diploma Attainment Rates

Rates for attaining a high school diploma or equivalent based on disability status were comparable to—although slightly higher than—reports from previous studies (e.g., Fairweather & Shaver, 1991; Wagner, 1993). These rates may be due to individuals who received a high school diploma, GED, or certificate being combined for analysis purposes. Even with this grouping scheme, adolescents with LD were less likely to have received a high school diploma, GED, or certificate than students in the general population. Women with LD appeared to be at particular risk. In fact, only two thirds of women with LD reported attaining a high school diploma or equivalent, compared to more than 80% for men with LD and 90% for nondisabled peers. Lower high school graduation or equivalency attainment rates for adolescents with LD are troublesome considering that workplace demands, increasing technological sophistication, and changing societal expectations about what constitutes an adequate education have interacted to make some type of postsecondary education increasingly necessary for entry into employment (Miller et al., 1990). More than one quarter of all young people with LD had not yet attained the minimal academic credentials they needed to have opportunities for entry and advancement in many employment fields. Without a high school diploma or equivalent, the occupational future for these individuals is questionable.

Determining specific reasons for the poor high school completion rate of women with LD was beyond the scope of this study. However, Vogel (1990) noted that women who whose LD were school identified tended to have lower intelligence scores, more severe academic impairments, and greater academic discrepancies than men with LD. Other possible explanations have been advanced, such as differing socialization experiences, cultural expectations, fewer real or perceived occupational opportunities, or systemic bias and structural barriers based on gender or disability status (Lerner, 1996; Rojewski, 1994). Regardless of the specific reasons, the results clearly indicate that continued attention should be paid to the occupational and educational problems of adolescents with LD and particularly of women.

Occupational Aspirations

The occupational aspirations of young adults with LD were examined because of the potential that expressed aspirations have to reflect an individual's past experiences, self-efficacy, and perceived barriers to eventual occupational attainment (Gottfredson & Becker, 1981). The types of occupational aspirations expressed by young adults with LD reaffirm the results of prior studies and suggest that the career choice patterns established early in adolescence (Rojewski, 1996a) remain fairly stable throughout latter adolescence (Rojewski, 1996b) and early adulthood. As in past investigations, men with LD were more likely to aspire to occupations of moderate prestige than other groups based on gender and disability status. Men with LD were also more likely to report low-prestige aspirations than their nondisabled peers. Women with LD were twice as likely as men with LD to aspire to occupations with high prestige, although they were also more than three times as likely as nondisabled peers to report low-prestige aspirations.

A number of possible explanations for lower occupational aspirations for individuals with LD have been advanced. One possible explanation was suggested by Gottfredson et al. (1984) who found that men with LD often obtained employment that emphasized nonacademic skills due to poor aca-

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demic achievement. It is also possible that lower aspirations reflect expectations, real or imagined, about the types of employment available to persons with LD. A third alternative reflects a sociological (Hotchkiss & Borow, 1996) or social–cognitive perspective (Lent, Brown, & Hackett, 1996) in which lower aspirations are viewed as a reflection of the effects of social bias or structural barriers resulting from disability status or gender. A number of other explanations are also possible for explaining lower prestige aspirations expressed by individuals with LD including lower self-concept, a more external locus of control, delayed or impaired career development, or inadequate social functioning (Fourqurean et al., 1991; Rojewski, 1994).

When combined with prior investigations (e.g., Rojewski, 1993, 1996a, 1996b), these results provide additional evidence of a consistent, long-term, and stable pattern of lower occupational and educational aspirations—and lower postsecondary attainment—for individuals with LD. It is important to remember that lower aspirations are not by themselves negative. In fact, the labor market does not produce unlimited numbers of high-prestige occupations (Gottfredson & Becker, 1981). Even so, the limiting effect that lower aspirations have on future opportunities should be an important consideration in transition planning. A comprehensive, longitudinal, and integrated focus on the career development of young people with LD is needed so that secondary educational options are not eliminated prematurely (Rosenbaum, 1981) and appropriate postsecondary choices can be identified, planned for, and attained.

Status 2 Years Postsecondary

Individuals with LD were more likely to be employed in the workforce (especially men) and only half as likely to be enrolled in some type of postsecondary education program (especially women) when compared to nondisabled respondents. A number of possible explanations have been suggested for lower enrollment rates of individuals with LD in postsecondary education, including limited knowledge about the types of program opportunities or the possible academic accommodations available to students with LD in many postsecondary educational programs, poor self-advocacy skills, low self-efficacy, lack of adequate secondary academic preparation, and effects of bias, discrimination, or low expectations by teachers, parents, and community (Miller, Corbey, & Asher, 1994; Ness, 1989; Rojewski, 1994).

Women with LD were as likely to report being unemployed or out of the workforce (24.5%) as they were to report participation in postsecondary education (24.6%). This rate was more than four times higher than that of the other three comparison groups. Greater unemployment for individuals with LD, especially for women, is consistent with past studies (Adelman & Vogel, 1993; Haring et al., 1990; Kranstover, Thurlow, & Bruininks, 1989; Scuccimarra & Speece, 1990). The influence of gender on career development patterns has been consistently demonstrated in the literature (Betz & Fitzgerald, 1987; Davey & Stoppard, 1993; Jenkins, 1989), leading to the conclusion that gender is a powerful and persistent influence on occupational behavior (Hall, 1994). The prominent role of gender has been attributed, in part, to the unique experiences of women, such as concern for balancing career and family relationships (Betz, 1993; Fitzgerald, Fassinger, & Betz, 1995). The combined effects of being a woman and experiencing LD had a substantial negative effect on career choice and attainment.

Predictors of Postsecondary Status

Classification Accuracy. Is information available in Grade 12 useful in classifying postsecondary outcomes—2 years beyond high school—for individuals based on disability status? First, the ability to predict postsecondary status from Grade 12 data was approximately 10% higher for young adults without LD. Second, the analysis of separate criterion status groups produced quite mixed results when compared by disability status. Prediction accuracy was similar for individuals enrolled in postsecondary education regardless of disability status. However, higher prediction rates were found for employed individuals without LD and for unemployed individuals with LD.

As expected, descriptive statistics revealed progressively lower scores on predictor variables from those enrolled in postsecondary education through being employed to being unemployed. The general profile of individuals enrolled in postsecondary education—regardless of disability status—consisted of high academic achievement, high-prestige occupational aspirations, relatively high socioeconomic status, positive self-esteem, internal locus of control, and graduation from high school in a college-prep or academic program. In contrast, individuals who were unemployed or out of the workforce were more likely to report low academic achievement, low- or moderate-prestige occupational aspirations, low socioeconomic status, negative self-esteem, external locus of control, and participation in vocational or general education programs during high school.

High educational aspirations and successful completion of an academic or college-prep high school program were the most important variables for individuals primarily enrolled in postsecondary education, regardless of disability status. The type of high school program was also important for young adults who were primarily in the workforce. However, some differences based on disability status were also noted for this outcome group. Educational aspirations was an important variable for individuals with LD. Composite academic achievement and socioeconomic status were impor-

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tant predictor variables for individuals without LD. The greatest differences between individuals with and without LD were found among persons who were unemployed or out of the workforce entirely. Lower self-esteem and socioeconomic status were the best predictors for individuals with LD, whereas locus of control and educational aspirations were important variables for nondisabled individuals in this group.

Several explanations might help clarify these findings. In a previous study, Rojewski (1993) concluded that the theoretical structure of career development was probably different for adolescents with LD. These differences resulted in less predictability and continuity in the career development process. It is also possible that individuals primarily working or unemployed received a lack of adequate career preparation and transition support. This seems to be especially relevant for individuals with LD. Another closely related explanation centers on the role that discrimination, social attitude, cultural expectations, and stereotypes play in career development. Researchers (e.g,. Hotchkiss & Borow, 1996; Lent et al., 1996; Mitchell & Krumboltz, 1996) have explained how negative teacher or societal perceptions and expectations can impose lower status and a devalued role for individuals, which in turn can result in limited educational or career choices, narrow opportunities, and restricted access to training programs.

Mediocre Hit Rates. Regardless of disability status, individuals enrolled in postsecondary education were easier to classify and shared similar characteristics. Somewhat disappointing was the limited ability to accurately classify individuals in the other two categories, primarily working and unemployed. This limitation is especially troubling given that less than one third of adolescents with LD were enrolled in higher education.

Several possibilities exist to explain the mediocre hit rates obtained, particularly for the group with LD. Low prediction rates may merely reflect the limited scope of the variables selected for inclusion. Without question, the process of transition from school to adult life is complex and significantly affected by any number of situations and events not represented in this study. For example, the presence of transition support or career guidance programs might enhance our ability to predict postsecondary attainment. Undoubtedly, other variables such as self-appraisal ability, work ethic and motivation, or orientation to and knowledge about the world of work also influence adult outcomes. The role of chance or unforeseen events in career choice and attainment is generally not well understood, but could be considerable for individuals with LD who may possess limited problem-solving or reasoning skills. It is also possible that poor hit rates simply reflect the degree of turbulence and uncertainty experienced as young people make the transition from adolescence to adulthood. Future investigations should consider these as well as other variables that might have an impact on educational and career behavior.

Another explanation for the low prediction accuracy obtained for individuals with LD is that the presence of a disability somehow precludes certain postschool options, making prediction difficult. In this scenario, prediction is problematic because of career-related problems— delayed or impaired career development—associated with the presence of a disability. Curnow (1989) noted that negative cultural perceptions and social expectations tend to impose lower status and a devalued role for persons with disabilities. Teachers or parents may be influential by limiting job or career choices, restricting opportunities and access to training programs, or suggesting narrow stereotypical employment possibilities. Persons with LD may also limit their own educational and occupational futures as a result of poor self-concept, delayed or impaired career development, or perceived inadequacies (Gottfredson et al., 1984; Rojewski, 1993, 1994).

Although separate theories of career behavior are not indicated, it is likely that the career development of individuals with LD is more complex, or at least different in some important respects, than for their nondisabled peers. Previous investigations (Rojewski, 1993, 1996a, 1996b) have supported the notion that, as a group, adolescents with LD tend to experience certain career-related problems, such as career immaturity, passive involvement in the career decision-making process, and limited information about the world of work. The unique experiences of this group should be acknowledged as career theories are applied to understanding individuals' career behavior or program development efforts.

Implications

These results, along with previous investigations, provide professionals (e.g., special educators, career counselors, and transition specialists) with knowledge about the differences in career behavior of adolescents with and without LD. Given the importance of high school program placement and educational aspirations to postsecondary attainment, professionals must remain sensitive to the potential influence that placement decisions and general teacher expectations have on career choice, occupational preparation, and the transition process. The critical role of professionals becomes increasingly important considering the emphasis on transition planning and career preparation programs (e.g., apprenticeship, tech-prep) at the secondary level that advocate selection of educational tracks and possible career options early in a student's secondary school years.

The longitudinal nature of career development and the early determinants of postsecondary attainment—perhaps in early childhood but certainly by the time adolescents enter high school—

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should be considered in program development, along with the unique problems experienced by individuals with LD. The present findings enhance our understanding of the career development process and postsecondary educational and occupational attainment patterns of young adults with LD. This information can be used to improve theoretical explanations, guidance and counseling activities, the development and sequencing of academic and occupational courses and programs, and transition planning efforts for adolescents and young adults with LD.

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