Cognitive, Academic, and Attitudinal Predictors of the Grade Point Averages of College Students with Learning Disabilities

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Abstract
This study examined cognitive, academic, and attitudinal predictors of college grade point average (GPA) among college students with learning disabilities (LD). The study population included 84 youth who attended a large private university in the midwestern United States. Measures of cognitive and academic functioning, along with a self-report measure of study habits and study attitudes, were used to predict college GPA. The results indicated that Full Scale IQ and one factor on the self-reported study habits scale accounted for a significant amount of variance in students' college GPA. These findings suggest that variables other than traditional cognitive and academic skills are important for determining the performance of youth with LD during college. The implications of these findings for future research efforts and practice are discussed.

A substantial body of research indicates that young adults with learning disabilities (LD) fare poorly in comparison with their nondisabled peers following high school (Blackorby & Wagner, 1996; Murray, Goldstein, Nourse, & Edgar, 2000). Youth with LD have elevated high school dropout rates, high rates of unemployment, low wage rates, and low rates of participation in postsecondary education (Blackorby & Wagner, 1996; Fourqurean & LaCourt, 1991; Hasazi, Gordon, & Roe, 1985; Murray, Goldstein, & Edgar, 1997; Murray et al., 2000; Zigmond & Thornton, 1985). One of the most consistent findings of research in this area has been that youth with LD have extremely low rates of postsecondary school attendance. Whereas some researchers have reported that the employment rates of youth with LD are comparable to those of their nondisabled peers (Murray et al., 1997), these same investigators found huge discrepancies between the college attendance rates of youth with LD and their peers without LD (Murray et al., 2000). Furthermore, although it is clear that youth with LD attend colleges and universities at lower rates than youth without LD, little is known about the factors that influence the performance of youth with LD during their college experiences. Developing further understanding about factors related to the college performance of youth with LD is important, because such information could be used by primary schools, secondary schools, and universities in efforts designed to promote and support the long-term educational outcomes of youth with LD. In this investigation, we examine how a number of cognitive, academic, and attitudinal student characteristics influence the college performance of youth with LD.

Literature Review
Previous research aimed at understanding the post–high school educational status of youth with LD has focused on two broad areas. The first seeks to document and understand the rates of postsecondary school attendance among youth with LD, and the second seeks to document and understand the performance of adults with LD in postsecondary school settings.

Rates of Attendance
The U.S. Department of Health and Human Services annually reports postsecondary school attendance rates for high school graduates between the ages of 25 and 29 years. This report provides overall population estimates and suggests that approximately two thirds (66%) of high school graduates within the general population have attended some college (U.S. Department of Health and Human Services, 2000). In contrast, in the most comprehensive follow-up investigation of youth with disabilities to date, Wagner et al. (1991) reported that about half as many (31%) youth with LD had attended postsec-
Findings from an investigation that carefully matched high school graduates with and without LD support these general trends. Murray et al. (2000) reported postsecondary attendance rates for two cohorts of graduates with LD who had been out of high school for 1 year to 5 years and 6 to 10 years, respectively. In addition to these cohorts, two cohorts of nondisabled youth—matched by school district, date of graduation, and gender—were also followed during the same time period. This design allowed Murray et al. to examine postsecondary attendance rates for both groups in each of 10 years following high school. Findings indicated that (a) the youth with LD were significantly less likely than the youth without LD to have attended postsecondary school in Years 1 through 10 and (b) those youth with LD who had attended postsecondary school were much more likely to have attended training schools and community colleges rather than 4-year colleges and universities. These findings highlight a general pattern of low rates of postsecondary schooling among youth with LD, and it appears that they have particularly low rates of attendance at 4-year colleges and universities.

Efforts aimed at understanding these patterns among youth with LD have focused on a number of educational, psychological, and environmental factors, including socioeconomic status (SES; Rawson, 1968), intellectual functioning (Bruck, 1987; Hartzell & Compton, 1984), severity of the learning disability (Hartzell & Compton, 1984), level of support in elementary school and high school (Halpern, Yovanoff, Doren, & Benz, 1995), and motivation and attitude (Vogel, Hruby, & Adelman, 1993).

In one of the few prospective studies to examine postsecondary school involvement among youth with disabilities, Halpern et al. (1995) examined how a variety of factors during high school influenced the students’ post-school educational status 1 year following high school. In this multistate investigation, demographic information, information related to students’ families, services received during high school, student attitudes, student achievement levels, services received following high school, and students’ quality of life outside of school were used to predict postsecondary school involvement status among youth in a number of disability categories, the majority of whom were individuals with LD. The findings indicated that individual student characteristics (i.e., achievement levels) and school experiences (i.e., the provision and completion of needed instruction, transition planning, and student and parent satisfaction with instruction) were stronger predictors of participation in postsecondary education than were gender, ethnicity, family income level, dropout status, prevalence of integrated instruction, or congruence of student-parent expectations (Halpern et al., 1995).

In contrast, Fairweather and Shaver (1991) examined the relationship between student demographic characteristics and postsecondary school involvement among youth in different disability categories. These researchers reported that youth with disabilities were less likely to attend postsecondary schools than were youth without disabilities, yet, regardless of disability status—disabled vs. nondisabled—parental levels of education, family income, and graduation from high school were associated with involvement in postsecondary school. Among youth with disabilities, youth whose family income was $25,000 or more were approximately twice as likely to have taken at least one college class than were youth whose family income was less than $25,000 per year. Parental levels of educational attainment were also associated with attendance rates. Youth whose primary caregiver had graduated from college were approximately four times more likely to have attended postsecondary school than were youth whose primary caregiver had not attended college. Finally, youth who graduated from high school were three times more likely than youth who did not graduate to have attended some form of postsecondary school.

Performance in Postsecondary School

Another body of literature has focused on understanding the performance of youth with LD who do attend postsecondary school. Vogel and Adelman (1992) examined the college performance of youth with LD and a matched sample of youth without LD from the same university. The matched group had similar entrance American College Testing (ACT) Assessment scores and was also matched by gender. Although the groups had similar incoming ACT scores, college students with LD were found to have significantly lower scores on a standardized measure of reading ability and sentence structure. Using college grade point average (GPA) as a dependent variable, Vogel and Adelman examined the relationship between ACT scores, high school GPAs, and college GPAs. The findings indicated that ACT scores were not associated with college GPA for either group, but that high school GPA was associated with performance in college (LD group, $r = .41$, $p < .05$; matched group, $r = .48$, $p < .05$).

In another investigation, Vogel et al. (1993) examined differences between youth with LD who graduated from college ($n = 36$) and youth with LD who had dropped out or had been dismissed from college ($n = 23$). The findings indicated that these groups did not differ on variables related to ACT scores, intellectual ability, or academic achievement. However, youth with LD who graduated from college were significantly older, were more likely to have spent time receiving private tutoring during childhood and adolescence, and were more likely to have taken a greater number of regular English courses during high school than were nongraduates. Furthermore, youth
with LD who did not graduate from college were more likely to have been placed in self-contained classrooms during elementary and secondary school than were college graduates. Because some of these data were gathered through retrospective accounts, and because the analyses involved a limited number of youth from one university, these findings should be interpreted with caution. However, these findings do suggest that variables other than cognitive and academic functioning are associated with the college performance of youth with LD.

Because academic and cognitive competencies appear to be inadequate predictors of college performance, a number of researchers have examined how other variables influence postsecondary educational performance. LaRose, Robertson, Roy, and Legault (1998) studied 179 students considered at risk of academic problems in college due to their failure to meet university entrance requirements (i.e., SAT scores and high school rank). Although this study did not specifically focus on youth with LD, the participants completed a measure called the Test of Reactions and Adaptations in College (TRAC), which was designed to assess student beliefs, emotional reactions, and behaviors in various learning situations. Factors on this scale included Examination Anxiety, Fear of Failure, Examination Preparation, Quality of Attention, Assistance from Peers, Giving Priority to Studies, Seeking Help from Teachers, and Belief in Effective Work Methods (see Larose et al., 1998, for complete description of measure). The outcome measure in this investigation was mean grade point average. The findings from stepwise regression analyses indicated that the overall TRAC score accounted for approximately 15% of the variance in these youth’s college GPAs after controlling for high school rank and SAT scores.

Similarly, Pickering, Calliotte, and McAuliffe (1992) conducted a series of discriminant function analyses and classified students according to their success in college. The participants in this investigation were 1,587 full-time first-year students at one university in the southwestern United States. Cognitive (i.e., high school GPA, high school rank, and SAT scores); demographic (i.e., gender, race, SES, and first-generation college student); and noncognitive (i.e., attitudes, opinions, and self-ratings) variables were used to predict academic success or academic difficulty among these youth following their first year of college. Students with GPAs below 2.0 following the first year of college were considered to be experiencing academic problems, whereas students with GPAs above 2.0 were considered academically successful. To determine the unique variance attributable to each of the predictors, classification rates of youth in both the successful and the unsuccessful groups were examined using various combinations of classification variables. This procedure indicated that for youth in the unsuccessful group, a combination of cognitive and noncognitive variables resulted in the highest correct classification rate. For this group, cognitive variables alone resulted in no correct classifications, demographic variables alone correctly classified only 2% of participants, but noncognitive factors resulted in 31% correct classifications. Interestingly, among youth in the successful group, cognitive variables alone resulted in 100% correct classification, and the addition of demographic and noncognitive variables actually reduced the correct classification rate to 96%, suggesting that nonacademic factors may have a stronger influence on the performance of youth who are experiencing academic difficulties in college than they do for successful students.

Summary and Present Investigation

In summary, findings from a number of previous investigations suggest that youth with LD are less likely than youth without LD to attend colleges and universities. Efforts to understand these patterns have focused on a variety of individual, social, educational, and familial factors. Although far from conclusive, the results of these investigations suggest that a variety of factors influence the postsecondary school attendance rates of youth with LD. Other researchers have focused on understanding the performance of youth with LD during their postsecondary educational experiences. The findings from the few investigations that have been conducted in this area suggest that traditional cognitive and academic factors do not adequately or completely explain the performance of youth with LD during postsecondary school. Although not specifically focused on youth with LD, a number of studies have reported that attitudinal and behavioral factors are important predictors of student performance during college. However, limited data exist regarding the influence of such factors on the postsecondary school performance of youth with LD. The purpose of the current investigation is to examine how cognitive, academic, and noncognitive attitudinal factors affect the postsecondary educational performance of adults with LD. Based on the findings from previous research, we hypothesized that student study habits and attitudes would be stronger predictors of college GPA than would prior cognitive functioning and academic achievement.

Method

Participants

The participants in this investigation were drawn from a pool of students attending a large private university in the midwestern United States. Participants were students diagnosed with LD who were receiving support services for LD at the university during the years 1998, 1999, and 2000. Students who had been previously diagnosed with a disability other than LD (e.g., attention-deficit disorder) or who had another disability listed as their primary area of service were not included in our initial sample. The initial
pool yielded a total of 148 students. However, to eliminate inconsistencies in our reporting, we restricted our analyses to those participants for whom we had complete data files. Forty students were excluded from these analyses because they were missing entire files or because they were missing large sections of their files (e.g., scores on an entire measure). An additional 24 students were excluded due to missing data within subsections of measures because they had completed fewer than 20 college credit hours. Therefore, the final study sample included 84 youth. Of these students, 56% were men, 44% were women, 76% were White, 14% were identified as students of color, and the race of 10% of the participants was unknown. The vast majority of students (96%) were undergraduates at the time of data collection, and 4% were graduate students. Approximately 51% of the participants received special education services for LD during primary or secondary school, whereas 41% of the sample was not identified until postsecondary school. We were unable to determine the time of initial identification for 8% of the sample.

Students initially diagnosed in postsecondary school underwent a multi-step process before receiving support services. Initially, students received a referral from a university faculty or staff member to seek support services. Students then contacted the director of the support program and completed an initial interview process. Based on that interview, the program director determined whether each student should undergo an evaluation for LD. If an evaluation was determined to be appropriate, a two-stage evaluation occurred. First, cognitive and achievement measures were administered, and the students had to exhibit either significant scatter on broad scales or subscales of these measures or significant discrepancies between overall IQ and academic achievement in order to be considered eligible for further testing. If the students met these criteria, they then completed a second battery of assessments related to memory, reading, written expression, and mathematics. Following these assessments, the program director, a diagnostician, and the student met to discuss the test results and to decide whether support services were warranted. All the participants included in this study went through all of these stages, and all were considered eligible to receive services for LD.

At the time of data collection, the average number of college credit hours earned for the entire sample was 120 hours. The university provides quarter-hour credits, and one course is typically worth four credit hours.

**Measures**

**College Grade Point Average.** The outcome variable in this investigation was college grade point average (GPA). GPAs for all participants were gathered from computerized records maintained by the support center. This system provided cumulative GPAs for all participants up to the quarter directly preceding the data collection activities. GPAs at the university are reported on a scale ranging from 0.0 to 4.0. On this scale, grades of A are reported as 4.0, grades of B as 3.0, grades of C as 2.0, grades of D as 1.0, and grades of F are recorded as 0.0. Mean GPAs and standard deviations for the current sample are presented in Table 1.

**Academic Achievement.** Incoming academic achievement levels of students were measured by individually administered, norm-referenced achievement tests. Participants who completed an achievement test during their final year of high school prior to entrance into the university did not complete a test on entrance into the support program. Similarly, several students had been tested following high school but prior to admission into the university. In these cases, students were not retested. However, if a student did not have recent academic achievement scores, he or she completed a number of achievement measures administered by trained support staff. Support staff tested approximately 49% of the participants. These youth completed the *Nelson-Denny Reading Test* to assess reading levels and the *Wide Range Achievement Test–Revised* (WRAT-R) to assess written language and mathematics skills. The remaining participants had scores from their last year of high school or from tests administered prior to entrance into the university. Of

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**TABLE 1**

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<th>Measure</th>
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Note. GPA = grade point average; SSHA = Survey of Study Habits and Attitudes (Brown & Holtzman, 1969).
the total sample, 32% of the participants had scores from the Woodcock-Johnson-Revise ed, approximately 12% had scores from the Wechsler Individualized Achievement Test (WIAT), and 7% had scores from the WRAT. Because these achievement test data were drawn from a variety of sources, standard scores were used in all analyses. Means and standard deviations on the reading, written language, and mathematics subtests for all measures are presented in standard score format in Table 1.

Cognitive Ability. Cognitive ability was assessed prior to or upon entrance into the support program through individually administered, norm-referenced tests of intelligence. As with the academic achievement tests, approximately half of the sample (49%) completed IQ tests administered by support staff at the university. In these cases, the Weschler Adult Intelligence Scale—Revised (WAIS-R) was administered. An additional 34% of the sample also had scores on the WAIS-R, but these assessments were administered by public or private school psychologists or by private clinicians. Approximately 17% of the sample had scores from the Weschler Intelligence Scale for Children—Revised (WISC-R). Unlike achievement tests, intelligence test scores are thought to be stable across developmental periods, so in approximately 17% of the cases, scores from IQ tests administered in childhood or adolescence were used. Means and standard deviations for the IQ scores are presented in Table 1.

Notably, the overall average IQ and achievement scores for this sample were similar and certainly did not meet a standard discrepancy formula for this category. However, researchers have noted that early intervention and remediation can eliminate or significantly reduce these discrepancies by adulthood, and this may be particularly evident in adults who have already been admitted to a 4-year university, because these adults have usually met initial admissions criteria (Vogel & Adelman, 1992). Similarly, other research has indicated that college students with LD often have average or above-average Verbal IQ but may have considerable scatter on the subtests that compose overall Verbal and Performance IQ scales (Vogel, 1986).

Survey of Study Habits and Attitudes. The Survey of Study Habits and Attitudes (SSHA; Brown & Holtzman, 1969) was used to assess the students’ attitudes and habits related to studying. This measure contains 100 questions answered on a 5-point Likert-type scale. Response options include rarely (0%–15%), sometimes (16%–35%), frequently (36%–65%), generally (66%–85%), and almost always (86%–100%). The questions revolve around four general constructs related to study habits and skills: Delay/Avoidance, Work Methods, Teacher Approval, and Educational Acceptance. Total raw scores for each participant were created by summing all items on each factor. In cases where items contained negative wording, the scores were reversed prior to summing the factor items. The raw scores were then divided by the total number of items on each subscale to derive an average score for each participant ranging from 1 (rarely) to 5 (almost always).

The Delay/Avoidance factor contains 25 questions related to delayed study habits and procrastination. Sample items include, “It takes a long time for me to get warmed up to the task of studying,” and “When I sit down to study, I find myself too tired, bored, or sleepy to study effectively.” On this subscale, higher average scores (i.e., closer to 5) are viewed as negative and indicate greater delay/avoidance, whereas lower average scores (i.e., closer to 1) indicate less delay/avoidance. The Work Methods factor contains 25 items related to student planning and work habits. Sample items include, “In preparing reports and term papers, I make certain that I clearly understand what is wanted before I begin work,” and “When reading a long textbook assignment, I stop periodically and mentally review the main points that have been presented.” On this factor, higher scores indicate stronger work methods, and lower scores indicate poorer work methods.

Brown and Holtzman (1969) reported strong test–retest reliabilities on the SSHA using a sample of more than 1,700 college-bound first-year students from six universities. Furthermore, Goldfried and D’Zurilla (1973) reported moderate to strong correlations between college students’ ratings on the SSHA and peer ratings of their study habits. More recently, Turnock, Rosen, and Kaminski (1998) reported that the SSHA was associated with academic competencies among college students with attention-deficit/hyperactivity disorder (ADHD), and Swanson and Howell (1996) reported that adolescents’ scores on the measure were negatively correlated with test anxiety. For the current sample, internal consistency reliabilities on the four SSHA subscales were in acceptable ranges (Delay/Avoidance, $\alpha = .92$; Work Methods, $\alpha = .88$; Teacher Approval, $\alpha = .87$; and Education Acceptance, $\alpha = .84$). Means and standard deviations for the current sample are presented in Table 1.
Procedure

On entrance into the university support program, all students completed assessments related to study habits and attitudes, and they also completed an initial interview sheet that contained questions related to age, gender, and educational history. As stated earlier, approximately half of them also completed tests of academic achievement and cognitive ability at entry. Trained university employees at the support center with graduate-level degrees conducted all testing.

The data for the current investigation were gathered from reviews of hard-copy folders and computerized records. Information related to credit hours, grade point averages, university status, and university major was drawn from computerized records maintained by the support center. This system provided current data for all participants and grade point averages for all participants attending the university in the quarter directly preceding the data collection activities. A cutoff criterion of 20 completed credit hours was used for participant inclusion in an effort to reduce the number of students who had not completed enough coursework to demonstrate their adjustment to college.

Information related to achievement test scores, IQ scores, and study habits and skills was maintained in hard-copy files at the support center. The first author reviewed each file, and the data for each of the variables were recorded onto a data collection sheet. Informal reliability checks of this process were conducted periodically by pulling previously recorded files and checking for errors on data recording sheets. All data were entered into an SPSS data file by the first author and a research assistant. Following data entry, additional reliability checks were conducted to evaluate the consistency of this process. Twenty-five hard-copy data files were randomly selected and compared to data entered in the SPSS data file. These checks indicated that the SPSS data fields matched hard-copy recording sheets in all cases.

Results

Three sets of analyses were conducted to examine predictors of the college GPAs of young adults with LD. As stated earlier, in an effort to ensure an adequate representation of student performance, all students who had completed fewer than 20 credit hours were excluded from these analyses. Because the remaining youth had completed varying levels of college credit, the number of cumulative credit hours completed was entered as a control variable when appropriate.

The first analysis involved comparisons of groups through a series of one-way ANOVA tests to examine gender differences on predictor and outcome variables. Similar comparisons by race were not conducted because there were too few participants in two of the race categories. The gender comparison for Full Scale IQ was significant, \( F(1, 82) = 4.2, p < .05 \), and men (\( M = 104, SD = 12.2 \)) had higher scores than women (\( M = 98, SD = 12.1 \)). On the Education Acceptance subscale of the SSHA, women (\( M = 3.9, SD = .56 \)) had higher scores than men (\( M = 3.6, SD = .45 \)), \( F(1, 82) = 7.0, p < .01 \).

Correlational Analysis

Zero-order correlations for the variables included in these analyses are presented in Table 2. Only one variable (Teacher Acceptance) was significantly correlated with college GPA among these youth. This was a weak but positive correlation, suggesting that youth with stronger teacher acceptance had higher GPAs. Most of the cognitive and academic variables were not correlated with GPA; however, these variables were associated with one another. Performance IQ and Verbal IQ were strongly correlated with Full Scale IQ (\( r = .84 \) and \( r = .86 \), respectively) and were moderately associated with each other (\( r = .45 \)). Similarly, the cognitive

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Note. \( N = 84 \). GPA = grade point average; FSIQ = Full Scale IQ; PIQ = Performance IQ; VIQ = Verbal IQ; RACH = reading achievement; WLACH = written language achievement; MACH = math achievement; DA = Delay/Avoidance; WM = Work Methods; TA = Teacher Approval; EA = Educational Acceptance.

\( *p < .05 \). \( **p < .001 \).
factors were moderately associated with reading, written language, and mathematics achievement factors, and prior academic achievement scores were moderately associated with one another. The one exception was that Performance IQ and written language achievement scores were not significantly associated with each other. Finally, factors related to study habits and study skills were moderately and significantly associated with one another (see Table 2).

Regression Analysis
To examine the predictors of college GPA among young adults with LD, a stepwise regression analysis was conducted, specifying GPA as the dependent variable and the variables related to cognitive functioning, academic achievement, and study habits and skills as predictor variables. As Performance IQ and Verbal IQ were highly correlated with Full Scale IQ, only Full Scale IQ was entered into the equation in an effort to enhance statistical power (Stevens, 1992). Also, because students had completed varying levels of college credit, and because gender was related to two of the predictors, these two variables were entered as control variables on the first step of the equation, and the other variables were entered in a second block of variables.

The results of the regression analysis indicated that Full Scale IQ and SSHA Delay/Avoidance were both significant predictors of college GPA. The full model, containing completed credit hours, gender, Full Scale IQ, and Delay/Avoidance, accounted for 14% of the variance in students’ grade point averages, $R^2 = .14$, $F(4, 79) = 3.2, p < .05$. After controlling for credit hours completed and gender, Full Scale IQ entered the equation first and accounted for approximately 6% of the variance, $R^2$ change $= .056, F(1, 80) = 4.9, p < .05$. The Delay/Avoidance variable entered the equation second and accounted for an additional 5% of the variance in GPA, $R^2$ change $= .053, F(1, 79) = 4.8, p < .05$. The standardized $\beta$ coefficient for Full Scale IQ was .28, $p < .05$, indicating that youth with higher Full Scale IQ scores had higher grade point averages. For Delay/Avoidance, the standardized $\beta$ coefficient was $-.24, p < .05$, indicating that students with greater Delay/Avoidance scores had lower grade point averages.

**Discussion**

The purpose of this investigation was to examine cognitive, academic, and attitudinal predictors of college GPA among college students with LD. The youth participating in this study attended a private university in the midwestern United States, and the results should be considered in light of the limited sample size and the selected population. The results of the primary analysis indicated that only two of the seven predictors were significantly related to the outcome variable (GPA) after controlling for student gender and the number of credit hours completed by each student. These two variables, Full Scale IQ and Delay/Avoidance, accounted for a small but significant amount of variance in these youth’s GPAs.

In general, these findings are consistent with findings from other investigations for several reasons. To begin with, the findings raise questions about the usefulness of traditional cognitive and academic measures as reliable predictors of the postsecondary school performance of youth with LD (Vogel & Adelman, 1992). In this investigation, we had access to data that in many ways were more direct measures of cognitive and academic competency than would usually be available to universities. The measures of intelligence and academic achievement were standardized, norm referenced, and individually administered. Despite these measurement strengths, only Full Scale IQ predicted college GPAs among these youth, and that association was modest at best.

Similarly, prior academic achievement was not a significant predictor of college GPA among these youth. This finding is even more surprising when one considers that the scores of these participants on the measures of academic achievement approximated a normal distribution. One explanation for this finding is that the achievement scores shared variance with general IQ. In a stepwise regression, all variables are entered at once, and the variables then “fight it out” to determine which will enter the equation. In this sample, intelligence scores and achievement scores were correlated (see Table 2), so the nonsignificant finding for achievement may be related to shared variance among these variables. However, regardless of the possibility that these measures were tapping similar attributes, neither was a strong predictor of GPA, suggesting that other factors play a significant role in determining the success or failure of youth with LD in college.

To examine the influence of other factors, we investigated the impact that self-reported study attitudes and habits had on college GPA. Only one of the four factors on the instrument used accounted for a significant amount of variance in GPA. This factor (Delay/Avoidance) was related to student procrastination and the avoidance of studying. Conceptually, one would expect student procrastination related to studying to negatively affect performance during college, so support programs in high schools and universities should make efforts to support students in completing their assignments and should also attempt to reduce these types of attitudes and behaviors among youth with LD. However, it is also important to note that although this factor did account for a significant amount of variance in college GPA, the total unique variance associated with this variable was only 5%. Therefore, although the factor appears to be somewhat important for understanding the college performance of youth with LD, it did not account for a large amount of variance in these youth’s college GPAs.

Based on these findings, we would say that the variables studied here
were not strong predictors of college GPA among the youth selected to participate in this investigation, and we would also suggest that continued research be conducted in this area. Such research should incorporate an even broader perspective. For example, other researchers have found that socioeconomic status, caregivers' level of education, parental expectations, transition planning during high school, and other high school experiences are related to students' participation in postsecondary school (Fairweather & Shaver, 1991; Halpern et al., 1995). Similarly, Vogel and Adelman (1992) found that prior educational experiences played a role in determining the graduation status of youth with LD. These findings suggest that it may be important to consider a broad range of educational, social, and familial factors in addition to individual factors when examining the performance of youth with LD in postsecondary school (Murray, 2003). Potentially important environmental factors might include students' previous educational experiences, access to economic resources, social support, stressful life events, and levels of academic support during college. At the individual level, factors related to study habits and study skills, self-determination, and various academic, cognitive, and emotional competency factors might be considered. Future investigations focused on these variables would help to clarify the relationship between student characteristics, environmental factors, and the performance of youth with LD in postsecondary school.

We would also argue that a growing body of research suggests that cognitive and academic factors—factors that have traditionally been valued by postsecondary institutions—appear to be less than reliable predictors of the performance of youth with LD during postsecondary school. Although the investigations conducted on this topic have been limited in size and scope, the findings raise important questions about the utility of these measures as "gatekeepers" to colleges and universities for students with LD. Therefore, in addition to conducting research focused on a broader number of social and ecological variables, we would suggest that universities and colleges look closely at their admissions criteria and consider the possibility that these criteria may have serious limitations.

It is also important for practitioners at other levels to be aware of the possibility that factors other than academic achievement and cognitive ability are influencing the postsecondary school performance of youth with LD. Although traditional cognitive and academic skills are currently highly valued in most educational settings, it is likely that other factors also play a significant role in determining the long-term educational outcomes of youth with LD. Although it would be presumptuous of us to suggest that we have a clear understanding of what those other factors are, the fact that a number of investigations have shown that traditional cognitive and academic factors are less than adequate predictors of postsecondary school performance among students with and without LD provides a basis for searching for other factors. Therefore, at this point, we would argue that teachers and other school personnel should be wary of making assumptions about the academic potential of students based solely on a knowledge of their academic and cognitive competencies, and they should also make efforts to teach nontraditional skills that may enhance the long-term potential of youth. Preliminary data from investigations in the areas of self-determination and social cognitive problem solving offer some promise in this regard (Egbert, Seyl, & Nichols, 1990; Wehmeyer & Schwartz, 1997).

This investigation has a number of limitations that should be considered. The first limitation concerns the size of the study population and the unique sample characteristics. This was a relatively small sample of college students from one university. This undoubtedly influences the generalizability of our findings in a number of ways. The youth who participated in this investigation represented a population of students who had already been admitted to a private, 4-year university located in a large midwestern city. This raises a number of issues about the characteristics of the population (e.g., socioeconomic status and other familial resources, prior school histories, academic and cognitive abilities). Similarly, the participants in this study had completed at least 20 credit hours at the university. This requirement was implemented because we were using college GPA as an outcome variable, and we wanted to ensure that at least five courses were included in the calculation of this variable. However, because all participants had completed at least five courses, less successful college students with LD who entered the school and then dropped out may have been excluded from the sample.

A second limitation related to sample size concerns the influence that sample size has on statistical power. When the ratio between the number of participants and the number of predictors is low (in this case, 9:1), the power of regression equations is reduced (Stevens, 1992). Therefore, in future research efforts, it would be important to consider larger populations.

A third limitation is related to the use of college GPA as a dependent variable. Grade point average has been criticized for being an unstable metric, because it is subject to error related to teacher judgments and biases. Thus, these scores may have provided an unreliable measure of student functioning, which did not correspond to the more traditional measures included. This could, in part, explain the weak predictive power of academic achievement, cognitive functioning, and study habits and attitudes. However, although this problem may have caused the weak statistical findings, college GPAs are of practical significance because they can affect the lives of students in many ways. College GPAs can influence whether students are dismissed from college; they are important for graduation; they can influence continu-
ing education; and they can influence postcollege employment. Therefore, although the scores may be unreliable, they are still important, and we should continue to make attempts to understand the factors that help to explain college GPA among youth with LD.

Despite these limitations, the results of this investigation do offer some insight into the postsecondary educational experience of young adults with LD. Although the predictors were weak in terms of their overall relationship with college GPA, two variables were significant, and efforts to improve general intellectual functioning, as well as efforts to reduce attitudes and behaviors related to the avoidance of studying, should be considered by teachers at primary and secondary levels as well as by support personnel in universities. Moreover, the finding that IQ and prior academic achievement levels were weak in terms of their overall predictive power suggests that other factors are influencing the college GPA of youth with LD. Continuing to develop further understanding about what those other factors are is an important research objective, because such information could be critical for improving the long-term educational outcomes of youth with LD.

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