Learning Disabilities in Dental Education: Trends, Management, and Concerns in U.S. Dental Schools


Abstract: The prevalence of learning disabilities (LD) in higher education has drawn significant attention at the undergraduate level. College freshmen reporting learning disabilities have increased significantly in the past twenty years. Although anecdotal evidence suggests an increase in the number of dental students with learning disabilities, nothing has been published regarding how dental education is affected by this general trend. The purpose of this study was to obtain information from U.S. dental school administrators regarding the incidence and prevalence of learning disabilities in dental education. We hypothesized that there has been an increase in diagnosed cases of learning disabilities in dental education. Following a pilot study to identify individuals responsible for working with students with learning disabilities in U.S. dental schools (response rate 91 percent, n=49), a eighteen-item survey instrument was distributed to specific contact individuals (response rate 81 percent, n=44). Mean cumulative incidence of diagnosed cases of learning disabilities was 0.3 percent; mean prevalence of identified diagnosed cases of LD 0.7 percent. Pearson analysis revealed a statistically significant weak positive correlation between mean prevalence and year, suggesting an increase in identified diagnosed cases of LD in U.S. dental schools over the past seven years (r=0.24, p=0.002). We conclude that the presence of learning disabilities in dental education is silent, pervasive, and deserves increased attention.

Dr. Cruikshank is a graduate student and Dr. Howell is Dean of Dental Education, Office of Dental Education, Harvard School of Dental Medicine; Dr. Brinckerhoff is an Educational Consultant with the Harvard Medical School; Dr. Badovinac is a graduate student, Department of Oral Health Policy and Epidemiology, Harvard School of Dental Medicine; and Dr. Karimbux is Director of Predoctoral Education, Office of Dental Education, Harvard School of Dental Medicine. Direct correspondence and requests for reprints to Dr. Nadeem Karimbux, Office of Dental Education, Harvard School of Dental Medicine, 188 Longwood Avenue, Boston, MA 02115; 617-432-1451 phone; 617-432-4262 fax; nadeem_karimbux@hms.harvard.edu.

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Over the past twenty years there has been a steady and dramatic increase in the number of students with learning disabilities (LD) attending post-secondary institutions.1-4 Although figures vary, the United States Department of Education reported in 1986 that approximately 160,000 students in post-secondary institutions had an LD.3 The American Council on Education HEATH Resource Center, which conducts a survey of college freshmen with disabilities, found that the percentage of first-time full-time college freshmen reporting LD doubled from 0.6 percent in 1976 to 1.1 percent in 1985.2 This figure rose to 3.7 percent in 1998.3 Therefore, one would expect an increased incidence of students with LD in health science schools.

A 1994 survey of LD in U.S. medical schools, conducted by the Association of American Medical Colleges Section for Student Programs, found that the incidence of LD among enrolled medical students had risen from a mean of 1.34 per school in 1988 to a mean of 2.90 per school in 1993, with a range of zero to sixteen students per school (response rate 73.8 percent).6 Although the incidence is small, the authors noted that the frequency of LD almost doubled over the five-year span in which the survey was conducted.6 There are relatively few publications concerning LD in dental education. Parks et al.7 implemented a class-wide screening and testing program for dental students with specific LD. The results of the screening, involving 1,000 first-year dental students, yielded a mean prevalence rate of 5.3 percent. This was the first, and remains the only, published prevalence figure of LD within dental education. In a later study, Antonoff et al.8 sought to determine the status of programs and services available to students with LD in dental schools. The study concluded that “in-
stitutions have a long way to go to meet the needs of this handicapped group." To date, no studies have looked at the incidence or prevalence of LD in dental education across all dental schools. Nor have investigators revisited the status of programs and services available to students with LD in dental schools.

The purpose of this study was to collect data on issues related to LD in dental education. Specific aims included: 1) determining the mean cumulative incidence of identified diagnosed cases of LD in dental schools, 2) establishing the mean prevalence of identified diagnosed cases of LD in dental schools, and 3) collecting information on the status of services available to students with LD in dental schools.

**Methods**

A pilot study was designed to identify an institutional staff member responsible for services to students with LD at each U.S. dental school. Inquiries were sent via email to one individual at each school. Individuals were chosen from those designated in the Directory of ADEA Institutional Members and Association Officers, 2000-01 as student affairs officers or academic affairs officers. The email asked for the name and contact information of the person who deals with issues related to LD in dental education. An individual at forty-nine of the fifty-four dental schools responded, producing a response rate of 91 percent.

An eighteen-question survey instrument, posing more specific questions, was then distributed to individuals identified in the pilot study. For those schools that did not respond to the pilot study, the follow-up survey was mailed to an officer in academic affairs or student affairs.

The contact individual at each school was asked to provide the following information: name, email address, dental school, title, years in position, education, educational background in the field of LD, referrals to other persons/offices, and level of responsibility for students with LD. The questionnaire inquired about the number of identified diagnosed cases of LD enrolled from 1995 to 2001. If schools were unable to identify an exact number of cases, they were asked to give a range: zero, one to four, five to eight, or more than eight. Inquiries about specific diagnoses and the timing of diagnosis were included, as well as questions concerning program accommodations and faculty concerns regarding students with LD. An open-ended question was incorporated into the survey for respondents to add any comments, thoughts, or clarifying points.

The questionnaires were sent by two means: 1) email attachment and 2) U.S. Postal Service letter. Each electronic survey was sent with a message describing the purpose of the study and assuring the recipient of confidentiality. Likewise, each paper questionnaire was accompanied by a cover letter with the same contents. Enclosed with each mailed survey was a postage-paid, self-addressed envelope to facilitate the return of the completed survey form. Addresses were obtained from the Directory of ADEA Institutional Members and Association Officers, 2000-01.

Approximately ten weeks following the initial mailing, nonrespondent dental schools were sent an email reminder and a second copy of the survey. Respondents were contacted by telephone or email, as necessary, to clarify any ambiguity in their responses.

Enrollment statistics were obtained from the American Dental Association.

Descriptive statistics were calculated for all variables. The t-test was used to compare mean cumulative incidence in public versus private schools, as well as mean prevalence in public versus private schools. To determine the linear relationship between year and mean cumulative incidence as well as the linear relationship between year and mean prevalence, the Pearson correlation was utilized. In all cases, alpha was set at 0.05. Analyses were computed with Stata 6.0 and Microsoft Excel 98.

**Results**

Survey questionnaires were mailed to fifty-four U.S. dental schools. A total of forty-four schools responded (81 percent response rate). Among the responding schools, two schools (5 percent) omitted the questions asking incidence, prevalence, timing of diagnosis, specific diagnoses, accommodations, and concerns. One school (2 percent) reported no identified diagnosed cases of LD and, accordingly, did not answer the questions on timing of diagnoses, specific diagnoses, accommodations, or concerns.

The forty-four respondents identified themselves (100 percent) as the institutional person responsible for working with students with LD. They described their title as associate dean (63 percent), assistant dean (14 percent), director (21 percent), or
All respondents held a position within the office of student affairs (59 percent), academic affairs (38.6 percent), or both (2.4 percent) (Figure 2). The highest level of education achieved by these individuals was identified as D.M.D. or Ph.D. (82 percent), masters degree (16 percent), or bachelors degree (2 percent). In the field of LD, the level of education was identified as Ph.D. (2 percent), masters degree (2 percent), continuing education courses (16 percent), or none (80 percent). Respondents averaged 5.8 years experience in their current position (n=41).

Incidence, Prevalence, and Types of LD

Forty-two schools responded to the question on incidence and prevalence. Of these, five schools were unable to determine an exact number and listed a range (one to four cases). In tabulating the results, we used the lowest number of cases within that range as the incidence figure. The overall mean cumulative incidence of identified diagnosed cases of LD was 0.3 percent (Table 1 and Figure 3). Pearson analysis revealed no significant linear relationship between mean cumulative incidence and year (r=0.013, p=0.85). Table 1 and Figure 3 display mean cumulative incidence by year. T-test analysis revealed that the mean cumulative incidence did not vary significantly between public and private schools (t=0.89, p=0.38). The overall mean prevalence of identified diagnosed cases of LD was 0.7 percent (Table 2 and Figure 4).

Table 1. Mean cumulative incidence and “don’t know” responses from 1995 to 2001

<table>
<thead>
<tr>
<th>Year</th>
<th>Mean CI</th>
<th>SD</th>
<th>Range</th>
<th>DK</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995-96</td>
<td>0.3</td>
<td>0.4</td>
<td>0-0.01</td>
<td>31</td>
</tr>
<tr>
<td>1996-97</td>
<td>0.3</td>
<td>0.3</td>
<td>0-0.01</td>
<td>29</td>
</tr>
<tr>
<td>1997-98</td>
<td>0.3</td>
<td>0.3</td>
<td>0-0.01</td>
<td>19</td>
</tr>
<tr>
<td>1998-99</td>
<td>0.3</td>
<td>0.4</td>
<td>0-0.02</td>
<td>12</td>
</tr>
<tr>
<td>1999-2000</td>
<td>0.3</td>
<td>0.3</td>
<td>0-0.01</td>
<td>2.3</td>
</tr>
<tr>
<td>2000-01</td>
<td>0.3</td>
<td>0.3</td>
<td>0-0.01</td>
<td>2.3</td>
</tr>
</tbody>
</table>

Note: All numbers in percentages

CI=Cumulative incidence
SD=Standard deviation
DK=“Don’t know” responses
Forty-one schools responded to the portion of the survey regarding time of diagnosis and types of LD reported. Sixty-one percent of schools reported at least one case of LD that was diagnosed before matriculation. Seventy-nine percent of schools listed at least one case that was diagnosed for the first time during dental school. Seven percent of schools reported that they did not know when any cases were diagnosed.

Regarding types of LD, 62 percent of schools reported at least one case of dyslexia (a language-based disorder in which a person has trouble understanding words, sentences, or paragraphs). Cases of dysgraphia (a writing disability where the difficulty is in forming letters correctly or writing them in a defined space) were reported in 15 percent of schools, while cases of dyscalculia (a mathematical disability in which the person finds solving arithmetic problems and grasping math concepts difficult) were reported by 5 percent of schools.

Management of Cases of LD and Concerns

Forty-two schools responded to the portion of the survey regarding management of cases of LD. Eighty-six percent of schools reported making referrals for students with LD, while 14 percent reported that they do not refer. Among the schools that refer, referrals are made to an individual or office in one of four areas: disability service (76 percent), health service (16 percent), dental school (5 percent), or medical school (3 percent).

Accommodations were reportedly made for students with LD in 100 percent of schools (Figure 5). Accommodations include extra time on exams (98 percent), tutors (67 percent), audiotaped lectures (45 percent), videotaped lectures (8 percent), and adjustment of clinical protocol (20 percent).

Forty-one schools responded to the part of the survey about concerns. Respondents listed their concerns regarding dental students with LD as concern over legal issues (29 percent), patient safety (27 percent), and “likelihood of student success in a dental career” (29 percent).

Discussion

Learning disabilities are a group of disorders that affect 10 to 15 percent of the general population, 3 to 6 percent of college students, and 3 percent of medical students.11 This group represents the most common handicapping condition in education and is one that no educator can avoid encountering in a significant number of students.12,13 Until now, the number of dental students affected by this condition has been unknown. The current study found that the mean prevalence of identified diagnosed cases of LD in dental education from 1995 to 2001 was 0.7 percent, and the mean cumulative incidence during this period was 0.3 percent (Table 1 and Figure 3). For the academic year 2000-01, the

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Table 2. Mean prevalence and “don’t know” responses from 1995 to 2001

<table>
<thead>
<tr>
<th>Year</th>
<th>Mean Prevalence</th>
<th>SD¹</th>
<th>Range</th>
<th>DK²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995-96</td>
<td>0.2</td>
<td>0.3</td>
<td>0-1.2</td>
<td>43</td>
</tr>
<tr>
<td>1996-97</td>
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<td>0.6</td>
<td>0-2.4</td>
<td>36</td>
</tr>
<tr>
<td>1997-98</td>
<td>0.6</td>
<td>0.9</td>
<td>0-3.6</td>
<td>31</td>
</tr>
<tr>
<td>1998-99</td>
<td>0.8</td>
<td>1.1</td>
<td>0-5.5</td>
<td>24</td>
</tr>
<tr>
<td>1999-2000</td>
<td>0.8</td>
<td>1.0</td>
<td>0-5.3</td>
<td>19</td>
</tr>
<tr>
<td>2000-01</td>
<td>0.9</td>
<td>0.8</td>
<td>0-4.1</td>
<td>14</td>
</tr>
</tbody>
</table>

Note: All numbers in percentages

¹SD=Standard deviation
²DK=“Don’t know” responses
The mean prevalence was 0.9 percent, and the mean cumulative incidence was 0.3 percent (Table 2 and Figure 4).

We believe that both our prevalence and incidence figures are underestimates of the actual cases of LD in the dental student population for a number of reasons. First, it has been said that most cases of LD in undergraduate and graduate schools are not identified nor diagnosed.6 It is estimated that 50 percent of students with LD attending undergraduate institutions are undiagnosed before college.14 A 1988 study conducted at Dartmouth15 revealed that two-thirds of students with LD did not know they had an LD when they started their undergraduate education. These students had an average IQ of 122 and Standard Aptitude Test (SAT) scores of 630 verbal and 580 math.

Secondly, there is another group of students who are both gifted and LD.7,16 They have experienced a high degree of academic success and may not be aware of their learning problems. These students do not have a highly visible handicap and may participate in graduate institutions without detection or awareness of their handicap.7 These students are often difficult to find because they do not flag the need for attention by exceptional behavior. It is believed that such students are enrolled in graduate schools throughout the country. Parks et al.7 listed this issue as a reason behind the development of a program to screen “at-risk” dental students through administration of a two-hour battery of tests designed by LD specialists (5.3 percent prevalence, 90 percent accuracy). Limiting ourselves to data of identified diagnosed cases, therefore, substantially restricts our population.

A third reason that we believe our incidence and prevalence figures are underestimations relates to the stigma attached to LD. According to Baum,16 many students with LD have lived for years with labels such as “lazy” or “mentally handicapped.” They may have been degraded while making it through the hostile, unyielding educational process. Obviously, these students lack incentives to openly self-identify themselves as having a learning disability.

Fourth, some students may have so much trouble in their graduate program that they are forced to drop out. Failure in school often provides the only clue that a problem exists. Unless the student seeks testing or the faculty recommend testing, the student will remain undiagnosed.

Even if our cumulative incidence and prevalence figures are low, two interesting trends emerged in analyzing these figures by year. While the response rate for prevalence in 1995-96 was only 57 percent, within our sample, this number increased to 86 percent in 2000-01 (Figure 4). Meanwhile, the mean prevalence jumped from 0.2 percent in 1995-96 to 0.9 percent in 2000-01 (Table 2). Analyzing the linear relationship between year and mean prevalence yielded a statistically significant weak positive correlation, suggesting that prevalence truly increased between 1995 and 2001 (Figure 4). These trends imply that prevalence and awareness of LD in dental education are increasing together. We are cautious to draw such conclusions, however, since it is not possible, within the scope of this study, to isolate the factors contributing to each of these trends.

The suggestion that LD awareness within dental education is progressing was bolstered by the responses to our questions regarding accommodations. The survey conducted in 1985 by Antonoff et al.8 found that only two schools reported having a designated coordinator or director of LD services. By contrast, our survey found that all the schools that re-
sponded to our survey (n=44) had a person responsible for services for students with LD. Furthermore, 86 percent of schools in our survey reported making efforts to refer students with LD to more experienced professionals.

In addition, Antonoff et al.8 alleged that many schools acted in obvious disregard for the federal mandates specified in the Rehabilitation Act—that is, to provide handicapped students with reasonable accommodations. Accommodations are considered to be reasonable if they do not fundamentally alter the nature of the program.17 For example, reasonable accommodations for students with LD in a dental setting include giving them extra time on exams.3 Only one quarter of schools, in the 1985 survey, allowed extra time on exams.

By comparison, our study found that curriculum accommodations were considered by all respondents (n=41: 100 percent), and 98 percent of these respondents indicated that they allowed identified diagnosed students with LD extra time on exams (Figure 5). Our study also showed an increase in access to tutors. Sixty-seven percent of schools reportedly provide tutors for students with LD, compared with 38 percent in the previous study. Audiotaping of lectures was also reportedly provided in many more schools now (45 percent) than in 1985 (21 percent).

While schools are federally mandated to “admit and accommodate a variety of handicapped persons,”17 there are defined situations for which accommodations should not be allowed. The courts have ruled that there are two circumstances under which a college or university may refuse to grant a particular accommodation: the first is undue financial or administrative hardship; the second is for safety.3

These concerns were investigated in the current study. Approximately 29 percent of respondents reported concerns regarding legal issues with students with LD. Another 27 percent of respondents expressed concern over patient safety. Concern that a student with LD “won’t succeed in a dental career” was reported by 29 percent of respondents.

While concerns regarding patient safety and administrative costs are prudent, some administrative fears are founded in ignorance. A clear understanding of LD is lacking within the dental community and in the educational community at large. For example, many educators are dumbfounded by the idea that a person can be diagnosed with LD in dental school. Walters and Croen14 provide insight into how students are able to progress as far as graduate school without drawing the attention of educators to their disabilities. These authors state that students with LD have always been present, but until recently were unlikely to be identified or have their needs met. Medical students with LD, for example, compensate effectively during their undergraduate course load, but the volume and pace of material they encounter in medical school expose their disability.14 The same holds true for the gifted students with LD in dentistry.

It is vitally important that school administrators understand and accept that students can be diagnosed with an LD in dental school. In our survey, the great majority of schools (79 percent) responded that at least one of their students was diagnosed with an LD while in dental school. The assessment of dental students, or any adult with LD, writes Brinckerhoff18 differs significantly from the diagnosis of children. There is no single battery of tests that can identify LD, and there is no consensus among diagnosticians as to which tests should be used.

The diagnostic challenges do not end with a blanket diagnosis, because persons with LD do not readily fit into any one simple taxonomy. Our study focused on only the three most common categories of LD: dyslexia, dysgraphia, and dyscalculia. Most schools (62 percent) reported at least one known case of dyslexia. Dysgraphia (15 percent) and dyscalculia (5 percent) were less commonly reported.

We would be remiss not to mention some potential shortcomings of this study. First, although an 81 percent response rate was obtained, there is a question about the ability to generalize the results of this study to the larger population of dental students and dental schools. Due to the poor response rate within our study for questions probing incidence and prevalence, we are hesitant to apply these figures to the greater population of dental students in the United States. Perhaps the most valuable figure is the 2000-01 mean cumulative incidence (0.3 percent, n=41), although we believe it is an underestimation of the actual mean cumulative incidence. Secondly, as with any written questionnaire, the possibility of ambiguity exists. Some respondents may not have interpreted the question as it was intended. Although we contacted some respondents to verify their responses, and thereby temper this problem, it is noted as a potential limitation of this study. Thirdly, the most significant potential limitation of this study deals with the identification of LD cases, as previously discussed.
Acknowledgments

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REFERENCES