

## **Patterns of Change and Predictors of Success in Individuals With Learning Disabilities: Results From a Twenty-Year Longitudinal Study**

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The research described in this article is part of a larger longitudinal project tracing the lives of a group of individuals with learning disabilities who attended the Frostig Center 20 years ago; this article focuses on the quantitative results of the follow-up study. Data were gathered through case records, public records, current testing, and in-depth interviews. First, changes in independent variables (e.g., socioeconomic status, IQ, life stressors, academic achievement) and dependent variables (e.g., employment status, educational attainment, living arrangements) across data points are described. Second, comparisons between successful and unsuccessful individuals on independent and dependent variables are discussed. Last, three possible predictors of success are identified: IQ, achievement, and "success attributes" (e.g., self-awareness, perseverance, proactivity, emotional stability, goal setting, and social support systems). The composite score on the six success attributes best predicted success at year 20, explaining 49 to 75% of variance, with either IQ or achievement making a minor contribution (0-5%), depending on the outcome measure employed. Implications for intervention and research are also discussed.

Both Jason and Mark were identified as learning disabled around 10 years of age. Both attended a school for children with learning disabilities (LD) and were considered to be "at risk," educationally and socially. Both Jason and Mark are now 35 years old. However, Jason is in a state penitentiary serving a life sentence for murder, whereas Mark lives at the beach and is president of a successful software company.<sup>1</sup> Why? What were the differences in these at-risk individuals' backgrounds or life experiences that led them to such distinct places? What internal factors or external events, encountered along their life paths, promoted antisocial behavior in one individual and upward mobility in the other? What factors, either singly or in combination, led one individual to "success" and the other to "failure"?

Answers to such questions, although of critical importance for understanding outcomes for individuals with LD, are not easily determined. Questions of this nature require a careful analysis and comparison of individual life trajectories to discover patterns of change in individuals over time. In short, they can only be answered adequately through longitudinal research. However, Raskind, Gerber, Goldberg, Higgins, and Herman (1998) emphasized that "although longitudinal studies in learning disabilities do exist,<sup>2</sup> the overwhelming majority are cross-sectional studies of school-aged children within educational settings" (p. 266). Although the importance of researching children with LD within the educational milieu is self-evident, it does little to promote our understanding of how these individuals change over time and of the 'various factors, conditions, contexts, and events that may lead to specific outcomes. McKinney (1994) stressed that longitudinal research "remains an under-used but powerful tool in understanding the development of individuals with learning disabilities and its full impact on practice has yet to be realized" (p. 203). He continued, "we still lack basic knowledge about the natural history of learning disability. Specifically, we know little about... how the manifestations of the disorder evolve and change over time as a function of biologic and environmental factors" (p. 203).

The present investigation seeks knowledge regarding what McKinney (1994) termed the "natural history" of learning disabilities by employing a longitudinal<sup>3</sup> design to study individuals with LD over a 20-year period. The study was designed to search for patterns of change and the factors, conditions, events, and contexts that may act individually or in combination to produce specific life outcomes. Answers were sought to the following questions:

1. What factors promote or prevent the success of individuals with LD?

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<sup>1</sup> Names are fictitious to protect the anonymity of all study participants.

<sup>2</sup> For example, see research by Lehtinen-Rogan and Hartman (1976), Spreen (1988), and Werner (1993).

<sup>3</sup> We acknowledge that some researchers are more restrictive in their use of the term *longitudinal* (e.g., Baltes & Nesselroade, 1979).

2. Do these factors change over time?
3. How might these factors interact to produce specific outcomes?
4. Are learning disabilities experienced differently across developmental periods?
5. Do specific academic-skill deficits of individuals with LD change over time?

The research described in this article is part of a larger longitudinal project tracing the lives of a group of individuals with LD who attended the Frostig Center 20 years ago. Although the overall design of the project includes the gathering and analysis of both quantitative and qualitative data, this article focuses on the quantitative results, specifically (a) changes in independent (e.g., socioeconomic status [SES], IQ, life stressors) and dependent variables (e.g., employment status, educational attainment, living arrangements) across data points, (b) comparisons between "successful" and "unsuccessful" individuals on independent and dependent variables, and (c) those results that relate to discovering predictors of "success" at year 20.

## HISTORY OF THE STUDY/FINDINGS AT YEAR 10

The current study is essentially Phase 2 of an ongoing longitudinal project conducted by the Frostig Center in Pasadena, California. The project has tracked a group of individuals who had been identified in childhood as learning disabled and enrolled at the Frostig Center during the period from 1958 to 1965. The study was driven by observations of the Frostig staff some 15 years prior that some graduates were successful, whereas others clearly were not. These reflections prompted a 10-year follow-up (Phase 1 of the project), which focused on identifying internal factors and external events in the past and current life experiences of young adults with LD, which could be used to discriminate between those who were successful and those who were not. The reader is referred to Spekman, Goldberg, and Herman (1992) for a complete description of this study. A multidimensional view of success was used that included educational achievement, employment attainment/accomplishments, social and familial relationships, and life satisfaction similar to areas deemed important to successful life adjustment in adults with LD (e.g., Cronin, Patton, & Polloway, in press; Halpern, 1985).

Fifty participants/informants<sup>4</sup> were located from a total population of 206 past students to participate in the 10-year follow-up study. (For a more detailed description of the selection process, see Spekman et al., 1992.) All 50 participants met the following criteria: (a) 18 to 25 years of age at the time of the 10-year follow-up, (b) verbal or performance IQ of 85 or above at the time of Frostig Center enrollment, (c) diagnosis of learning disability, (d) no sensory deficits at initial diagnosis, (e) no initial diagnosis of severe emotional disturbance, and (f) 1-year minimum Frostig Center enrollment. Data were collected on each participant from case records; parent rating scales; cognitive and academic testing; and a semistructured interview that focused on education, employment, social relations, and future aspirations. The data were analyzed both quantitatively and qualitatively. Twenty-nine participants were identified as successful and 21 unsuccessful by three independent raters who reviewed the data using the multidimensional view of success described earlier.

Quantitative analyses revealed few meaningful, significant differences between the groups based on background variables or cognitive or academic achievement, and it appeared that success might be related to other factors in the lives of these individuals. In this regard, qualitative analysis revealed a set of "success attributes" that differentiated the groups, with the successful group illustrating greater (a) realistic adaptation to life events including greater self-awareness/self-acceptance of the learning disability, proactivity, perseverance, and emotional stability; (b) goal setting; and (c) presence and use of effective support systems. Further exploration of these attributes became a key goal at year 20.

The 10-year study also yielded several qualitative "themes" that appeared to hold true for both groups. These were (a) having a learning disability is an ongoing condition that does not go away, (b) persons with LD face life stressors in addition to their learning disability, and (c) individuals with LD tend to be "late bloomers."

The 10-year follow-up study provided highly valuable information and considerably enhanced our knowledge and understanding of individuals with LD. However, the study also posed a number of new questions—questions regarding the nature of learning disabilities across time and the various factors related to successful outcomes (see specific questions discussed earlier). Answers to these questions could best be found by re-entering the lives of these individuals further down their life path, specifically, 20 years after they had left the Frostig Center.

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<sup>4</sup> The term *informants* is used interchangeably with *participants* throughout this article. The term derived from the ethnographic perspective and emphasizes learning from people, rather than studying them (Spradley, 1979).

## METHOD

### Participants

The involvement of the cohort of 50 for the 10-year follow-up was the result of a multistep process. A letter of introduction and questionnaire were mailed to parents of former students who met the criteria for inclusion described earlier. Of the 206 questionnaires sent, 87 (42.2%) were completed and returned by a parent, 68 (33%) were unanswered, and 51 (24.8%) were returned marked "address unknown." Parent respondents were then contacted by phone to seek permission for the researchers to contact each young adult. Phone contacts were then made with the former students. Fifty former students agreed to be interviewed and kept scheduled appointments.

For the 20-year follow-up, letters of introduction were sent to the 50 participants' last known addresses, or last known address of parents if the participant's address was not known. Additional efforts to locate all 50 participants included searches of regular and reverse telephone directories, examination of state voter registration records, use of a private investigator to examine out-of-state public records, personal and professional networking to locate individuals or institutions in the "learning disabled community" who may have had knowledge of or provided services to the informants, and systematic prolonged postal and telephone inquiries. These efforts were made over the months between March 1995 and June 1996 and netted 47 informants located, only 3 of whom declined to participate further and another 3 who did not respond to repeated written and telephone communications. Hence, 41 informants (82%) participated in the 20-year follow-up.

Of the 41 participants, 14 were women and 27 were men. The mean age of the participants was 32.1 years, with a range of 28 to 35 years. The mean Verbal IQ at entry to the Frostig Center was 98, Performance IQ was 94, and Full Scale IQ was 96. The sample was 88% White, 10% Hispanic, and 2% African American. The SES of the family of origin was upper upper class, 29%; upper class, 15%; upper middle class, 29%; middle class, 12%; upper lower class, 10%; and lower class, 5%. The average length of stay at Frostig was 37 months ( $SD=18.29$ ).

Regarding the representativeness of the sample, chi-square tests revealed the 41 participants did not differ significantly on ethnicity, gender, or SES characteristics from the original pool of 206 students at the Frostig Center from which they were chosen. Mean Full Scale IQ at time of entry to the Frostig Center did not differ, and informants in the present follow-up did not differ as to the presence or absence of any particular diagnostic category, or on total number of diagnosed difficulties.

### Procedures

#### *Independent Variables*

Multiple procedures and data sources were used to collect data on various background variables (e.g., SES, ethnicity, IQ), life stressors, academic achievement, and success attributes. First, data were collected from in-depth personal interviews with informants. Interviews were divided into five sections that focused on (a) employment and educational history; (b) residential and household economic arrangements throughout informants' lives; (c) family relationships, both of family of origin and family of descent; (d) community and social relations outside the family; and (e) personal beliefs, values and aspirations, behaviors, and feelings on a number of topics. Twenty-six of the 41 informants were interviewed by one of the four researchers in a variety of settings, including researchers' offices, homes of informants, and public restaurants. Four interviews were conducted out of state, in informants' homes or in public settings. Interviews ranged from 2.5 to 6 hr in length. All interviews were audiotaped in full and subsequently transcribed verbatim into a database. Information on the remaining 15 informants was gathered by means of shorter telephone interviews and from the multiple data sources described later.

In addition to providing rich qualitative data and supplying "nuts-and-bolts" descriptive information, the interview transcripts were scrutinized in order to identify behaviors and attitudes associated with the previously identified success attributes. In the previous follow-up study, the researchers had identified six attributes of the candidates who had been successful: self-awareness, proactivity, perseverance, emotional stability, appropriate goal setting, and the presence and use of effective support systems. Unsuccessful informants were characterized by a lack of self-awareness, reactivity, lack of perseverance, emotional instability, lack of appropriate goal setting and self-directedness, and lack of presence or use of effective support systems. To operationalize the concepts further, the behaviors and expressed attitudes that make up each attribute were specified. For example, self-awareness was operationalized as follows:

Acceptance of the learning disability

1. Participant refers to self as learning disabled.
2. Participant describes events in terms of his or her learning disability.

3. Participant compartmentalizes the learning disability, seeing it as only one aspect of him- or herself rather than being defined entirely by it.

#### General self-awareness

1. Participant refers to his or her individual strengths and/or weaknesses.
2. Participant refers to his or her individual behavior patterns, "hang-ups," and so on apart from the learning disability.

Score sheets were prepared, and the presence of each of the behaviors just described or attitudes was scored as 1 (*present*) or 0 (*absent*), then totaled. For example, 5 points were possible on the score sheet for the self-awareness example just given. The complete list of behaviors and attitudes that correspond to all six success attributes (including negative manifestations of each attribute) appears in Appendix A. Each researcher independently scored informants on the presence or absence of each specific behavior or attitude as revealed through their narratives. The four researchers then met to determine attribute scores for each informant and resolve any disputes on scores. Interrater reliability was .96 on overall attribute scores.

In addition to the interview, data were collected from (a) case records that included information on academic, cognitive, diagnostic, medical, psychological, and familial history; (b) a life stressor checklist (Werner & Smith, 1992; a modification of Holmes & Rahe, 1967), modified to include a column for stressors occurring before and after age 18; (c) interviews with informants' relatives (and others); (d) current cognitive and academic testing (Vocabulary and Block Design subtests of the Wechsler Adult Intelligence Scale-Revised, Wechsler, 1981; and the reading and math sections of the Wide Range Achievement Test-3, Wilkinson, 1993), and (e) public records (e.g., voter registration, criminal and civil court logs, social security, and credit records).

### *Dependent Variables*

Interviews, case records, and public records were also used to collect data and make determinations regarding a number of dependent variables/outcomes. These procedures are described next.

**Group assignment.** There was adequate information available on 41 informants to allow a rating on the overall status of their current lives. Overall success ratings (successful or unsuccessful) were based on clinical judgments while taking into consideration outcomes concerning six domains used in the previous follow-up: employment, education, independence, family relationships, community relations/interests, and crime/substance abuse. Two additional domains, physical health and psychological health, were considered for the 20-year follow-up.

A transcript was prepared that consisted of a printout of each informant's database. Two of the researchers read all 26 full-length interviews, one read 12 interviews, and the fourth read 17 (so that each participant received a reading by at least three researchers), and 4 participants were read by all four researchers. Each researcher then announced their rating and provided rationale for their vote of successful or unsuccessful.

Prior to making judgments, researchers agreed that ratings should be global assessments guided by outcomes in all eight domains, but with the understanding that some domains may carry more weight than others. Further, it was agreed that a successful rating should reflect the values and expectations held by the larger culture for members of participants' age cohort. Specifically, it was agreed that the reference group against which the participants were to be compared was their same-age, nondisabled peers.

Those informants who had not participated in the long interview were assigned in a similar fashion, with the contact researcher providing descriptive information on the nature of the contact." All available information was reviewed, including public records, relatives and other contacts, informant contacts, and so on, and a vote was taken on perceived overall success. Interrater reliability was .97 on overall success. Following the determination of interrater reliability, disputes were resolved through discussion so that each informant received a unanimous rating of either successful or unsuccessful.

**Domain ratings.** As in the 10-year study, judgments on overall success were loosely guided by outcomes in the eight domains listed in the previous section (e.g., employment, education, etc.). However, in the 20-year study, further quantification was desired concerning these domains. Therefore, for this follow-up, each of the eight domains for each participant was additionally rated by each researcher on a scale of 1 to 5 for each participant. The average of all researchers' scores was entered in each domain, for each participant. Further, a composite or total score on all eight domains was calculated for each participant. (See Appendix B for a description of criteria used for ratings within each domain.) Average interrater reliability was .94 for the eight domains.

**Ranking on objective measures of success.** Both of the dependent variables just discussed, or outcome measures (group assignment, domain ratings), rely entirely on judgments made by researchers. Although every

effort was made to be fair and unbiased, it was felt that any data sources that could be utilized directly without appeal to rater judgment would improve the objectivity of the study and could reinforce findings based on the other dependent measures.

Eight actual outcome measures were identified for this purpose: current employment status, highest grade achieved, independent living status, participants' ratings of family relationships, total number of community involvements, incidence of arrest and/or (self-reported) substance abuse, current health status, and number and severity of mental health diagnoses. Once actual outcomes were tallied, participants were assigned ranks on each objective measure of success.<sup>5</sup> Each participant's ranks were then combined to create a composite rank score.

## Data Analysis Plan

As previously mentioned, although the overall longitudinal project collected both quantitative and qualitative data, this article focuses on the quantitative results. Quantitative analysis was conducted relative to the three areas previously noted: (a) changes across data points, (b) differences between the successful and unsuccessful groups, and (c) predictors of success at year 20. As appropriate (in conjunction with the various scoring/rating procedures described earlier), descriptive statistics were used to summarize changes on independent and dependent variables across data points and significance was determined by the use of repeated-measures analysis of variance (ANOV A) and multivariate analysis of variance (MANOVA) procedures. Likewise, chi-square and independent *t* tests were used to evaluate differences between the successful and unsuccessful groups on independent and dependent variables.

Determining the relation between various predictors of success or independent variables was a two-step process that included a data reduction phase to arrive at a small number of potential predictors, and a subsequent hypothesis testing phase that evaluated models of the combinations of a smaller set of predictors. First, data were reduced in two ways: (a) An examination and evaluation of the correlation matrix of individual variables was done to discover theoretically related variable clusters, and (b) a principal component analysis using the SPSS FACTOR procedure was done to provide a more empirical method of identifying potential components. Second, hypothesis testing of the various models of combinations of predictors was done and included (a) a discriminant function analysis on the dependent variable of success, (b) a multiple-regression analysis using a composite of domain scores as the dependent variable, and (c) a multiple-regression analysis using participants' rank on the objective measures of success as the dependent variable.

## RESULTS

The results of this study revealed (a) changes in a number of independent and dependent variables across data points, (b) differences between the successful and unsuccessful groups on several dependent and independent variables, and (c) a set of personal attitudes and behaviors predictive of success. These findings are discussed next.

### Changes Across Data Points

Information on participants was gathered at four data points: (a) entry at the Frostig Center, (b) leaving the Frostig Center, (c) at year 10, and (d) at year 20. Depending on the variable, information on the participants could be gathered across two to four of the data points, as appropriate. Changes across time in independent and dependent variables are reported in the sections that follow.

#### *Independent Variables*

In terms of background variables, there were no differences in relative age, gender, ethnicity, number of siblings, or birth order across data points. As for cognitive variables, no significant changes in Verbal ( $t = -.32, p = .756$ ), Performance ( $t = -2.16, p = .056$ ), or Full Scale ( $t = 1.592, p = 1.42$ ) IQ were found over time (using repeated measures, MANOVA, and follow-up univariate ANOVA). In regard to present SES of participants, participants were rated on a scale of 1 to 6, with a rating of 1 representing the highest SES level and 6 the lowest, as had been

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<sup>5</sup> The objective measures of success were ranked as follows: employment status (full time = 1, part time = 2, unemployed = 3), highest grade achieved (no ranking necessary), independent living (self-supporting, living independent of parents, and financially contributing to another's support = 1, self-supporting and living independent of parents = 2, public assistance and living independent of parents = 3, living independently but financially supported by parents = 4, living with parents and financially supported by parents = 5), ratings by informants of family relationships (no ranking necessary), community involvements (no ranking necessary), incidence of arrest and/or substance abuse (no ranking necessary), physical health (no health problems = 1, minor health problems = 2, major debilitating illness or injury = 3), diagnosed mental illness (no diagnosis = 1, past diagnosis but no current involvement = 2, currently under treatment or institutionalized = 3).

done previously to determine SES for participants' families of origin. Results indicate that participants' SES at year 20 was much lower than that of participants' parents. These results are shown in Table 1.

TABLE 1  
Socioeconomic Status of Participants  
and Participants' Parents

<i>Class Assignment</i>	<i>Parents (%)</i>	<i>Participants (%)</i>
1. Upper upper class	29	0
2. Upper class	15	0
3. Upper middle class	29	10
4. Middle class	12	56
5. Upper lower class	10	14
6. Lower class	5	20

*Note.*  $N = 41$ .

In terms of life stressors, information was gathered on typical stressful events likely to be experienced by nondisabled, as well as learning disabled, populations such as death of father, change of residence, and so on. In addition, in order to estimate the impact of a learning disability from the informants' point of view, a question was added to the life stressor checklist used by Wemer and Smith (1992) that asked the informants to estimate the impact of their learning disability during different developmental periods—childhood, adolescence, adulthood, and at present. The question asked that they choose a number between 1 and 1,000, with "getting married" being the midpoint (500) and 1,000 being the most stressful event possible. The results are shown in Table 2. Informants obviously felt that the amount of stress due to their disability reduced as they became older, especially following adolescence.

As to other life stressors, researchers noted an obvious, extremely high incidence of "problems in school" and the cascading effect of "changes in schools." These were described as the major life stressors by virtually every member of this group in narratives as well, although a few individuals reported traumatic events, such as physical and sexual abuse as a child or having had an alcoholic or mentally ill mother, to be equally powerful stressors.

Academic testing revealed relatively continuous progress in both math and reading skills across the four data points.<sup>6</sup> However, even at year 20, the average reading and math grade-level scores were below expectancy in view of the educational level of this group. Academic levels are indicated in Table 3.

An analysis of the rate of acquisition of academic skills over time revealed peaks and valleys of progress across informants' lives. Clearly, more progress was made during their stay at the Frostig Center than previously, and this progress tapered off rapidly following their departure. This occurred despite the fact that most informants continued in public and other private-school settings through high school, and all but two attended postsecondary education following this. This progress is shown in Table 4.

TABLE 2  
Participants' Ratings of Their Learning  
Disability as a Stressor Over the Lifespan

<i>Life Stage</i>	<i>Mean Rating of Stress</i>
Childhood	715.9
Adolescence	560.23
Adulthood	333.23
Today	282.05

<sup>6</sup> When academic achievement is described as an independent variable, it is treated as a (possible) predictor of success. When it is described as a dependent variable, it is discussed in terms of its contribution to a successful rating.

TABLE 3  
Academic Progress Over Four Data Points in Grade Levels

<i>Data Point</i>	<i>Reading Grade Level</i>	<i>Math Grade Level</i>
Entering Frostig	2.875	2.483
Leaving Frostig	4.923	6.08
Ten-year follow-up	8.518	5.669
Twenty-year follow-up	10.964	9.009

TABLE 4  
Months of Academic Progress Per Month of Chronological Age  
Over Four Data Points

<i>Data Point</i>	<i>Reading</i>	<i>Math</i>
Previous to Frostig	.74	1.1
While at Frostig	.84	.93
Ten-year follow-up	.36	.09
Twenty-year follow-up	.25	.20

### *Dependent Variables*

Of the 41 informants, 47% were employed full time, 12% as part-time or temporary workers, and 41% were not employed at the 20-year follow-up. In year 10, 14% had been full-time employed, 39% part time, and 47% were unemployed.

Twenty-four percent of the participants were married at year 20, 15% of those married were divorced, 2% had children, and 1 informant was a live-in "stepfather" to a teenage boy. At year 10, only 2% had been married and none had any children. Of the 31 single informants at year 20, 42% were still living with parents and 6% of the participants living alone were being financially supported by their parents. This compares to 74% of singles who were still living with their parents at year 10.

At year 20, 24% of the informants had completed college with a BA degree and one had completed her MA degree and obtained a license to practice as a marriage, family, and child counselor. Another 24% had attended college for between 2 and 7 years but had not graduated, and all but 5% of the participants had taken at least two semesters of postsecondary employment training or academic coursework. All but 1 had graduated high school. This compares to 2% who had completed their BA at year 10, no one having obtained a graduate degree, 24% having between 2 and 7 years of college or employment training, but no degree, and only 10% who had not yet completed high school at year 10.

As to family relationships, during the course of the long interview, informants were asked to rate their relationships with close family members on a 6-point scale ranging from 1 (*best*) to 6 (*worst*). Ratings of various family members were as follows: father, 2.2; mother, 2.1; brothers, 2.6; sisters, 2.5; spouses, 1.8; and children, 1.5. The results reflect generally positive relationships with members both of the family of origin, and especially of the family of descent. Qualitative responses during the interview confirmed that the group appeared to have but a smattering of strained family relationships. Comparison information from year 10 is not available.

Regarding community involvement, of the 41 informants, only 2 regularly attended religious services or considered themselves members of a religious congregation. Two informants regularly attended recovery/self-help meetings; 1 was an active member of a singles club; only 3 regularly participated in professional organizations; and 6 participated in groups that were centered around particular recreational activities such as pottery co-ops, theater groups, shooting and fishing clubs, and one regularly attended "dead-head" activities (centered around the rock group The Grateful Dead). None had any continuing involvement in community projects or political action groups. Comparison information from year 10 is not available.

As to criminal activity, 1 participant was in state prison at year 20, serving a life sentence; he had had a long history of criminal behavior. Two participants had single juvenile arrests, but no record of criminal behavior between years 10 and 20. Another participant had been arrested between years 10 and 20, but had no record of

arrests prior to that time. In terms of substance abuse, 1 participant reported daily use of illegal drugs and alcohol; 2 were currently daily users of alcohol; 2 reported having had difficulties with alcohol during college years, but were not currently "abusing" alcohol or drugs (although they had never sought treatment); and 1 was in active recovery from drug and alcohol abuse.

Most informants appeared to have retained relatively "good to excellent" physical health from year 10 to year 20, with only a few notable exceptions. One participant had developed a brain tumor since year 10 and suffered partial paralysis and speech difficulties. Another had been in two automobile accidents and was recovering from injuries. Two other participants had suffered sports injuries that ended their athletic competition but did not restrict their day-to-day activities. Four participants, including the one who had developed a brain tumor, were classified as "permanently disabled," although not necessarily in poor health. These participants also included one with epilepsy, one with hearing loss, and one with motor impairment. Although these impairments were not identified at initial entry into the Frostig Center during childhood, it is possible that these physical problems were present at that time. These four participants are discussed later in the Outlier Determination subsection.

There was high incidence of psychological disturbance within the 26 informants who participated in the full interview process at the 20-year follow-up. Eleven of the 26 informants (42%) reported diagnosed psychological difficulties that were classifiable under the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; American Psychiatric Association, 1994). These informants reported currently suffering from such disturbances as prolonged and profound depression, schizophrenia, abuse of alcohol and illegal drugs, social phobias, panic disorders, and obsessive-compulsive disorders. For most of these participants, these disturbances emerged between the 10- and 20-year data points. As previously discussed, no participants had been diagnosed with severe emotional disturbance upon entry into the Frostig Center during childhood. These disturbances were evenly distributed between successful and unsuccessful participants. Although there were some verified reports of psychological disturbance among the remaining participants who did not participate in the long interview, data were not available for these individuals. Therefore, the authors refrain from speculation on the psychological status of those participants.

## Findings of Comparisons Between the Successful and Unsuccessful Groups

### *Dependent Variables*

**Group assignment.** Twenty-one of the 41 participants were rated as successful and the remaining 20 were rated as unsuccessful. Seventeen of the 26 informants who participated in the long interview (and for whom data were also collected from the additional data sources described in the Method section) were rated as successful with the remaining 9 rated as unsuccessful. Four of the participants who were rated solely on the basis of data sources other than the long interview were judged to be successful and 11 were rated as unsuccessful.

**Group movement.** Only 6 participants had switched categories since the 10-year follow-up: 3 went from successful to unsuccessful, and 3 did the reverse.

**Domain ratings.** Means for the entire group on each of the eight domains approximated 3, with standard deviations around 1. As one would expect, differences between means of successful and unsuccessful candidates on the eight domains were significant for the most part, with the exception of crime/substance abuse, which had an incidence too low in both groups for meaningful comparison, considering the small sample size.

**Objective measures of success.** As expected, many of the outcome/dependent measures differed significantly between the successful and unsuccessful informants including employment ratio, highest education level attained, reading and math achievement, independent living and community involvement (based on independent *t* tests and chi-square tests). These results are presented in Table 5.

### *Independent Variables*

**Background variables.** When alpha levels were adjusted for the number of variables, no significant differences were found between successful and unsuccessful candidates in any of the following background variables: age, gender, family SES, ethnicity, birth order, number of siblings, IQ measures, diagnostic categories, length of time at the Frostig Center, or services received at the Frostig Center. However, differences in IQ at year 10 between successful and unsuccessful groups (at year 20) approached significance and were, in fact, significant at the univariate level ( $p = .02$ ).

*Life stressors.* No significant differences were found in the number of life stressors reported during childhood, during adulthood, or for total stress across the life span between the successful or unsuccessful groups. However, although the trend was not quite statistically significant, those with very high and very low levels of stress seemed to be more prone to being rated unsuccessful, whereas those moderately stressed seemed to have a better chance at success.

*Success attribute scores.* The presence or absence of the specific behaviors and attitudes expressed during interviews were counted as they appeared in narratives. Results are expressed in percentages of total possible points for each attribute based on its presence or absence in the narratives (see Table 6). As can be seen from Table 6, the successful and unsuccessful groups can be easily differentiated on the basis of the presence or absence of the success attributes.

## Predicting Success

The researchers gathered information over four time periods on a great number of independent variables, which, alone or in concert with others, could be used to explain or predict group membership (successful/unsuccessful). In addition, several means of measuring outcomes were considered. To summarize, the independent variables utilized in the analysis to follow include (a) background variable, (b) diagnostic categories, (c) IQ measures, (d) achievement measures, (e) life stressors, and (f) success attribute scores. The dependent/outcome measures utilized in the analysis include (a) ratings of overall success (successful/unsuccessful), (b) domain ratings (composite score), and (c) objective measures of success (ranks).

There were too many independent variables to test each individually as to their predictive value, and the result of such an analysis would not reflect potential theoretical or mathematical relationships between independent variables. Therefore, data reduction techniques were employed to discover a smaller number of subsuming categories.

TABLE 5  
Comparison of Successful and Unsuccessful Participants on Objective Measure of Success

<i>Measure</i>	<i>Successful</i>	<i>Unsuccessful</i>	<i>Significance</i>
Employment ratio	17/21	4/20	.0002
Education: Highest level	15.1	12.7	.0001
Education: Academic skills			
Reading	9.9	7.5	.03
Math	6.5	5.0	.05
Independence: Ratio living independent of parents	18/21	10/20	.05
Family relationships: Mean ratings by informants	2.1	2.5	<i>ns</i>
Community involvements	.8	.2	.05
Crime: Incidence of arrest	1/21	2/20	<i>ns</i>
Substance abuse incidence	3/21	1/20	<i>ns</i>
Health: Incidence of debilitating illness or injury	1/21	2/20	<i>ns</i>
Psychological health: Diagnosed mental illness	7/21	6/20	<i>ns</i>

TABLE 6  
Comparison of Percentage of Successful Behaviors Practiced by  
Successful and Unsuccessful Informants

<i>Success Attributes</i>	<i>Successful Informants (%)</i>	<i>Unsuccessful Informants (%)</i>
Self-awareness	93	11
Pro activity	93	22
Perseverance	93	22
Emotional stability	64	22
Appropriate goal setting	93	22
Use of support systems	93	78
Lack of self-awareness	7	67
Reactivity	7	78
Lack of perseverance	7	78
Emotional instability	21	78
Lack of goal setting	7	78
Lack of use of support system	0	33

#### *Data Reduction Techniques*

**Examination of the correlation matrix.** The correlation matrix of all individual variables was examined to find those that had a high correlation with successful/unsuccessful ratings by researchers ( $p < .05$ ). It should be noted that many of the individual variables were significantly correlated with one another. For example, length of stay at Frostig was correlated with several other variables such as initial reading deficit, SES, final spelling achievement, and so on. However, as it turned out, none of these variables, either alone or in combination, was significantly correlated with success, and hence they were dropped from further consideration as possible explanatory variables. Table 7 shows a list of the variables significantly correlated with success. The first 10 variables are the individual success attribute ratings. These variables group together clearly with one another on both theoretical and mathematical grounds (hereinafter "success attributes"). A second group of variables includes several measures of IQ (hereinafter "IQ"). A third group contained two achievement measures (hereinafter "achievement"). The last two single variables appear to be related to the initial diagnostic categories assigned to participants.

**Principal component analysis.** The single independent variables were analyzed using the SPSS FACTOR procedure with the Principal Component Analysis option in order to provide an empirical check on the mathematical inter-relatedness of individual variables (in contrast to the theoretical interrelatedness established previously with the examination of the correlation matrix). All categories of independent variables were represented (e.g., background, achievement, life stressor, etc.), but no outcome measures were included so that the components of independent variables generated could later be used to predict outcome scores. The procedure used here, then, attempts to develop components that explain overall variance on all variables but will not necessarily be related to variance in success.

TABLE 7  
Single Variables Correlated With Success

<i>Variable</i>	<i>Correlation With Success</i>
Perseverance	.88
Proactivity	.90
Goal setting	.75
Self-awareness	.69
Emotional stability	.55
Lack of support system	-.84
Emotional instability	-.78
Reactivity	-.77
Lack of goal setting	-.70
Lack of self-awareness	-.58
Verbal IQ at year 20	.78
Full Scale IQ when leaving Frostig	.45
Performance IQ when leaving Frostig	.43
Verbal IQ when entering Frostig	.36
Full Scale IQ when entering Frostig	.35
Reading achievement at year 10	.41
Math achievement at year 10	.40
Total number of diagnostic categories	-.32
“Organic brain syndrome” diagnosis	-.40

*Note.* All correlations were  $p < .05$  ( $r \geq .3044$ ).

Fourteen components were generated, which explained 100% of the variance on all variables. Three met Stevens's (1996) criteria for acceptance as principal components in that three or more variables loaded on a component at .6 or above. These included a component containing the success attribute ratings, a component containing many dysfunctional family traits, and a component containing several IQ measures.

All 14 components were submitted for analysis for correlation with success (including those that did not meet Stevens's criteria); only 2, the success attribute rating component and the ninth component generated (the current diagnostic category of physical handicap), were correlated significantly with success.

**Outlier determination.** In multivariate analysis, it is important to examine the data carefully not only for single variable outliers, but for multivariates as well. Four such multivariate outliers (participants) were located using combinations of single variables displayed in scatter plots. All four of the outliers turned out currently to have a physical disability in addition to their learning disability, although it had not existed or was not severe enough to be detected when they entered the Frostig Center. One had a major brain tumor operation, one was epileptic, one had a profound hearing loss, and one had significant motor difficulties. It is important to note that these four individuals were especially troublesome to the data set because they showed strong ratings on the success attributes, yet had not been successful. Although these four individuals were dropped from subsequent analysis, it should be noted that the comorbidity of a physical disability appears to have exerted an especially powerful blow to these individuals, already at risk due to their childhood diagnosis of learning disabilities (see Figure 1). Once these outliers had been removed, both data reduction techniques indicated that components composed of diagnostic variables could be dropped from further analysis.

In summary, both the principal component analysis and the examination of the correlation matrix had generated a component for success attributes and component for IQ. In addition, achievement was suggested as a potential predictor by the correlation matrix examination. Although the principal component analysis had developed a "toxic family" component, this factor turned out to have insignificant correlation with success. Therefore, this factor was not included in the predictive models discussed in the next section.

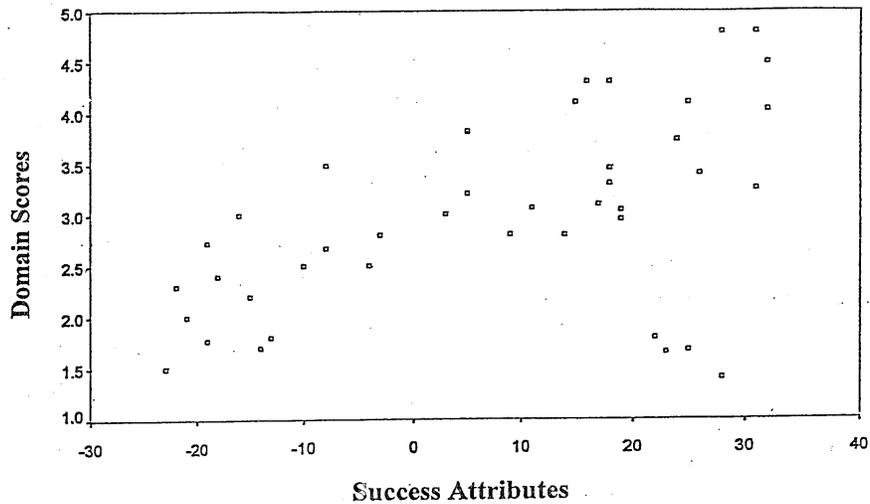


Figure 1 Outliers with physical disabilities.

### *Hypothesis Tests on Predictive Models*

**Discriminant analysis.** Using successful/unsuccessful ratings as the dependent variable, a discriminant analysis was done using the stepwise procedure, submitting a composite score on the success attributes and on achievement as independent variables.<sup>7</sup> A discriminant function was determined (Wilks's  $\Lambda = .259$ ,  $\chi^2 = 51.354$ ) and found to be significant ( $p < .0001$ ). The function was composed largely of the success attribute composite score, with a small contribution from the achievement composite score (standardized canonical function coefficients were .960 for success attributes and .517 for achievement). The structure matrix suggests, however, that achievement was redundant with the success attribute composite in differentiating groups (structure matrix = .862 for success attributes and .334 for achievement).

**Regression of principal component of success attribute scores on successful/unsuccessful.** The regression yielded  $R^2 = .748$ , which was, of course, highly significant ( $p < .0001$ ), indicating that the success attributes explained approximately 75% of the variance in the successful/unsuccessful variable (see Table 8).

**Multiple regression on a composite of domain scores** The stepwise procedure tested three models:<sup>8</sup> (a) Model 1: success attributes alone, (b) Model 2: success attributes + IQ, and (c) Model 3: success attributes + IQ and achievement. The additional variables in the last two models did not sufficiently improve the model to be included, so these models were rejected. Statistics for success attributes alone appear in Table 8.

**Multiple regression of ranks on objective measures of success.** A composite of ranks on objective measures was submitted to the three models, as just given. The addition of achievement in the third model did not improve the models, so it was rejected. Statistics on Models 1 and 2 appear in Table 8. With the addition of IQ in Model 2, the model's predictive power improved approximately 5%, allowing the model to explain a total of 54% of the variance in success.

**Multiple regression on individual objective measures of success.** Because several objective measures were combined to make up a composite ranking for one of the dependent variables, it was possible to further explore the relationship of the independent variables (IQ, achievement, success attributes) to four of the individual objective

<sup>7</sup> The IQ component was excluded because several sources (Barcikowski & Stevens, 1975; Huberty, 1975, 1994; Stevens, 1996) suggest a participant-to-predictor ratio of 1:20. With 41 participants, only two predictors could be included in the model. The decision to choose achievement over IQ as the second predictor was made because achievement had a higher correlation with success.

<sup>8</sup> Three predictors could be included in the analysis because the recommended ratio of participants to predictors in multiple regression is about 1: 15 (Park & Dudycha, 1974; Stein, 1960; Stevens, 1996).

measures of success (i.e., employment, education, independent living, and community involvements):

TABLE 8  
Summary of Stepwise Multiple Regression for Variables Predicting Success

<i>Variable Models</i>	<i>B</i>	<i>SE</i> <sup>•</sup>	$\beta$	<i>R</i> <sup>2</sup>
1. Success attribute component (on success)	-.421	.068	-.863	.748
1. Success attributes alone (on domain scores) <sub>a</sub>	.875	.107	.794	.631
1. Success attributes alone (on objective measures) <sub>a</sub>	-2.345	.382	-.701	.491
2. Success attributes + IQ (on objective measures) <sub>b</sub>				.541
Success attributes	-1.938	.419	-.579	
IQ	-1.058	.522	-.254	
Individual objective measures				
1. Success attributes alone (on employment) <sub>a</sub>	-.386	.080	-.612	.375
2. Success attributes + IQ (on employment) <sub>b</sub>				.469
Success attributes	-.280	.085	-.445	
IQ	-.275	.106	-.350	
1. Success attributes alone (on education) <sub>a</sub>	-3.247	.700	-.596	.355
2. Success attributes + achievement (on education) <sub>c</sub>				.511
Success attributes	-2.542	.651	-.467	
Achievement	-.266	.077	-.415	
1. Success attributes alone (independent living) <sub>a</sub>	-.426	.075	-.671	.450
1. Success attributes alone (community involvements) <sub>a</sub>	-.357	.080	-.581	.338

<sup>a</sup> Excluded variables: IQ, achievement. <sup>b</sup> Excluded variable: achievement. <sup>c</sup> Excluded variable: IQ.

1. *Employment rate* as the dependent variable: The stepwise procedure evaluated Models 1 and 2, but rejected Model 3; see Table 8. The addition of IQ in Model 3 improved the model's predictive power from 38 to 47%.
2. *Educational level* as the dependent variable: The stepwise procedure evaluated Models 1 and 2, but rejected Model 3; see Table 8. The addition of achievement in Model 2 improved the model's predictive power from 36 to 51 %.
3. *Community involvement* as the dependent variable: The stepwise procedure evaluated only Model 1 and rejected the addition of other variables (see Table 8).
4. *Independent living* as the dependent variable: The procedure evaluated only Model 1 and rejected the addition of all other variables.

## DISCUSSION

### Changes Across Data Points

#### *Independent Variables*

As for SES, clearly informants have not succeeded in maintaining the same standard of living as their parents. However, it should be noted that the population of these families of origin is skewed dramatically at the high end, as compared to what might be expected from an "average" population (U.S. Department of Commerce, Economics & Statistical Administration, 1996). Therefore, it is important to stress that "keeping up" with parents' SES might have proved a daunting task for any sample of individuals, learning disabled or otherwise.

In terms of life stressors, our informants reported that the stress of having a learning disability was felt most strongly during childhood, lessened somewhat in adolescence (perhaps because they were allowed more power in decision making concerning their own education at this time), and became much less stressful during adulthood once they had left the academic context. It was clear from both the quantitative data reported here and the qualitative data gathered from interviews that the stress of having a learning disability was the major influence on the participants'

lives, far outweighing other events or conditions, especially during childhood and adolescence. This was partially due to the cascading effect of the learning disability adding other stressors to their lives, such as school changes, having to make new friends, being ridiculed and teased, and so on.

Weighed against these psychic costs are the benefits that special education provided. Informants continued to improve academically in both reading and math across all four data points. This progress was most dramatic while they were at the Frostig Center receiving intensive special education assistance and support services. However, participants reported that the learning disability persisted into adulthood, and their reports are confirmed by the fact that their achievement scores lag behind what would be expected for their level of education. Remarkably, however, more than half of the informants are able to lead successful and productive lives, despite the persistence of their academic deficits.

### *Dependent Variables*

Over the past 10 years, participants have moved in larger numbers from being part-time to full-time employed, from being dependent on parental support to living independently of them, have moved from being single to married while maintaining strong positive relationships with parents and siblings, and have continued to advance themselves educationally in spite of their academic difficulties. Such trends appeared to the researchers to be typical of participants' nondisabled cohorts as they moved in age from their 20s to 30s.

Overall, participants indicated that they had few community involvements. Many reported that the strain of competing with their nondisabled peers, of working longer hours, studying more, learning to drive, and generally taking more time to accomplish daily living tasks left them little time for participation in community activities. Vogel (1987) also noted that individuals with LD may take considerably longer to complete certain tasks than their nondisabled peers.

Although much of the literature has reported higher levels of substance abuse and criminal behavior in learning disabled populations (e.g., Brier, 1989; Karacostas & Fisher, 1993; Maag, Irvin, Reid, & Vasa, 1994), our study did not find this to be the case for this population. However, the group did show a very high incidence of diagnosed psychological disturbance as adults. This finding is consistent with results reported by Gregg, Hoy, King, Moreland, and Jagota (1992a, 1992b) and Hoy et al. (1997). It is possible that the original sample contained a high incidence of children with psychological problems that contributed to their need for special education, even though none of the informants had an original diagnosis of severe emotional disturbance. The definition of learning disabilities has changed since these participants attended school and has been reflected in a change in the types of difficulties that can be found in special education settings as compared to 20 years ago. Many more children with behavioral and emotional problems could be found in learning disabled, special education classes at that time. It is also possible that the stress, loss of self-esteem, and other difficulties associated with learning disabilities could have contributed to the high incidence of reported psychological disturbance. Because more detailed psychological and diagnostic information on the pool of students at the Frostig Center is not available, the exact emotional state of the informants, as children, cannot be determined. Therefore, the researchers can do little to explain the phenomenon, but rather are left to merely report on this unfortunate high incidence of psychological difficulties experienced by the informants.

Finally, the physical status of the informants at year 20 turned out to be an important variable in determining success. Although the group as a whole appeared to retain relatively good to excellent health from year 10, four of the informants were found to have physical disabilities (not identified, but possibly present in childhood) in addition to their learning disability (i.e., brain tumor, epilepsy, hearing loss, motor impairment). These difficulties turned out to be crucial in determining success for these individuals (i.e., in spite of very high scores on the success attributes, these informants did not "make it"). The researchers believe that the addition of these disabilities actually placed these informants in a position where it was no longer appropriate to compare them to their nondisabled, same-age peers, as was done with the remainder of the informants. Perhaps expectations for these participants might be adjusted toward those held for other disabled populations with similar problems in terms of quality of life and participation in economic, social, and family affairs.

## **Comparisons/Differences Between the Successful and Unsuccessful Groups**

### *Dependent Variables*

As to group movement, the lack of movement between the successful and unsuccessful groups from year 10 to year 20 suggests that success is stable over time. This finding is in contrast to the impression in the 10-year follow-up (Spekman et al., 1992) that participants were "late bloomers" suffering from delayed maturation. An underlying assumption of this notion was that participants in the unsuccessful group might "catch up" with their nondisabled peers and achieve greater success as they matured. The lack of movement of participants between the groups

illustrates that this was not the case.

As to objective measures of success, five of the outcome measures showed significant differences between successful and unsuccessful groups (employment ratio, education level, academic skills, independent living, and number of community involvements), whereas five did not (ratings of family relationships, number of mental health diagnoses, incidence of crime, incidence of substance abuse, and incidence of debilitating injury/illness). The obvious interpretation is that raters probably depended on outcomes along the first five measures quite heavily for determining group assignment and less so for the latter five measures. In the case of crime, substance abuse, and debilitating illness/injury, the incidence was so low (i.e., affected so few individuals) that these variables could not be used to differentiate participants. In the case of diagnosed mental illness, however, the incidence was high (in both groups), indicating that raters simply did not consider it as important in determining group assignment as the first five variables. The same could be said for participants' ratings of family relationships (i.e., they did not contribute heavily in determining a participant's group assignment).

### *Independent Variables*

Among all background variables, only IQ at year 10 showed a significant difference between the groups (and this only at the univariate level). As in the previous study, age, length of stay at the Frostig Center, ethnicity, and family SES showed no differences. In addition, the 20-year follow-up added birth order and number of siblings as background variables, which were also shown not to differ between groups. We do not interpret this finding to mean that all background variables have no influence on success, but rather that, for this sample of relatively homogeneously upper- and middle-class White participants, factors other than class membership, race, or the other previously mentioned variables differentiated participants.

As to life stress variables, neither individual stressors, such as "mother alcoholic/mentally ill," nor total amounts of stress over childhood, adulthood, or across the life span were shown to relate directly to outcomes. Again, we do not interpret the lack of significant findings to mean life stress is unimportant in determining success, but rather that the relationship of particular stressors or total amounts of stress to other factors, such as success attributes, has not been fully explored by the data analysis thus far employed. For instance, it could be that the learning disability itself was a stronger or more persistent stressor than other "normally" distributed stressors. We hope that this intriguing relationship and others can be addressed in later analyses of both quantitative and qualitative data.

Finally, all of the success attributes clearly discriminated successful from unsuccessful participants. Self-awareness, proactivity, perseverance, emotional stability, appropriate goal setting, and use of support systems, both individually and as a whole (using a composite score of all attributes), discriminated successful from unsuccessful candidates better than any other independent variable. These success attributes are similar to a number of success-related constructs described by Reiff, Gerber, and Ginsberg (1997); Wehmeyer (1996); and Werner and Smith (1992).

### **Predicting Success**

This study used multiple techniques to determine the specific variables or combinations of variables that are predictive of success in persons with LD. All techniques led to the same conclusion: There exists for these participants a set of personal attitudes and behaviors, the possession of which would predict success. Specifically, the attributes of self-awareness, perseverance, proactivity, emotional stability, goal setting, and the use of support systems were more powerful predictors of success than numerous other variables, including IQ, academic achievement, life stressors, age, gender, SES, ethnicity, and many other background variables. These success attributes are consistent with those reported in year 10 of this longitudinal project and appear to be relatively stable across time. Although different terms have been utilized, several of these attributes and their relationships to success in adults with LD are similar to those reported by other researchers (e.g., Reiff et al., 1997; Wehmeyer, 1996; Werner & Smith, 1992).

### **IMPLICATIONS**

This research suggests a reevaluation of current educational practices utilized to enhance the lives of persons with LD. Traditionally, the field of learning disabilities has focused its intervention strategies on the improvement of academic skills. However, noting that results of this study indicate that such attributes as self-awareness, proactivity, perseverance, emotional stability, goal setting, and the use of effective support systems were more predictive of success than were academic skills, one might question the validity of approaches that focus almost exclusively on remediation of academic deficits. This is not to suggest that efforts to enhance the academic abilities of individuals with LD should cease, but rather that the relative emphasis of each approach should be reevaluated. It would appear

that the development of success attributes in persons with LD should be given at least as much attention as efforts to improve academic skills. Such efforts to "teach" success attributes to children with LD are currently underway at the Frostig Center (Herman & Goldberg, 1993) and will be discussed in subsequent research articles. Along these lines, Reiff et al. (1997) also developed a curriculum that concentrates on teaching several constructs similar to the success attributes described in this study to children with LD. Of course, it remains to be seen whether attributes such as self-awareness, proactivity, perseverance, goal setting, emotional stability, and even use of support systems can be taught to, and learned by, persons with LD. Only further research will substantiate the validity of such teaching.

Like previous research (e.g., Gerber, Ginsberg, & Reiff, 1992; Gottesman, 1979; Hoffman et al., 1987; Johnson & Blalock, 1987; Kava le, 1988), this study has demonstrated, among other findings, that learning disabilities are a lifelong condition. Although some specific skills may be improved, learning disabilities do not go away. They do not go away despite the best efforts of teachers, therapists, and parents to remediate them. Noting the persistence of learning disabilities across time (despite concerted remedial efforts), an interesting question arises. Should interventions focus greater energy on helping persons with LD to develop compensatory strategies aimed at circumventing difficulties, rather than on attempts to remediate skills deficits? Such an approach has been shown to help individuals with LD to perform at levels commensurate with their intelligence, as well as to develop the strategies necessary to accentuate their strengths and abilities, rather than their deficits.

The persistence of learning disabilities across time also suggests that support services (e.g., educational, psychological, occupational) should not be stopped after leaving school or entering the work force. Learning disabilities continue across the life span, and therefore, support services should continue as well. Although many individuals may not need a full range of support services on an ongoing basis throughout their lives, the persistent difficulties experienced by the individuals in this study point to the necessity of having specific support services available on an as-needed or periodic basis. Of particular interest here is the finding among our sample of a high incidence of mental illness diagnoses. Clearly, psychological, medical interventions, and support services continue to be indicated. Similarly, because many individuals from our sample continued to struggle with employment, services that provide strategies for job search, retention, and success might also be made available.

The methodology used in this study also has implications for future research on predictors of success in persons with LD. At year 10, we were led by the data to conclude that the countable variables, such as IQ, achievement, gender, or SES, held little explanatory power, despite their ability to be reliably measured. Although we have not reported on the bulk of the qualitative findings from year 20, we have offered a modest methodology for utilizing the rich narrative information so generously offered by informants in this small-scale study to operationalize previously unquantifiable constructs. The behavior checklist based on success attributes has been shown to be useful in transforming qualitative information so that previously untestable hypotheses can be explored. It is hoped that other longitudinal researchers with access to larger and more varied learning disabled samples, as well as studies with non disabled control groups, will utilize the checklist or generate a comparable one that will provide further validation for what began as mere clinical "hunches" based on client reports of what they believe had allowed them to overcome adversity.

## LIMITATIONS

This study yielded valuable information regarding the nature of learning disabilities across time and various factors related to successful outcomes. However, findings of this study need to be viewed in light of several limitations. Learning disability definitions and diagnostic criteria have changed since the participants in this study were first identified during childhood. This raises the possibility that some of the participants might not be considered learning disabled by current standards. Consequently, caution is suggested in generalizing findings from this study to present learning disabled populations.

There are obvious limitations of small sample size and the lack of a nondisabled control group that the reader should heed when generalizing findings to other samples. Further, the homogeneous socioeconomic and ethnic makeup of the group did not allow for a testing of the relative importance of independent variables in other than upper and middle-class White samples of participants with LD. In addition, the finding that participants classified under the cultural category of *physically disabled* were not able to overcome adversity despite their possession of successful attitudes and behaviors suggests that the relationship between independent variables is highly sensitive to cultural context and should, therefore, be considered sample specific to some degree.

Finally, this study relied on participant interviews and self-reported data. Although attempts were made to validate self-reported data from other data sources (e.g., public records, relatives, case records), there is no guarantee that all the information provided by the informants was "true." Such problems are inherent to all research utilizing self-reported data. Notwithstanding, the informants' willingness to openly and candidly share their stories of courage in the face of adversity provided a richness and depth of data that otherwise would not have been possible to obtain. Their generosity is to be praised.

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## APPENDIX A

### Operationalized Success Attributes

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#### Self-awareness

- A. Acceptance of the learning disability
  - 1. Participant refers to self as learning disabled.
  - 2. Participant describes events in terms of his or her learning disability.
  - 3. Participant compartmentalizes the learning disability, seeing it as only one aspect of him- or herself rather than being defined entirely by it.
- B. General self-awareness
  - 1. Participant refers to his or her individual strengths and/or weaknesses.
  - 2. Participant refers to his or her individual behavior patterns, "hang-ups," and so on, apart from the learning disability.

#### Proactivity

- A. Participant makes decisions.
- B. Participant is actively engaged in the world, participates economically, socially in family and community.
- C. Participant expresses belief that he or she has the power to make positive changes in his or her own life.

#### Perseverance

- A. Participant kept going in spite of adversity.
- B. Participant expresses the attitude that difficulties are necessary to learning.
- C. Participant describes self as "never giving up," "not a quitter."

#### Emotional stability

- A. Participant does not report unstable emotional states.
- B. Participant describes instances of managing or reducing stress.
- C. Participant demonstrates good peer relationships.
- D. Participant is socially active.
- E. Participant expresses a positive, hopeful outlook.
- F. Participant describes effective techniques for coping with frustrations and ambiguity.

#### Appropriate goal setting and self-directedness

- A. Participant refers to current goals.
- B. Participant gives evidence of past and future planning.
- C. Participant illustrates an appreciation for step-by-step process of obtaining goals.
- D. Participant's stated goals appear attainable.
- E. Participant identified general goals early in life that provided direction to the course of his or her development.
- F. Participant expressed interest in developing a sense of "meaning" to his or her life.

#### Presence and use of effective support systems

- A. Participant refers to support, guidance, encouragement from "significant others."
- B. "Significant others" appear to hold clear, realistic expectations for participant.
- C. Participant utilizes family or mentor support when offered.
- D. Participant actively seeks family and/or mentor support.
- E. Participant actively maintains long-term relationships with tutor, therapist.

Unsuccessful attributes were also further specified. This was deemed necessary because unsuccessful behaviors were not always simply mirror images of successful attributes. For example, reactivity was more than the mere lack of proactive behaviors, but rather involved a competing, maladaptive reaction:

#### Lack of self-awareness

- A. Nonacceptance of the learning disability
  - 1. Participant denies difficulties or the impact of difficulties.
  - 2. Participant is evasive about difficulties.
  - 3. Participant avoids disabled student service centers.
  - 4. Participant refuses to associate with other exceptional individuals.
  - 5. Participant is critical of those who attempt to assist him or her.
- B. Lack of general self-awareness
  - 1. Participant is not aware of specific areas of strength and weakness.
  - 2. Participant is not aware of individual behavior patterns, "hang-ups," apart from the learning disability.

#### Reactivity

- A. Participant does not acknowledge that situations can be altered.
- B. Participant does not acknowledge that multiple solutions to a difficulty might exist.
- C. Participant merely responds to events rather than planning ahead.

- D. Participant responds with passivity and avoidance to negative events.
- Lack of Perseverance
- A. Participant describes being overwhelmed by adversity.
  - B. Participant describes minor events that caused him or her to quit a particular educational or employment situation or from seeking a particular personal goal.
  - C. Participant externalizes blame for failures onto other persons or circumstances.
- Emotional instability
- A. Participant expresses high anxiety.
  - B. Participant reports being diagnosed with an identifiable clinical pathology (e.g., treatment for depression, paranoia, schizophrenia).
  - C. Participant reports being hospitalized or institutionalized.
  - D. Participant does not discuss having discovered effective means for coping with stress, frustration, and/or ambiguity.
- Lack of goal setting or self-directedness
- A. Participant does not express future educational plans.
  - B. Participant does not express future employment goals.
  - C. Participant expresses goals that are grandiose or unrealistic, given his or her capabilities and status.
- Lack of use of social support system
- A. Participant does not refer to supportive, guiding, or encouraging "significant others."
  - B. "Significant others" hold ambiguous or unrealistic expectations for participant.
  - C. Participant describes incidents where he or she was unable to utilize family or mentor support that had been offered.
  - D. Participant does not actively seek family or mentor support.
  - E. Participant does not maintain long-term relationships with tutors or therapists, or uses support services only in crisis situations.

#### APPENDIX B Criteria for Rating Domains

Employment	Income, status of position, present job stability, overall job retention, relationship of employment to training/education, interactions with coworkers, and compensatory ability
Education	Last grade completed, degrees, certificates, continuing education
Independent living	Financial independence, independent residence, transportation, money management, personal organization, and social/psychological independence
Family relations	Relationships with family of descent-quality of relationships, care/responsibility for parents, siblings, appropriateness of relationships; family of procreation--divorce or separation, relationship with children, spouse, care and responsibility extended, longevity of family relations
Social relations, activities, interests, community involvements	Quality and length of friendships, number of close friends that provide support when needed, long-term romantic relationships, community involvement, social gatherings, hobbies, recreation/leisure
Resilience	Life stressors, severity and pervasiveness of disability, as compared to achievement
Crime/Substance abuse	Currently untreated abuse, past history of abuse with current treatment involvement, incarceration, juvenile delinquency, and current status of crime involvement
Physical health	Current and past general health, debilitating illness or injury, personal health practices, health maintenance and physical activity
Psychological health	Diagnosed mental illness, untreated mental illness, institutionalization

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