Agreement Among Four Models Used for Diagnosing Learning Disabilities

Briley Proctor and Frances Prevatt

Abstract

We compared the level of agreement among four models used to diagnose learning disabilities (LD), including the simple discrepancy, intraindividual, intellectual ability–achievement, and underachievement models. The sample included 170 clinic-referred university students. The simple discrepancy model diagnosed significantly more students with LD than the other three models. The highest degree of agreement occurred between the intraindividual and intellectual ability–achievement models (70%); the lowest level of agreement occurred between the simple discrepancy and underachievement models (48%). Finally, only two of the six comparisons among the four models demonstrated significant correlations. We conclude that even when discrepancy models diagnose similar *numbers* of students with LD, the *same* students are not diagnosed across different models.

Choosing appropriate criteria for diagnosing learning disabilities (LD) is undoubtedly one of the most debated and dubious tasks in the fields of special education, general education, and even higher education. Neophytes who expect that some agreed-on, explicit criteria for diagnosing LD exist may be astounded when they are first confronted with the myriad of different, and sometimes conflicting, methods used for diagnosis. The ambiguity in criteria stems from the multiple definitions of LD, including those found in the Individuals with Disabilities Education Act (IDEA) of 1990, the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM-IV*; American Psychiatric Association, 1994), and ICD-10 (World Health Organization, 1992), and those adopted by individual states. According to Hammill (1990), 11 definitions have been popular at some time or other since the term *learning disabilities* was first coined by Kirk and Bateman (1962–1963). Whereas some say a definitional consensus is near (Hammill, 1990, 1993; Mercer, Jordan, Allsopp, & Mercer, 1996), others suggest that the lack of definitional uniformity continues to plague the field of LD (Brinkerhoff, Shaw, & McGuire, 1992; Gregg, 1994; Mellard, 1990; Siegel, 1999). As expected, the various definitions of LD lead to different operationalization procedures regarding the specific criteria used for diagnosis. However, even the *same* definition of LD can be interpreted in numerous ways. For example, although 71% of state departments of education use the 1990 IDEA definition or some variation of it to diagnose LD, differences still exist in how the states address specific components of the definition, such as intelligence level, academic failure, processing deficits, and neurological impairments (Mercer et al., 1996). Because of this variability, it is very plausible that a child diagnosed as having LD in one state would not meet the criteria in a different state, and in some cases, different decisions would be reached even in districts within the same state.

Perhaps the definitional aspect of LD that has received the most attention is that of *discrepancy*. Discrepancy is a key component in the IDEA identification criteria, and many consider it to be the common denominator of LD definitions (Hammill, 1990; Mercer et al., 1996). In most definitions of LD, discrepancy refers to whether the child has a severe discrepancy between achievement and intellectual ability. Thus, in determining a discrepancy, one has to consider several issues:

1. What is meant by *achievement*?
2. Which areas of achievement are considered?
3. What is meant by intellectual ability?
4. How is intellectual ability measured?
5. What aspects of intellectual ability are to be considered?
6. What is a discrepancy?
7. What is meant by *severe*?

Three of the more commonly used models of severe discrepancy are the grade-level discrepancy model, standard score comparison model, and regression discrepancy model (Mercer et al., 1996; Reynolds, 1984–1985).

Grade-level discrepancy models, also called *deviation from grade level,* look for a difference between the child's actual grade placement and his or her achievement level as indicated by grade-equivalent scores. In this model, actual grade placement almost serves as a proxy for ability—that is, where the child should be functioning. If the ability–achievement discrepancy exceeds a certain criterion, such as two grade levels, then the discrepancy is determined to be severe. For example, if a child in the third grade is currently reading at a first-grade level, as measured by grade-equivalent scores on achievement tests, then he or she meets the grade discrepancy criteria stipulated in this type of model. Of course, grade placement is an inaccurate or misleading proxy for ability when social promotion has occurred. Some states use students' age as a replacement for students' grade placement in determining the discrepancy (Mercer et al., 1996). Moreover, these types of models frequently require that a child have a minimum IQ (e.g., 85) in order to be diagnosed with LD (Reynolds, 1984–1985). Overall, age and grade deviations are easy to understand and implement (Chalfant, 1985; Reynolds, 1984–1985). However, according to Reynolds, this is a biased model that will result in overidentification with LD of children with IQs below 100 (false positives) and underidentification of children with IQs above 100 (false negatives) and should therefore be disregarded.

Standard score comparison models, sometimes called *simple discrepancy models,* are also used to identify discrepancies between ability and achievement, but in this model, IQ scores are used to represent ability. Discrepancy models that use differences between IQ and achievement scores are consistent with the belief that learning disabilities are supposed to be "specific." What was originally desired was a way to ensure that the deficit displayed by a child with LD did not extend into other areas (Stanovich, 1988a; Van den Broeck, 2002a), because if a child displayed deficits in multiple areas, she or he was probably already covered under other special education categories (e.g., mental retardation) and therefore did not have LD. The use of an IQ–achievement discrepancy score was supposed to ensure that children identified as having LD really had achievement levels that were "unexpected" given their ability levels. Burt (1950) was the first to say that a person's achievement needed to be measured within the context of his or her IQ in order to establish that underachievement was occurring in the presence of intact intellectual functioning. In other words, in this conceptualization, achievement that is not commensurate with IQ is considered a key indicator of LD. Typically, criteria will state that an individual's achievement score must fall a standard amount below that individual's IQ. For example, using a 1 *SD* discrepancy criterion with measures that have a standard deviation of 15 points means that a person's achievement scores must be below his or her IQ by at least 15 points.

The simple discrepancy model is the most widely used of all the models (Mercer et al., 1996; Van den Broeck, 2002a), but it has been heavily criticized in the literature. Many have argued that scores obtained from most paper-and-pencil IQ tests are not an accurate indicator of potential or of intelligence (Ceci, 1990, 1996; Gardner, 1983, 1999; Siegel, 1989; Stanovich, 1988a, 1988b; Sternberg & Grigorenko, 2002). Other strong arguments against the simple discrepancy model include (a) the finding that difference scores between IQ and achievement are unreliable (Sternberg & Grigorenko, 2002); (b) that poor readers diagnosed with LD do not differ from garden-variety poor readers in terms of cognitive makeup, nature of reading difficulties, educational prognosis, or sensitivity to remedial interventions (see Aaron, 1997, for a meta-analysis on studies examining differences between these two groups of poor readers); and (c) that simple discrepancy models fail to recognize the effects of regression toward the mean (Brackett & McPherson, 1996; Cone & Wilson, 1981; McLeod, 1979; Reynolds, 1984–1985; Shaywitz, Fletcher, Holahan, & Shaywitz, 1992; Stanovich, 1999; Sternberg & Grigorenko, 2002; Thorndike, 1963; Wilson & Cone, 1984). This last point refers to the contention that because IQ and achievement measures are imperfectly correlated, simple discrepancy models tend to overidentify LD for individuals with IQs above the mean and underidentify LD for those with IQs below the mean. A complete explanation of how the phenomenon of regression toward the mean affects those identified under the simple discrepancy model is beyond the scope of this article, but the interested reader is referred to Reynolds (1984–1985), Van den Broeck (2002a, 2002b), and Willson and Reynolds (2002) for further discussion.

In response to the general agreement that simple discrepancy models are biased because they fail to take into account the effects of regression toward the mean, Thorndike (1963) was the first to suggest using a *regression-based discrepancy* formula. Like simple discrepancy models, regression-based models examine the difference between an individual's IQ and achievement, but the regression model controls for the correlation between the two tests. In doing so, this model purportedly avoids the criticism leveled against simple discrepancy models regarding over- and underidentification of students on the basis of their IQs (although there is some dissension among researchers regarding whether the regression-based formula is truly superior to the simple discrepancy model; see Van den Broeck, 2002). The regression-based model is not, however, immune to the other criticisms lodged against discrepancy models in general (e.g., that poor readers and IQ–achievement discrepant readers are more alike than different). According to Reynolds (1984–1985), the regression model answers two questions:

1. Is there a severe discrepancy between this child's achievement

score and the average achievement score of all children with equivalent IQs?
2. Is there a severe discrepancy between this child's measured achievement and his or her level of intellectual functioning?

The first question is answered through developing a *predicted* achievement score, which is then compared to the child's obtained achievement score. When the predicted achievement–achievement discrepancy exceeds a predetermined amount of standard deviation units (usually 1–2) of the discrepancy distribution, the discrepancy is determined to be severe. The cutoff for a severe discrepancy will be more standard score points for individuals whose IQ is above 100 than for individuals whose IQ falls below 100, thus correcting for disproportional identification of LD between IQ-disparate groups (Shinn, Good, & Parker, 1999).

Not all models of LD include discrepancy scores. For example, Siegel (1988, 1989, 1999) suggested that IQ tests not be used at all to determine LD, but rather that LD be indicated when an individual's achievement score falls below a certain percentile (e.g., 25th percentile). Fletcher et al. (2002) described a model of identifying LD that requires the identification of an achievement problem, followed by an exploration of the cognitive and psychosocial traits that are related to the manifest disability. In this model, IQ tests are usually unnecessary. However, what constitutes an IQ test—versus a processing test or a test of cognitive abilities—is not always explicated. Stanovich's (1988b) phonological-core variable-difference model advocates assessing domain-specific skills and primarily implicates the role that phonological processing plays in reading difficulties. Still other experts have suggested eradicating the LD label altogether and, instead, adopting a service delivery model that provides assistance to all individuals experiencing academic difficulties (Shinn et al., 1999; Sternberg & Grigorenko, 2002).

Clearly, there is no consensus regarding the best way to identify individuals with LD. Hence, policymakers and clinicians are responsible for researching and choosing from the available models, knowing that the adoption of one model may identify a different population from that identified through a different model. Because the consequences of being identified as having LD are so profound in most educational environments (e.g., LD determines who will receive special education services and who will not), it is desirable to know the consequences of selecting one model over others before actually choosing. Very few studies have compared the populations identified under competing models of eligibility.

Brackett and McPherson (1996) applied four discrepancy-based models to scores on the *Wechsler Intelligence Scale for Adults–Revised* (WAIS-R) and the *Wide Range Achievement Test–Revised* (WRAT-R) obtained from a sample of 169 college students. The four models were (a) a simple discrepancy model using a 1½ *SD* cutoff (20 points) between IQ and achievement; (b) an intra-achievement model based on the scatter between WRAT-R subtests; (c) a regression-based discrepancy, based on Reynolds' (1984–1985) model; and (d) an intra-cognitive model, which examined scatter between the WAIS-R subtests. The researchers also compared the aforementioned four models to the *clinic model*, which was described as a more comprehensive process that uses staff decisions and qualitative measures in addition to standardized test scores. They found very little agreement between the discrepancy models and the clinic model in diagnosing students with and without LD. The highest agreement was between the simple IQ–achievement discrepancy model and the clinic model (86% agreement) for non-LD students. The lowest agreement (43%) was found between the intra-achievement and clinic models for diagnosing LD. Furthermore, the only significant correlation was found between the simple IQ–achievement and regression models. Brackett and McPherson concluded that their clinic model was superior to the discrepancy models because of its inclusion of case history, background information, and "clinical investigations and interpretations of error patterns that are indicative of processing strengths and weaknesses" (p. 81).

Hoy et al. (1996) used a population of 80 adults already receiving services for LD in a rehabilitation setting to compare the decisions made based on three regression models (one each for reading, math, and spelling) to those from a clinical model. All participants completed the *Woodcock-Johnson Psychoeducational Tests of Achievement–Revised* (WJ-R-ACH), the *Woodcock-Johnson Psychoeducational Tests of Cognitive Ability–Revised* (WJ-R-COG), the WAIS-R, and the WRAT-R. To be diagnosed with LD under the clinical model, the participants needed to meet the following score criteria: (a) underachievement evidenced by a discrepancy of 1½ *SD* between the WAIS-R Full Scale IQ (FSIQ) standard score and one or more areas of achievement on the WJ-R-ACH, and (b) cognitive processing deficits, evidenced by one or more areas from the WJ-R-COG being at least 1⅓ *SD* below the WAIS-R FSIQ, Verbal IQ (VIQ), or Performance IQ (PIQ). Using the clinical model, 54 of the 80 participants were classified as having LD.

The regression-based models were based on the WAIS-R FSIQ and, individually, on the reading, math, and spelling scores from the WRAT-R. Using this regression model, 37 participants were diagnosed with LD in reading, 33 in math, and 21 in spelling. Significant differences were found between the clinic and regression methods using reading, math, and spelling data. In each case, the regression formula identified a smaller proportion of participants as having LD than did the clinic model. Neither model identified as many adults demonstrating LD as would be identified based on past documentation—the method by which participants were initially selected into the rehab setting. Finally, Hoy et al. (1996) noted that if one applied Siegel's (1989) cutoff score method (achievement scores equal to or below the 25th percentile), at least 86% of the sample would qualify as having LD in reading, math, or spelling.

Additional studies are needed in order to discern the consequences of selecting different eligibility models for diagnosing LD, especially as new tests are being published that are designed to identify LD. The best example of this may be the recently published *Woodcock-Johnson–III* (WJ-III; Woodcock, McGrew, & Mather, 2001a, 2001b), a battery of cognitive ability and achievement tests that yields six different types of discrepancies. According to Mather (2001), the type of discrepancy procedure used to evaluate an individual for LD depends on why the individual is being tested. If the evaluation is used for diagnosis, then "the intra-individual discrepancy procedure is the most useful procedure for identifying specific learning disabilities" (p. 2). This is because the intra-individual discrepancy procedure identifies an individual's specific strengths and weaknesses in academic achievement areas and then allows the examiner to explore the cognitive abilities that may be related to the individual's learning difficulties. This approach is similar to the one advocated by Fletcher et al. (2002), who recommended that specific achievement deficits be identified, followed by an exploration into the cognitive and psychosocial traits that are related to the manifest disability. According to Mather and Schrank (2001),

> The intra-individual discrepancy procedure is most appropriate when the purposes of the assessments are to determine why the student has had difficulty, to explain how the difficulty relates to academic performance, and to select appropriate interventions. This procedure is in line with current conceptualizations of multiple intelligences specifying that different cognitive processing capacities are related to solving different types of problems. (p. 3)

A second discrepancy score that is likely to be used to diagnose LD is the intellectual ability–achievement procedure, which compares an individual's achievement scores to his or her general intellectual ability score. This procedure is consistent with the criteria of several states that require a severe discrepancy between intellectual ability and achievement (viz., IQ–achievement discrepancy) as a fundamental component of LD diagnosis.

Purpose of the Study

Because the WJ-III and its precursor, the *Woodcock-Johnson Psycho-Educational Battery–Revised* (Woodcock & Johnson, 1989), are included in the most frequently administered tests of cognitive ability and achievement, the new discrepancies included in the WJ-III scoring procedures are sure to receive wide interest. Users of the WJ-III may wonder whether they should replace or supplement their current discrepancy procedures with one of the six offered by the WJ-III. Before doing so, it may be useful to know how the selection of certain discrepancy models will affect the diagnosis of LD. The purpose of this study, therefore, was to help elucidate these consequences by examining the application of the following four competing models to a clinic-referred population: (a) a simple discrepancy model, using *Wechsler Adult Intelligence Scale–Third edition* (WAIS-III; Wechsler, 1997) FSIQ scores and achievement scores from the WJ-III; (b) the WJ-III intra-individual discrepancy model; (c) the WJ-III intellectual ability–achievement discrepancy model; and (d) an underachievement model, using achievement scores from the WJ-III. The following research questions were investigated:

1. Under which model is a student most likely, and least likely, to be diagnosed with LD?
2. What is the level of agreement among the four diagnostic models regarding LD diagnoses?
3. What are the relationships among the four diagnostic models?

Method

Participants

Participants were 170 college students who were referred to a university-based assessment clinic due to academic difficulties and who were specifically interested in determining whether a learning disability could be contributing to their difficulties. The participants were enrolled at one of two universities or one of three community colleges. The mean GPA for the sample was 2.44 (range 1.25–3.75, SD = 2.44); the average number of failed college courses was 7 (range 0–32, SD = 6). Of the 170 participants, 50% (n = 85) were men. Ethnicity was as follows: European American, 53.5% (n = 91); African American, 19.4% (n = 33); Hispanic, 6.5% (n = 11); Asian American, 1.2% (n = 2); other, 1.8% (n = 3); and unknown, 17.6% (n = 30).

Measures

As part of their evaluation for academic difficulties, all participants completed the WJ-III and the WAIS-III. The WAIS-III is an individually administered test of intelligence that yields three composite scores, the FSIQ, VIQ, and PIQ. Each composite score has a mean of 100 and a standard deviation of 15. The WJ-III consists of two distinct, co-normed batteries: the *Woodcock-Johnson–III Tests of Cognitive Abilities* (WJ-III-COG; (Woodcock, McGrew, & Mather, 2001b) and the *Woodcock-Johnson–III Tests of Achievement* (WJ-III-ACH; Woodcock, McGrew, & Mather, 2001a). The WJ-III-COG yields seven cluster scores, each representing a broad cognitive ability as outlined in the Cattell-Horn-Carroll theory of cognitive abilities (see Mather & Woodcock, 2001, for further description of cluster scores). The WJ-III-ACH yields broad achievement scores in the areas of reading, math, writing, and oral language. Each cluster, or area, score on the WJ-III has a mean of 100 and a standard deviation of 15.

Procedure

All participants completed an intake form that included reason for referral, demographic information, and academic history. An appointment was scheduled for either one whole day or two half days of assessment with the cognitive and achievement measures. Prior to testing, the evaluator conducted a brief interview that further probed referral issues and academic history. Testers were graduate students who were employed in the assessment center; all testers had successfully completed at least 2 semesters of supervised graduate instruction on psychoeducational testing, as well as training provided by the assessment center. Furthermore, a clinical psychologist supervised all testing.

WAIS-III FSIQ scores and all WJ-III cluster scores were used as units of analysis. The four discrepancies were calculated using SPSS Version 10.0.

Simple Discrepancy. For each participant, the WJ-III-ACH scores of Broad Reading, Broad Math, Broad Written Language, and Broad Oral Language were compared to the participant's FSIQ. A difference of 15 points (1 *SD*) or more in favor of FSIQ in any of the four achievement areas was considered a severe discrepancy and coded as a weakness. Participants' VIQ and PIQ scores were not used in lieu of the FSIQ, regardless of the magnitude of the VIQ/PIQ split, in order to strictly adhere to the traditional simple discrepancy model.

Intra-Individual Discrepancy. Using Compuscore (Schrank & Woodcock, 2001), a computer software program developed specifically for the WJ-III, intra-individual discrepancies were calculated for each individual using his or her scores from the WJ-III-COG and the WJ-III-ACH. In this procedure, each participant's cognitive and achievement cluster score is compared to the average of that individual's remaining cognitive and achievement scores. Difference scores are calculated and compared to the distribution of difference scores. Difference scores equal to or exceeding 1.3 *SD* (of the *difference score* distribution, not the standard score distribution) are considered significant. A 1.3 *SD* criterion is the minimum allowed by Compuscore (range 1.3–2.3 *SD*) and was chosen in order to be consistent with the discrepancy criteria for the other models, both of which used the minimum acceptable value (i.e., 1 *SD* in both the simple discrepancy and underachievement models). In this study, when any of the 7 cluster scores was significantly lower than the average of the remaining scores, an intra-individual weakness was indicated.

Intellectual Ability–Achievement. Compuscore was used to calculate intellectual ability–achievement discrepancies for each participant. With this model, the participants' overall composite score on the WJ-III-COG, called the General Intellectual Ability (GIA) score, was compared to each of the four broad achievement scores (viz., reading, math, written language, and oral language). The 1.3 *SD* criterion was again used to indicate a severe discrepancy. If any difference score exceeded the 1.3 *SD* criterion (in favor of the GIA), an intellectual ability–achievement weakness was coded.

Underachievement. In this model, just the WJ-III-ACH broad scores were analyzed. Any score that was equal to or below 85 (16th percentile) was coded as a weakness.

Results

The numbers and percentages of participants who met the LD criteria under each of the four models are presented in Table 1. Frequency analysis suggested that the simple discrepancy model yielded the most LD identifications (n = 79), whereas the intellectual ability–achievement model yielded the fewest (n = 42). A McNemar test was used to compare the frequency of LD diagnoses under each pair of models (total of six comparisons). McNemar tests are used to test the equality of two proportions, where each sample proportion involves some of the same observations, making the two sample proportions dependent (Hays, 1973). An α level of .05 was used for all tests of statistical significance. No differences were found between the intra-individual and intellectual ability–achievement models, $\chi^2(4, N = 170) = .71$, $p = .40$; the intra-individual and underachievement models, $\chi^2(4, N = 170) = .54$, $p = .46$; or the underachievement and intellectual ability–achievement models, $\chi^2(4, N = 170) = 2.73$, $p = .10$. However, more participants were diagnosed under the simple discrepancy models than in the intra-individual model, $\chi^2(4, N = 170) = 13.57$, $p = .00$; the intellectual ability–achievement model, $\chi^2(4, N = 170) = 18.25$, $p = .00$; or the underachievement model, $\chi^2(4, N = 170) = 5.56$, $p = .02$. In

TABLE 1
Number and Percentage of Participants Meeting the LD Criteria of the Four Models

Model	*n*	%
Simple discrepancy	79	46.5
Intra-individual	49	28.8
Intellectual ability–achievement	42	24.7
Underachievement	56	33.1

Note. N = 170.

sum, the simple discrepancy model was more likely to yield an LD diagnosis than any of the three alternative models.

A contingency table is presented in Table 2, which gives the information needed to calculate frequencies and percentages of agreement/disagreement among all four models. Agreements occur when two models agree that a participant has LD or does not have LD. A disagreement occurs when a participant would be diagnosed with LD under one model, but not another. The highest percentage of agreement (combining the percentages for *yes–yes* and *no–no*) occurred between the intra-individual and intellectual ability–achievement models (70%), followed by the simple discrepancy and intra-individual (64%), intellectual ability–achievement and underachievement (63%), intra-individual and underachievement (60%), simple discrepancy and intellectual ability–achievement (58%), and simple discrepancy and underachievement models (48%).

A Phi coefficient was also calculated for each pair of models to determine interrelationships. Phi coefficients are indices of strengths of association, or effect sizes (Hays, 1973). The association between the simple discrepancy and intra-individual models was significant, $\Phi = .27$, $p = .001$, effect size $\Phi^2 = .07$, as was the association between the intra-individual and intellectual ability–achievement models, $\Phi = .24$, $p = .002$, effect size $\Phi^2 = .06$. The effect sizes for these significant indices of association suggest that the relationships between these models are weak. The remaining four paired comparisons were not significant.

Discussion

Many models are available for diagnosing LD, although there is no consensus regarding which model is best. Therefore, diagnosticians have much latitude in their choice of a model, but at the same time they need to understand that the models are *not* interchangeable. In this study, we compared four models to investigate whether the models would yield the same number of participants and whether the same participants would be classified as LD or non-LD under each model. The models investigated were the simple discrepancy model, intra-individual model (from the WJ-III), the intellectual ability–achievement model (from the WJ-III), and the underachievement model.

First, we found that of the four models, the simple discrepancy method produced more positive LD diagnoses than either of the two WJ-III discrepancy models or the underachievement model. There were no differences among the latter three models in terms of the number of students diagnosed. These results suggest that if one were to move from the simple discrepancy model to one of the three alternative models, a decrease in positive LD diagnoses should be expected. Second, we found that there was very little agreement among the four models in terms of diagnosis. In other words, although some of the models identified similar *numbers* of students (e.g., intra-individual and underachievement), they were each identifying *different* students. Significant relationships were found between the simple discrepancy and intra-individual models and between the two WJ-III models, but not in the other four comparisons. These results suggest that switching among models could lead to very different populations being identified as having LD.

The findings of this study are disconcerting because they strengthen the contention that the diagnosis of LD is often so arbitrary as to render it suspect. It is clear why a child diagnosed with LD in one setting would not be diagnosed with LD in another; the decision depends in large part on the model that has been adopted. The choice of model has a tremendous impact on who is diagnosed and, subsequently, who will receive special services. Such capriciousness implies that we, the experts, really do not understand what is meant by "the child with

TABLE 2
Contingency Table Comparing Decisions Made Under Each Pair of LD Diagnostic Models

Model/Decision	Intra-individual				Intellectual ability–achievement				Underachievement			
	Yes		No		Yes		No		Yes		No	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Simple discrepancy												
Yes	33	19.4	46	27.1	25	14.7	54	31.8	24	14.2	55	32.5
No	16	9.4	75	44.1	17	10.0	74	43.5	32	18.9	58	34.3
Intra-individual												
Yes					20	11.8	29	17.1	19	11.2	30	17.8
No					22	12.9	99	58.2	37	21.9	83	49.1
Intellectual ability–achievement												
Yes									18	10.7	24	14.2
No									38	22.5	89	52.7

LD." The purpose of this article is not to advocate for one model over another, but simply to illustrate that the various models may identify very different samples as having LD. The choice of model will largely depend on the diagnostician's own theoretical beliefs about LD, but nevertheless, the implications of model selection must be understood. Diagnosticians should examine both the theoretical differences and the real-life consequences of each model before making this very important selection. Perhaps even more important, school districts and other policymaking institutes should not allow individuals under their jurisdiction to select from among all, or even a subset, of the available models. In doing so, they would be implying that the models are interchangeable or have at least a moderate amount of agreement, which they most likely do not.

Further research is desired, including further comparisons between these and other models. For example, future studies may want to alter the simple discrepancy model so that a 1½ *SD* IQ–achievement discrepancy is used, rather than the 1 *SD* used in the present study. Alternatively, the WJ-III discrepancies could be calculated using 1½ to 2 *SD* rather than 1⅓ *SD*. These changes would most likely yield even fewer numbers of participants identified as having LD. Future studies could also examine the profiles of students identified under each model to better explicate the qualitative differences between the samples.

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REFERENCES

Aaron, P. G. (1997). The impending demise of the discrepancy formula. *Review of Educational Research, 67*, 461–502.

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.

Brackett, J., & McPherson, A. (1996). Learning disabilities diagnosis in postsecondary students: A comparison of discrepancy-based diagnostic models. In N. Gregg, C. Hoy, & A. F. Gay (Eds.), *Adults with learning disabilities: Theoretical and practical perspectives* (pp. 68–84). New York: Guilford Press.

Brinkerhoff, L. C., Shaw, S. F., & McGuire, J. M. (1992). Promoting access, accommodations, and independence for college students with learning disabilities. *Journal of Learning Disabilities, 25*, 417–429.

Burt, C. (1950). *The backward child* (3rd ed.). London: University of London Press.

Ceci, S. J. (1990). *On intelligence . . . more or less: A bio-ecological treatise on intellectual development.* Englewood Cliffs, NJ: Prentice Hall.

Ceci, S. J. (1996). *On intelligence.* Cambridge, MA: Harvard University Press.

Chalfant, J. C. (1985). Identifying learning disabled students: A summary of the National Task Force report. *Learning Disabilities Focus, 1,* 9–20.

Cone, T. E., & Wilson, L. R. (1981). Quantifying a severe discrepancy: A critical analysis. *Learning Disability Quarterly, 4,* 359–371.

Fletcher, J. M., Foorman, B. R., Boudousquie, A., Barnes, M. A., Schatschneider, C., & Francis, D. J. (2002). Assessment of reading and learning disabilities: A research-based intervention-oriented approach. *Journal of School Psychology, 40,* 27–63.

Fletcher, J. M., Francis, D. J., Shaywitz, S. E., Lyon, G. R., Foorman, B. R., Stuebing, K. K., et al. (1998). Intelligent testing and the discrepancy model for children with learning disabilities. *Learning Disabilities Research & Practice, 13,* 186–203.

Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences.* New York: Basic Books.

Gardner, H. (1999). *Reframing intelligence.* New York: Basic Books.

Gregg, N. (1994). Eligibility for learning disabilities rehabilitation services: Operationalizing the definition. *Journal of Vocational Rehabilitation, 4*(2), 86–95.

Hammill, D. D. (1990). On defining learning disabilities: An emerging consensus. *Journal of Learning Disabilities, 23,* 74–84.

Hammill, D. D. (1993). A timely definition of learning disabilities. *Family and Community Health, 16,* 1–8.

Hays, W. L. (1973). *Statistics for the social sciences.* New York: Holt, Rinehart & Winston.

Hoy, C., Gregg, N., Wisenbaker, J., Bonham, S. S., King, M., & Moreland, C. (1996). Clinical model versus discrepancy model in determining eligibility for learning disability services at a rehabilitation setting. In N. Gregg, C. Hoy, & A. F. Gay (Eds.), *Adults with learning disabilities: Theoretical and practical perspectives* (pp. 55–67). New York: Guilford Press.

Individuals with Disabilities Education Act of 1990, 20 U.S.C. § 1400 *et seq.*

Kirk, S. A., & Bateman, B. (1962–1963). Diagnosis and remediation of learning disabilities. *Exceptional Children, 29,* 73–78.

Mather, N. (2001, Spring). Educated guesses: A guide to choosing WJ-III discrepancy procedures. *WJ-III Newsletter, 1,* 2–3.

Mather, N., & Schrank, F. A. (2001). *Use of the WJ-III Discrepancy Procedures for Learning Disabilities Identification and Diagnosis* (Assessment Service Bulletin No. 3). Itasca, IL: Riverside.

Mather, N., & Woodcock, R. W. (2001). *Examiner's manual: Woodcock-Johnson–III Tests of Cognitive Abilities.* Itasca, IL: Riverside.

McLeod, J. (1979). Educational underachievement: Toward a defensible psychometric definition. *Journal of Learning Disabilities, 12,* 42–50.

Mellard, D. F. (1990). The eligibility process: Identifying students with learning disabilities in California's community colleges. *Learning Disabilities Focus, 5,* 75–90.

Mercer, C. D., Jordan, L., Allsopp, D. H., & Mercer, A. R. (1996). Learning disabilities definitions and criteria used by state education departments. *Learning Disability Quarterly, 19,* 217–232.

Reynolds, C. R. (1984–1985) Critical measurement issues in learning disabilities. *The Journal of Special Education, 18,* 451–476.

Schrank, F. A., & Woodcock, R. W. (2001). WJ-III Compuscore and Profiles Program [Computer software]. Itasca, IL: Riverside.

Shaywitz, B., Fletcher, J., Holahan, J., & Shaywitz, S. (1992). Discrepancy compared to low achievement definitions of reading disability: Results from the Connecticut Longitudinal Study. *Journal of Learning Disabilities, 25,* 639–648.

Shinn, M. R., Good, R. H., III, & Parker, C. (1999). Noncategorical special education services with students with severe achievement deficits. In D. J. Reschly, W. D. Tilly, III, & J. P. Grimes (Eds.), *Special education in transition: Functional assessment and noncategorical programming* (pp. 81–105). Longmont, CO: Sopris West.

Siegel, L. S. (1988). Evidence that IQ scores are irrelevant to the definition and analysis of reading disability. *Canadian Journal of Psychology, 42,* 202–215.

Siegel, L. S. (1989). IQ is irrelevant to the definition of learning disabilities. *Journal of Learning Disabilities, 22,* 469–478.

Siegel, L. S. (1999). Issues in the definition and diagnosis of learning disabilities: A perspective on Guckenberger v. Boston University. *Journal of Learning Disabilities, 32,* 304–319.

Stanovich, K. E. (1988a). The right and wrong places to look for the cognitive locus of reading disability. *Annals of Dyslexia, 38,* 154–177.

Stanovich, K. E. (1988b). Explaining the differences between the dyslexic and the garden-variety poor reader: The phonological-core variable-difference model. *Journal of Learning Disabilities, 21,* 590–604.

Stanovich, K. E. (1999). The sociopsychometrics of learning disabilities. *Journal of Learning Disabilities, 32,* 350–361.

Sternberg, R. J., & Grigorenko, E. L. (2002). Difference scores in the identification of children with learning disabilities: It's time to use a different method. *Journal of School Psychology, 40,* 65–83.

Thorndike, R. L. (1963). *The concepts of over- and under-achievement.* New York: Columbia University, Bureau of Publications.

Van den Broeck, W. (2002a). The misconception of the regression-based discrepancy operationalization in the definition and research of learning disabilities. *Journal of Learning Disabilities, 35,* 194–204.

Van den Broeck, W. (2002b). Will the real discrepant learning disability please stand up? *Journal of Learning Disabilities, 35,* 209–213.

Wechsler, D. (1997). *Wechsler adult intelligence scale–Third edition.* San Antonio: Psychological Corp.

Willson, V. L., & Reynolds, C. R. (2002). Misconceptions in Van den Broeck's representation of misconceptions about learning disability research. *Journal of Learning Disabilities, 35,* 205–208.

Wilson, L. R., & Cone, T. (1984). The regression equation method of determining academic discrepancy. *Journal of School Psychology, 22,* 95–110.

Woodcock, R., & Johnson, M. (1990). *Woodcock-Johnson psycho-educational battery–Revised.* Itasca, IL: Riverside.

Woodcock, R. W., McGrew, K. S., & Mather, N. (2001a). *Woodcock-Johnson III.* Itasca, IL: Riverside.

Woodcock, R. W., McGrew, K. S., & Mather, N. (2001a). *Woodcock-Johnson–III tests of achievement.* Itasca, IL: Riverside.

Woodcock, R. W., McGrew, K. S., & Mather, N. (2001b). *Woodcock-Johnson–III tests of cognitive abilities.* Itasca, IL: Riverside.

World Health Organization. (1992). *The ICD-10 classification of mental and behavioural disorders: Clinical description and diagnostic guidelines.* Geneva, Switzerland: Author.

NOTICE

Confront Teasing as School Year Starts

The teasing that hurts all children is doubly hurtful to those who stutter. Teachers can help by following expert advice in a new brochure published by The Stuttering Foundation to address both teasing and stuttering at the beginning of the school year. In addition to tips on handling teasing, the brochure provides guidance on how to deal with reading aloud, calling on the child, and other questions teachers routinely have when a child stutters in their classroom. Parents of children who stutter often give a copy of *The Child Who Stutters: Notes to the Teacher* to their child's instructor during the first week of class. The brochure is also available in Spanish.

To obtain a free copy of *The Child Who Stutters: Notes to the Teacher* or *El Niño Que Tartamudea en la Escuela,* the Spanish version, contact The Stuttering Foundation, 3100 Walnut Grove Rd., Suite 603, Memphis, TN 38111; call 800/992-9392; or download the brochures directly from our Web sites (www.stutteringhelp.org; www.tartamudez.org). The 56-year-old nonprofit foundation also offers 27 books and 24 videotapes on stuttering, including the new video *Stuttering: Straight Talk for Teachers.*

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