Examining Differences Between Students with Specific Learning Disabilities and Those with Specific Language Disorders on Cognition, Emotions and Psychopathology

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The purpose of the present study was to investigate the differences between students with LD and SLI on emotional psychopathology and cognitive variables. In particular, the study examined whether cognitive, emotional, and psychopathology variables are significant discriminatory variables of speech and language disordered groups versus those having specific learning disabilities. Participants were 137 students from which 44 had a diagnosis of F80 and 93 of F81 based on the ICD10. They were administered measures of cognition (WISC) and emotions/psychopathology. Results indicated that students with LD and SLI did not differ significantly on emotion and psychopathology variables, according to the perceptions of their parents as they rated with CBCL scale. There were, however, substantial differences on cognitive variables. These differences could not be predicted by the operational definitions of the disorders (which posited no such differences at the population level).

Keywords: emotions, psychopathology, learning disabilities, specific learning disabilities, ROC analysis.

During the last decade teachers had to deal with an increasing number of students who exhibited challenges in their learning outcomes or presented behavioral problems. Mental health problems in children and adolescents are relatively common, affecting 14–20% of youths, although estimates vary because of differences in diagnostic conceptualization and methodology (Roberts, Atkinson, & Rosenblatt, 1998; Sawyer et al., 2001). Several recent empirical findings suggest that learning problems occur concomitantly with emotional and motivational deficits and the presence of psychopathology. The existence of psychopathology in students with learning disabilities has been documented earlier (Handwerk & Marshall, 1998; Heath & Ross, 2000; Sideridis, 2007; Talbott & Loyd, 1997) indicating high prevalence rates in students with learning problems/disabilities (Breen & Barkley, 1984; Maag & Reid, 2006; Noel, Hoy, King, Moreland, & Meera, 1992; Swanson & Howell,

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1996). For example, Sideridis, Mouzaki, Simos and Protopapas (2006) pointed to the importance of motivation and psychopathology as reading comprehension difficulties were best predicted by student subgroups who presented a "helpless" motivational profile, but also a maladaptive motivational profile that involved high scores in competitiveness and low scores on cognition. In another study, Sideridis, Morgan, Padeliadu, Botsas, and Fuchs (2006) reported that motivational and psychopathology variables were, at times, more predictive of academic achievement and group membership (learning disabilities (LD) vs. Typical) compared to cognitive and metacognitive variables suggesting that attention should be given to the former. When looking at the value of individual predictors, Watkins (2005) has repeatedly demonstrated the inability of cognitive variables to be salient identifiers of learning disabilities. More specifically, multiple studies have supported the linkage between language impairment and concomitant socioemotional and behavioral difficulties (Benner, Nelson, & Epstein, 2002; McCabe, 2005; McCabe & Meller, 2004; Redmond & Rice, 1998). Rates of comorbidity between the above-mentioned difficulties have converged to a range of 50% to 70%. The nature and severity of social, emotional, and behavioral difficulties exhibited by students with specific speech and language disorders vary. One reason is that the above symptoms are dependent on the age of the students and the type or subtype of language impairment. Emotional and behavioral difficulties may include difficulties across both internalizing and externalizing dimensions; e.g., attention problems, hyperactivity, aggression, conduct disorders, low self-esteem, low self-confidence, social withdrawal, depression and anxiety (Gallagher, 1999; Noterdaeme & Amorosa, 1999). The relationship between language impairment and socioemotional and behavioral difficulties determines the treatment recommendations which are appropriate (McCabe, 2005).

Wechsler Intelligence Scales and LD Profiles

In terms of cognitive abilities, results from studies investigating the WISC-III performance of children with LD are somewhat equivocal because of methodological inconsistencies. These inconsistencies may occur because researchers (1) have not administered all subtests comprising the four WISC-III factors (Verbal Comprehension [VC], Perceptual Organization, [PO], Freedom From Distractibility [FD] and Processing Speed [PS]); (2) used different criteria for determining the presence or absence of LD without always mentioning comorbid diagnoses; (3) applied different factor analytic methods; and (4) employed variable sample sizes (Mayes, Calhoun, & Crowell, 1998; Watkins & Kush, 2002). Research on subtest and index profiles has revealed contradictory results. Slate (1995) reported that the Freedom From Distractibility (FDI) Index was not the lowest factor for 202 children with LD, whereas some other researchers reported that Freedom From Distractibility (FDI) and Processing Speed (PS) were lower than Verbal Comprehension (VO) and Perceptual Organization (PO) in children with LD (Newby, Recht, Caldwell, & Schaefer, 1993; Prifitera & Dersh, 1993). In the aforementioned studies mean scores on Arithmetic, Coding, Digit Span and Symbol Search were the lowest subtests for children with LD compared to the remaining subtests. In another study Mayes, Calhoun and Crowell (1998) revealed that except from the FD Index, the CAD profile (Coding, Arithmetic, Digit Span) had one of the lowest mean subtest scores for all LD subgroups (8 to 16-year-olds) suggesting that, in addition to problems of

attention, students with LD may also have difficulties in other areas such as those measured by the Coding subtest (i.e., graphomotor skill, performance speed, or memory). However, the fact that only a minority of children with LD exhibited any of the profiles led the researchers to the conclusion that "profile analysis may not be helpful diagnostically but it is useful in understanding cognitive differences in students with LD" (Mayes, Calhoun, & Crowell, 1998, p. 315). In a recent study, Mayes and Calhoun, (2004) supported the validity of distinctive profiles for children with ADHD, LD, autism, and brain injury but not for children with mood and behavior disorders. More specifically, their findings were congruent with previous results indicating low Coding (or FD Index) without low comprehension for children with ADHD or LD. On the other hand, Watkins and Kush (2002) (1) conducted confirmatory factor analysis to examine the underlying latent constructs measured by the WISC-III in a sample of 1201 students with LD and (2) found similar results with a growing body of evidence suggesting that VC, PO, and PS factors are robust across samples; but the FD factor demonstrates tenuous construct validity. In another study, Watkins and Worrell (2000) concluded that deviation of individual WISC-III subtest scores from mean IQ scores failed to discriminate accurately students with and without LD. Furthermore, Watkins (2005) reported that subtest scatter is also an inaccurate diagnostic indicator for children with LD, since in his study only 50% to 55% of students with LD were accurately diagnosed using any of the subtest scatter indices.

Apart from the FD and PS factors, the ACID profile was also recognized to be common in learning- and reading-disabled students (Daley & Nagle, 1996; Prifitera & Dersh, 1993; Wechsler, 1991) suggesting that when clinicians encounter an ACID profile, they "investigate the possibility of a learning disability" (Daley & Nagle, 1996, p. 330). However, the ACID profile has generated considerable disagreement among psychologists regarding its diagnostic validity for students with LD. Empirical evidence derived from Watkins, Kush, and Glutting (1997) examining the discriminant and predictive validity of the WISC-III ACID profile among 612 students with LD showed that the ACID profile did not efficiently separate students with learning disabilities from those without disabilities, nor did it predict academic achievement in students with LD. In another study Filippatou and Livaniou (2005) evaluated the discriminant validity of WISC-III scores to differentiate students with ADHD, LD, and Language Disorders. They reported that the ACID profile did not efficiently discriminate students with ADHD from those with LD and from those with Language Disorders.

Wechsler Intelligence Scales, LD and SLI Profiles

Studies of clinical groups have pointed to the presence of significant differences among some diagnostic groups (groups with ADHD, LD, emotional disturbance, autism, Asperger's syndrome, etc.) in WISC-III subtest scores. Research on WISC-III scores concerning students with specific language impairment (SLI) has shown that there is often a variable pattern in the IQ profiles of students with language-related disorders both in Verbal and Non-verbal attributes, illustrating the heterogeneity of language disorders in school-aged children (Ottem, 2002; Webster, Erdos, Evans, Majnemer, Kehayia, Thordardottir, Evans, & Shevell, 2006). According to Ottem (2002) this scatter of scores leads to an underestimation of the difference

between verbal and nonverbal abilities because the tests are more structurally complex on the Performance scale compared to the Verbal scale. Hence, the traditional V-P IQ discrepancy may not be a very meaningful or interpretable concept for many students in this group. Once the scatter was taken into account, the revised V-P IQ differences were generally shifted towards the negative end of the spectrum in language- and reading-impaired students. Furthermore, several studies have examined the relationship between non-verbal IQ and language abilities for students with SLI, concluding that issues surrounding direction of influence are complex (Webster et al., 2006). In particular, Botting (2005) investigated the developmental patterns between language abilities and non-verbal IQ in 82 children with SLI assessed at 7, 8, 11 and 14 years of age. Results showed that a clear and dramatic fall occurred in non-verbal IQ that remained consistent until the age of 14. However, this fall was not universal across students, and the pattern of IQ development seems to be related, at least in some way, to linguistic progress. In another study, Dethorne and Watkins (2006) examined the association between language abilities and non-verbal IQ in 30 children with language impairment. Results indicated that the strength of association between language abilities and nonverbal IQ depends on the form of assessment used. Standardized measures of both semantic and morphosyntactic skills generated moderate to high associations with non-verbal IQ while criterion-referenced assessments of language mitigated the strength of this relation. In addition, discrepancies between language and nonverbal IQ occurred in both directions – meaning that in some cases, language exceeded nonverbal IQ and that in others nonverbal IQ exceeded language.

Studies concerning WISC-III IQ differences between students with LD and specific language impairment (SLI) are limited and produced equivocal results. Filippatou and Livaniou (2005) examined the discriminant ability of the WISC-III to differentiate students having ADHD (n = 22) or LD (n = 50) from those having SLI (n = 42). Results showed significant differences between the learning-disability and language-disordered groups in total IQ and verbal IQ as well. On these two indices the language-disordered group scored lower compared to the learning disability group. Students with language disorders had the lowest scores on Vocabulary, while students with LD had the lowest scores on Coding. On the other hand, Rotsika (2007) reported that students with language disorders had low scores on Digit Span and Arithmetic based on the WISC-III. She further reported a 5.6 point difference between the Verbal and Performance subscales compared to 15.2 points reported by Filippatou and Livaniou (2005). These inconsistencies may be due to the heterogeneity of the SLI population – e.g., (1) grammatical SLI, (2) receptive language disorders, (3) speech output problems and (4) pragmatic language impairment (Bishop, 2004) and the different criteria used for determining the presence or absence of LD.

Achenbach Scales, LD and SLI Diagnosis

According to Achenbach (1997), the assessment must be sensitive to developmental processes. Within this context, the developmental psychopathology perspective conceptualizes childhood disorders within the context of child development, the interaction of the child with his or her environment, and the dynamic interplay of individual and system variables over time. Various risk and protective

factors interact to affect the current presentation and future course of mental health problems (Wingenfield, 2002). As Mash and Dozois (1996) point out, different pathways – e.g., brain dysfunction and environmental deprivation – can lead to outcomes such as learning and language difficulties; also, similar initial pathways (e.g. exposure to trauma) can also lead to learning disabilities and language disorders. Although some behaviors may be of concern to teachers and disruptive in the classroom, they may be reflective of typical development. Behaviors such as those reflecting externalizing or internalizing problems also concern different types of informants (e.g., teachers versus parents) and these considerations make the identification and diagnosis of learning, behavioral and emotional problems a complex process.

The major systems for classification of childhood disorders are categorical such as the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2000), the ICD-10 (WHO, 1992) and/or empirically based dimensional approaches. These latter approaches are based on information provided by questionnaires and rating scales. The Achenbach scales (CBCL, TRF, YSR) are the most widely used multidimensional, multisource measures of school and home behaviors related to psychological disorders of children and adolescents (Achenbach, 1999). According to these scales, behavioral and emotional problems can be divided in two broad dimensions and several narrow-band ones within each broad-band factor. More specifically, the broad-band externalizing dimension consists of disruptive behavior while the internalizing dimension is characterized by anxiety, depression and somatic concerns. The controversy on whether categorical, dimensional or integrated approaches provide the most valid assessments of children's mental health problems has been longstanding (Wingenfeld, 2002). For example, McGuire and his colleagues (2000) examined CBCL cross-informant syndromes such as Delinquent Behavior and Aggressive behavior in predicting diagnostic groups of disorders such as Disruptive Behavioral Disorders (F90 and F91) and Emotional Disturbances (F93, F32, F40, F41, F42, and F43) as described in ICD-10. The sample consisted of 120 children and adolescents aged 6–15 years who were referred to a psychiatric service of a university's clinic. The results revealed that the scores of the two cross informant syndromes were able to significantly separate Disruptive Behavioral Disorders from all other disorders.

As Youngstrom, Loeber, and Stouthamer-Loeber (2000) report, in the majority of studies several methodological issues have complicated the evaluation of cross-informants' agreement, especially regarding the identification of specific diagnostic categories. First, there has been relatively little guidance regarding the sources from which one is to gather specific diagnostic information, or to combine in the best way more than one source of clinical information (Meyer, 2001; Youngstrom, Findling & Calabrese, 2003). Second, when one attempts to synthesize categorical and continuous data – as commonly happens when using DSM and ICD-10 schemes, along with behavior checklists and rating scales – several inconsistencies may lead to confusions or even to erroneous diagnoses. As Wingenfeld (2002) points out, discrepancies between respondents may be due to differences in scale construction and validation. Scales vary (1) in content; (2) in the accuracy of describing the target behavior (e.g., inattentive, adsent-minded, or daydreaming); (3) in their scaling format; and (4) in their psychometric efficiency. Many of these measures have

been shown to have good convergent and construct validity but poor discriminant validity. In consequence, different disorders can lead to elevations of the same scale on a behavioral checklist (Youngstrom, Findling & Calabrese, 2003). Finally, response sets and response styles also affect ratings of behaviors (Rogers, 1997; Wingenfeld, 2002). For example, lack of motivation or compliance may produce a random response style, which may result in the underestimation or overestimation of the true problems.

As far as the CBCL's diagnostic accuracy is concerned, several studies have investigated whether clinically derived diagnostic groups can be differentiated using the above-mentioned tool (e.g., Bird, Gould, Rubio-Stipec, Staghezza & Canino,1993; Edelbrock & Costello, 1988; Jensen, Salzberg, Richters & Watanabe, 1993; Jensen et al., 1996; Kazdin & Heidish, 1984; Lahey et al., 2004; Roza et al., 2003). The CBCL has been widely used for assessing behavioral and emotional problems of students with LD and comorbid disorders; e.g., ADHD (Hudziak, Copeland, Stanger & Wadsworth, 2004; Chen, Faraone, Biederman & Tsuang, 1994; Ostrander, Weinfurt, Yarnold & August, 1998).

In addition, speech- and language-impaired children have been reported to be at special risk of psychiatric disorders. Furthermore, attention problems seem to be among the most common reported deficiencies regarding children with specific language impairment (SLI). Noterdaeme and Amorosa (1999) examined how the CBCL could be used as a screening instrument in language-impaired children. The sample consisted of 83 children who had had an expressive or receptive language disorder, not explained by hearing loss; gross neurological abnormalities; or mental retardation. In addition, DSM-IV diagnoses were established for all children. Sixty-six of the 83 children had a psychiatric diagnosis such as Attention Deficit Disorder (ADD), Attention Deficit Hyperactivity Disorder (ADHD), Conduct Disorder (CD), or an Emotional Disorder (EM). The use of the Total Behavior Problem score (TBP) showed that children with a psychiatric diagnosis had significantly higher scores on the TBP compared to children without a psychiatric diagnosis. In particular, 75.8% of children with a psychiatric diagnosis were correctly classified as clinically deviant, and 88.2% of children without a psychiatric diagnosis were classified as being within the normal range on this measure (the false classification rate was 21.6%). The CBCL correctly classified children with SLI and a diagnosis of ADHD or Conduct Disorder, but not so for children with ADD or Emotional Disorders (they failed to reach the proposed cut-off point on the TBP score).

From the above it is apparent that research investigating differences between students with LD and SLI on emotional psychopathology and cognitive variables is scarce. Furthermore, the ICD-10 manual suggests that "specific developmental disorders of speech and language (F80) –SLI- are often followed by associated problems, such as difficulties in reading and spelling, abnormalities in interpersonal relationships, and emotional and behavioral disorders" (ICD-10, p. 234). The above hypothesis is not posited for the group of students with specific developmental disorders of scholastic skills (F81) - LD. Additionally, students with LD and SLI do not provide a distinct cognitive profile based on the subtest scores of WISC-III. Thus, the testing of differences between students with an F80 diagnosis and those with an F81 diagnosis on emotional psychopathology and cognitive variables is war-

ranted. Specifically, the present study was designed to provide answers to the following hypotheses:

1. Are emotions and psychopathology significant discriminatory variables of speech and language-disordered groups versus those having specific learning disabilities?
2. Are cognitive variables important discriminators of speech and language-disordered groups versus those with specific learning disabilities?

Method

Participants

The sample consisted of 137 students – between 6 and 17 years of age, of whom 99 were boys and 41 were girls – and these students were referred to the Special Diagnostic, Research and Therapeutic Unit "Spyros Doxiadis" (SDRT Unit) for learning, behavioral and emotional problems. To avoid confounding effects of low cognitive ability, we excluded children/youths from the study if they had a full scale IQ score below 90. There were 44 students with a diagnosis of F80 and 93 students with a diagnosis of F81. The mean IQ was 105.193 and the mean age, 10.61 years.

The diagnostic procedure consisted of several multidisciplinary evaluations such as (1) semi-structured interview of parents conducted by a family therapist, (2) psychological evaluation which was administered by a clinical child psychologist, (3) educational assessment carried out by an educational psychologist, and (4) assessment of the child's language development carried out by a speech and language therapist. Each evaluation included the administration of appropriate tools and tests that provided information regarding children's cognitive and behavioural-emotional profile. More specifically, the Greek version of Wechsler Intelligence Scale (WISC-III); Thematic Apperception Test (Bellak & Bellak, 1991); and Sentence Completion Test (Goldberg, 1965) were administered in the context of psychological assessment. Furthermore, speech and/or language problems of children were identified based on Greek language battery tests that assess reading, writing, and comprehension. In order to acquire additional information regarding children's emotional profile and social skills parents and teachers completed the Achenbach's checklists that were adapted and standardized in the Greek population in 1999 (Roussos, Karandanos, Hartman, Karajiannis, Kyprianos, Lazaratou, Mahaira, Tassi & Zoubou, 1999). The final diagnoses of the participants were reached by the multidisciplinary team consensus after reviewing the collected data, in the context of implementing the most appropriate therapeutic programs for the children. The present study focuses on the data collected by the Wechsler Intelligence Scale (WISC-III) and the Child Behavior Checklist (CBCL).

Instruments

Wechsler Intelligence Scale (WISC-III). The WISC-III comprises of 13 subtests, 6 in the Verbal scale and 7 in the Performance scale. Five subtests in each scale are designated as standard subtests. In the Verbal Scale they are Information, Similarities, Arithmetic, Vocabulary, and Comprehension. In the Performance Scale they are Picture Completion, Coding, Picture Arrangement, Block Design, and

Object Assembly. The remaining three subtests – Digit Span in the Verbal Scale and Symbol Search and Mazes in the Performance Scale – are supplementary. The child's performance on the various subtests yields three composite scores: Verbal IQ score, Performance IQ score, and Full IQ score (Sattler, 1992). In the present study, children were psychologically assessed with the Greek version of WISC-III (Georgas, Paraskevopoulos, Besevegis & Giannitsas, 1997). The only subtest that was excluded was Mazes.

Child behavior checklist (CBCL). One parent, mainly mothers, rated their children's behavior. Parents rate each behavior or symptom on a three point scale: not true (0); somewhat or sometimes true (1); or very true or often true (2). The 113 items have yielded eight empirically validated syndromes including Withdrawn, Somatic Complaints, Anxious/Depressed, Social Problems, Thought Problems, Attention Problems, Delinquent Behavior, and Aggressive Behavior. The internalizing scale sums 32 items loading onto three clinical syndrome scales: Withdrawn/Depressed, (8 items); Social Complaints, (11 items); and Anxious/Depressed, (13 items). The externalizing scale sums up 35 items from two clinical syndrome scales: Delinquent Behavior, (17 items) and Aggressive Behavior, (18 items). The CBCL also contains items about activities, social relationships, academic performance, chores, and hobbies. These are summarized in three competence scales: Activities, Social, and School scales. The Greek version of CBCL was normed on 4,994 children and youths. Normative data are used to convert raw scores to T scores (mean = 50; SD = 10) for the Total, Internalizing, Externalizing; and for the eight narrow-band scores. Separate norms are provided for boys and girls. Test-retest mean stability coefficient is .90 for the113 items and the alpha ranged from .78 to .97 (Achenbach & Rerscola, 2003). Alphas ranged between .772 and .914.

Data Analyses

Differences between groups at the mean level. They were evaluated using a series of independent samples t-test.

Prediction of group membership from individual predictors. Receiver operating characteristic curves were generated to evaluate the contribution of each individual predictor to accurately classify students as having reading comprehension difficulties (e.g., Hanley & McNeil, 1982; Hsu, 2002).

Power analysis. Statistical power was evaluated as suggested earlier in order to ensure the stability of the effects (Cohen, 1992; Onwuegbuzie, Levin & Leach, 2003). For the t-test, power was 1.00, given a medium effect (i.e., .50 of an SD) for a two-tailed test at the .05 level. For the ROC curves, power was estimated to be 1.0 for an alternative hypothesis: An AUC of .700 is significantly different from chance (i.e., .500). The .700 level was selected because it represents non-chance classification and is based on expert recommendations (Grilo et al., 2004; Hsu, 2002).

Results

Between Groups Differences at the Mean Level

When examining differences between groups (F80 vs. F81) on all the CBCL variables, no significant effect was observed. Thus, despite the empirical base and the mention of psychopathology in the definition of the F80 group, no such differences

were evidenced between groups. With regard to cognition (for which there was no expectation for the presence of differences), several effects exceeded conventional levels of significance (see Figure 1). Specifically, there were significant differences favoring the F81 group on full-scale IQ based on the WISC [$t(135) = 4.829$, $p < .001$], the verbal component of the WISC [$t(135) = 6.938$, $p < .001$], information [$t(135) = 5.398$, $p < .001$], similarities [$t(135) = 4.050$, $p < .001$], arithmetic [$t(135) = 3.728$, $p < .001$], vocabulary [$t(135) = 5.731$, $p < .001$], comprehension [$t(135) = 5.076$, $p < .001$], and digit span [$t(135) = 2.598$, $p < .01$]. These empirical findings are certainly against predictions as the two groups were not hypothesized to differ in all these factors.

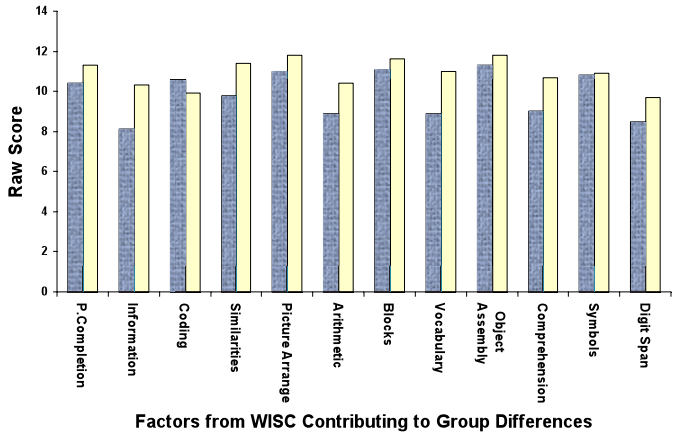
Table 1

Outcomes From a ROC Analysis Expressed in Probability Form

	True State of Affairs Regarding an F81 Diagnosis	
Variable's Findings	Present	Absent
Present	*a* (true positives - TPF)	*b* (false positives - FPF)
Absent	*c* (false negatives - FNF)	*d* (true negatives - TNF)

Note. The subscripts *a, b, c,* and *d* represent the probability of a person *i* with specific characteristics belonging to a specific cell. The available combinations are as follows: (a) presence of F81 status and correct identification by variable, (b) absence of F81 status and false classification as having an F81 diagnosis, (c) presence of F81 status and inability of variable to correctly classify students, and (d) absence of F81 status and agreement and ability of variable to produce correct classification. Sensitivity = (true-positive rate) = $a/(a + c)$; specificity *(= true-negative rate)* = $d/(b + d)$; positive predictive power = $a/(a + b)$; negative predictive power = $d/(c + d)$.

Figure 1. Between-groups differences on cognitive variables. A (*) indicates significance between groups differences. No significant effect was observed with regard to the psychopathology variables.



Discriminant Validity of Individual Predictors

Several Receiver Operating Characteristic Curves (Hanley & McNeil, 1982, 1983) were implemented in order to determine the predictive validity of individual cognitive variables towards predicting group membership (F80 vs. F81). The psychopathology variables were excluded from this analysis, given that their linear combination was not associated with significant variability in group membership. Thus, it was not deemed important to further test the psychopathology variables. Results, with regard to the cognitive variables, indicated several significant effects, highlighting the importance of individual predictors (see Table 2). Specifically, nine of the WISC variables were significant discriminators of group formation. These were full IQ, verbal IQ, information, similarities, picture arrangement, arithmetic, vocabulary, comprehension, and digit span. Each one was associated with a significant pattern of correct classification as shown in Table 2. For example the verbal component of the WISC and comprehension were associated with high correct classifications for both the F81 and the F80 group, favoring the former. This finding demonstrated the salience of these two variables regarding correct group classification. High classification rates for the F81 group only (sensitivity index) were observed with regard to information, similarities, picture arrangement, comprehension, and digit span, among significant variables. With regard to the correct classification of the F80 group members, significant predictors were the full scale IQ, and arithmetic (specificity index).

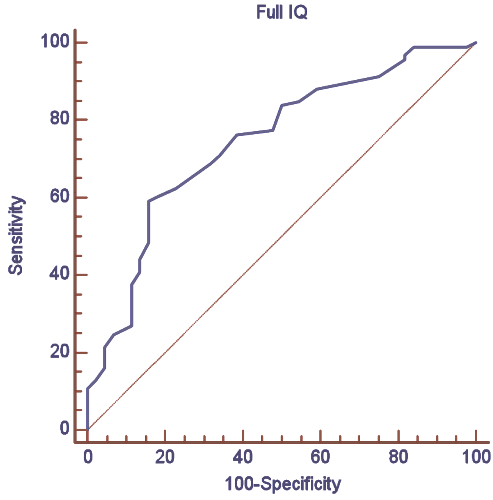
Table 2

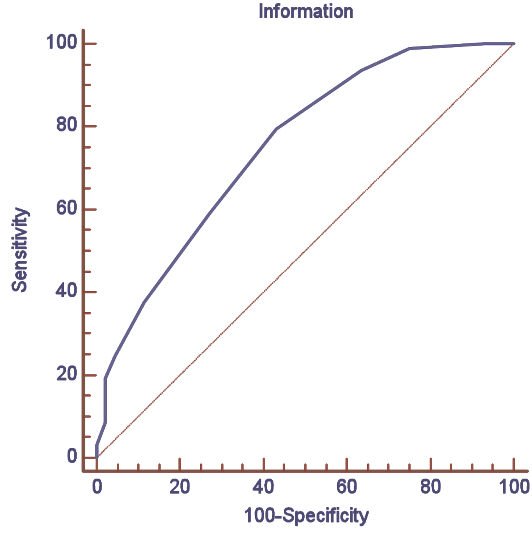
Areas Under the Curve (AUC), and Accuracy Indices for Cognitive Variables

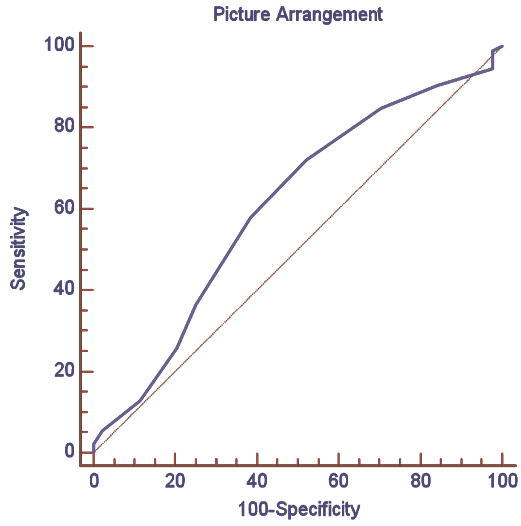
Variables	AUC	Std. Error	Significance	Sens. [t]	Spec. [t]	PLR[t]	NLR[t]
Full Scale IQ (WISC)	**.745**	.042	.000**	.591	.841	3.72	.490
Verbal	**.822**	.035	.000**	.860	.636	2.37	.220
Practical	.564	.052	.214	.699	.432	1.23	.700
Picture Completion	.578	.051	.129	.914	.250	1.22	.340
Information	**.750**	.042	.001**	.796	.568	1.84	.360
Coding	.561	.033	.249	.333	.841	2.10	.790
Similarities	**.706**	.045	.001**	.817	.500	1.63	.370
Picture Arrangement	**.605**	.050	.030*	.720	.477	1.38	.590
Arithmetic	**.693**	.046	.000**	.398	.864	2.92	.700
Block	.561	.052	.237	.516	.614	1.34	.790
Variables	AUC	Std. Error	Significance	Sens. [t]	Spec. [t]	PLR[t]	NLR[t]
Vocabulary	**.778**	.039	.000**	.785	.659	2.30	.330
Object Assembly	.557	.052	.272	.807	.341	1.22	.570
Comprehension	**.747**	.042	.000**	.936	.455	1.72	.140
Symbols	.535	.064	.587	.354	.793	1.71	.810
Digit Span	**.615**	.051	.024*	.899	.261	1.22	.390

Note. *$p < .05$ ** $p < .001$. [t]sens. = sensitivity, spec. = specificity, PLR = positive likelihood ratio, NLR = negative likelihood ratio. Significant (at $p < .05$) and substantial (above .700) areas under the curve are shown in bold.

Figure 2. ROC curves indicating significant predictions for group membership or the fact that a specific variable significantly discriminates the two student groups (F80 vs. F81).






Picture Arrangement
Sensitivity
100
80
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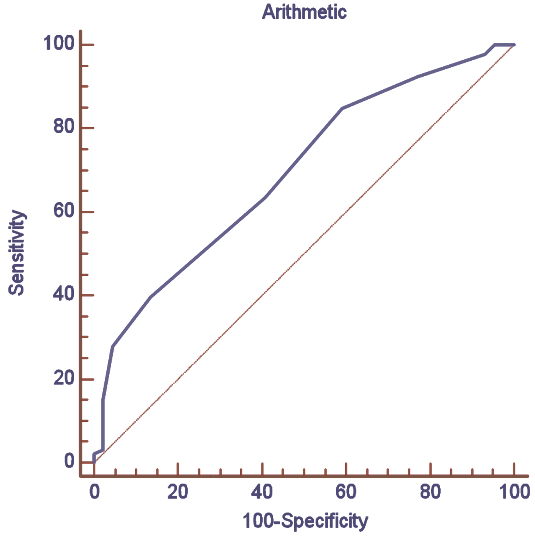
80
100
100-Specificity


Arithmetic
Sensitivity
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60
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40
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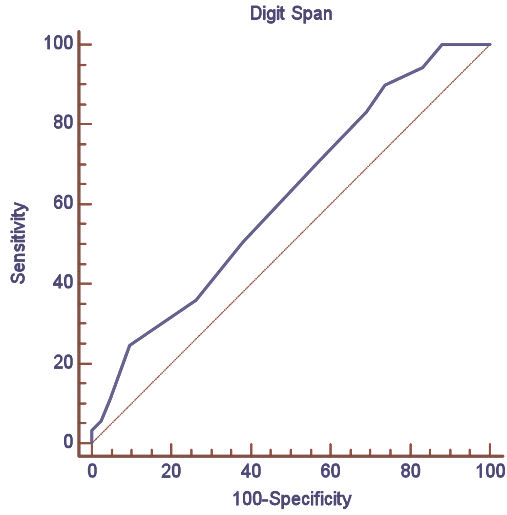
100-Specificity


Digit Span
Sensitivity
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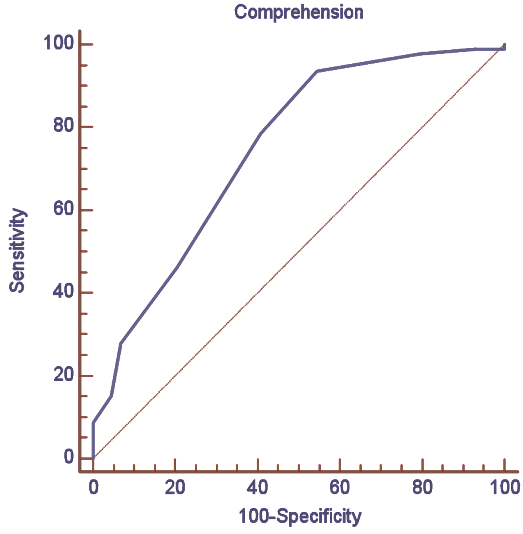
Comprehension
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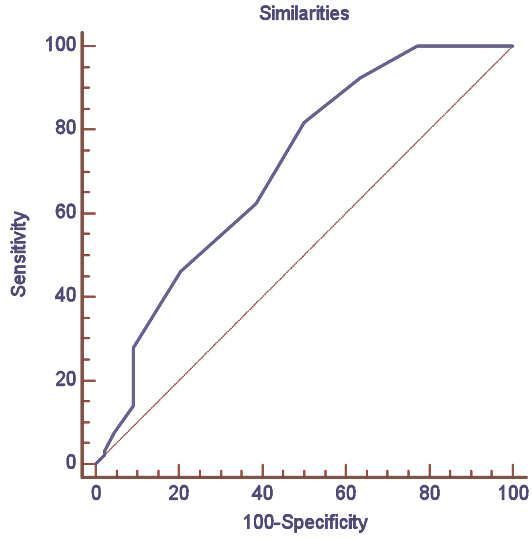
100
100-Specificity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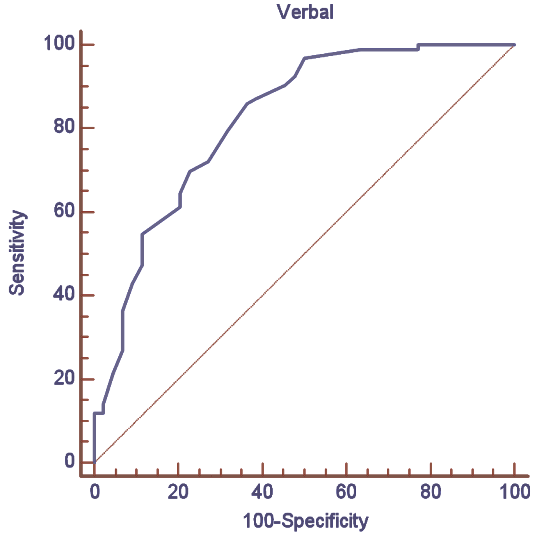
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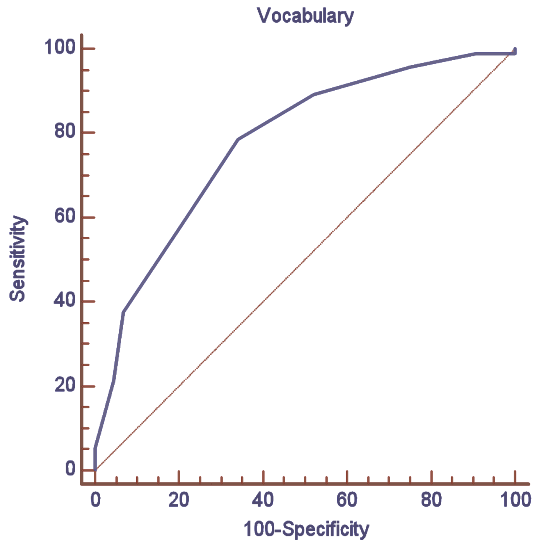

Discussion

The purpose of the present study was to examine the "emotionality hypothesis," which claims that students with learning problems possess salient emotional deficits that significantly depict the disorder. More specifically, the present study attempted to test whether (1) emotions and psychopathology are significant discriminatory variables of speech- and language-disordered groups versus those having specific learning disabilities and (2) cognitive variables are also important discriminators regarding SLI and LD groups of students.

The first important finding was that students with LD and SLI did not differ significantly on emotion and psychopathology variables according to the perceptions of their parents as they rated with CBCL scale. In many studies, it has been found that parents give more emphasis on academic outcomes compared to emotional outcomes regarding students with speech, language, and learning disorders (Noterdaeme & Amorosa, 1999; Filippatou, Livaniou, Dimitropoulou, 2007; Tsiantis et al., 1982). Furthermore, based on the above literature review, these behavioral rating scales have been shown to have good convergent and construct validity but poor discriminant validity. Thus, learning disabilities and specific language disorders could probably lead to elevations of the same scale on a behavioral checklist, such as the CBCL (Youngstrom, Findling & Calabrese, 2003). For this reason, the CBCL could be a supplementary tool in the diagnostic procedure in conjunction with other

assessments such as clinical observations and teacher rating scales (e.g., TRF scale). This seems to be necessary in order to validate behavior ratings and to reveal more subtle aspects of SLI children's socialization attempts that are overlooked by rating forms, so as to avoid an erroneous diagnosis (McCabe, 2005; Youngstrom, Loeber & Stouthamer-Loeber, 2000).

On the other hand, empirical research has indicated a diverse set of psychosocial variables, including behavioral problems, academic motivation, social preference, and self-concept regarding children with learning disabilities (Gadeyne, Ghesquiére & Onghena, 2004). Furthermore, research on SLI children has shown similar findings regarding the existence of social, emotional, and behavioral difficulties across both internalizing and externalizing dimensions (McCabe, 2005). These difficulties, based on the subtype of language impairment (McCabe, 2005), are varied and complicated. Taking into consideration the heterogeneity of the LD population and the difficulties with spoken language (receptive and expressive) included in the IDEA definition of learning disability, we conclude that it is probable that children with both LD and SLI exhibit similar psycho-emotional profiles.

Significant differences were found between the two groups regarding cognition (WISC-III). Specifically, they were significant differences on full scale IQ, verbal IQ, information, similarities, arithmetic, vocabulary, comprehension, and digit span. Based on relevant research, children with specific language impairments suffer from a more general deficit that is not restricted to the impairment of speech and language (Stone & Connell 1993). In particular, many researchers have suggested that children with SLI exhibit a representational deficit, affecting the processing of symbolic information regardless of type of stimulus presentation (auditory or visually) (Morehead & Ingram, 1976; Connell & Stone 1992), or have limitations in their processing capacity (Johnston, 1994). Moreover, Ottem (2002) has suggested that the Wechsler scales, both verbal and non verbal, include structurally complex (e.g., digit span and coding), of moderate difficulty (e.g. arithmetic, picture arrangement, object assembly) or simple tests (e.g., information, similarities, vocabulary, comprehension and picture completion). This procedure takes time and demands cognitive effort, thus, children with SLI who have constraints on information processing score low on these subscales. Furthermore, Filippatou and Livaniou (2005) have found that children with language disorders had statistically significant lower mean performance scores on the WISC III verbal subscales (information, vocabulary, arithmetic, comprehension, digit span, similarities) compared to children with LD.

In addition, the literature has suggested that children with SLI have socio-emotional and behavioral difficulties along with language impairments (Benner, Nelson, & Epstein, 2002; McCabe, 2005; McCabe & Meller, 2004; Redmond &Rice, 1998). In the present study, there were no differences in psychopathology between SLI and LD students. This finding does not suggest, though, the absence of socio-emotional and behavioral difficulties on both groups. Thus, it is important that intervention practices are developed to support both educational and socio-emotional outcomes.

It must be emphasized that the present findings are correlational and have come from modest sized samples. Thus, caution should be exercised in generalizing them to the populations of interest. Nevertheless, the findings appeared robust, as

they were of large effect size (in most cases) pointing to the likely existence of these effects in the population.

Future studies could test the predictive ability of emotion and psychopathology predictors with other variables besides achievement. Furthermore, research efforts could focus on the examination of the academic social and emotional profiles of the language-impaired subtypes such as receptive, expressive, and pragmatic impairments. Also, experimental studies would enrich our understanding of the complex relationship between emotions/psychopathology and achievement in disadvantaged populations.

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