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Implementation of Response to Intervention (RtI) Model in Spain: An example of a collaboration between Canarian universities and the department of education of the Canary Islands

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The purpose of this study was to examine the effectiveness of second tier intervention at-risk readers within the context of a Response to Intervention approach. The study was conducted in the Canary Islands (Spain), directed by research team ¨Dificultades de Aprendizaje, Psicolingüística y Nuevas Tecnologías¨ (DEA&NT) from University of La Laguna, and supported by the Government of the Canary Islands. A sample of 1.123 Spanish children from fourteen schools districts were given the Spanish adaptation of The Hong Kong Specific Learning Difficulties Behavior Checklist and children who scored at or above the 75th percentile on the test were classified as «at risk» for early reading difficulties. Half of the students were randomly assigned to a project-based intervention condition where they received small group supplementary intervention for 30 minutes daily using the Prevención de las Dificultades Específicas de Aprendizaje (PREDEA) curriculum from mid to late December and continued until mid June. The other half received whatever remedial services were available at their schools. Results indicated that children who received the PREDEA curriculum had higher scores on the Early Grade Reading Assessment Test (EGRA) on initial sound identification, listening comprehension, letter sound knowledge and oral reading fluency compared to the control group.

Implementación del Modelo de Respuesta a la Intervención (RtI) en España: un ejemplo de colaboración entre las Universidades Canarias y la Consejería de Educación del Gobierno de Canarias. El objetivo de este estudio consistió en examinar la eficacia del segundo nivel de actuación del modelo de respuesta a la intervención. El estudio se llevó a cabo en las Islas Canarias (España), dirigido por el equipo de investigación «Dificultades de Aprendizaje, Psicolingüística y Nuevas Tecnologías» (DEA&NT) de la Universidad de La Laguna, y apoyado por la Dirección General de Ordenación e Innovación Educativa de la Consejería de Educación del Gobierno de Canarias. Se administró inicialmente a una muestra de 1.123 niños españoles procedentes de un total de catorce colegios, la adaptación española del *The Hong Kong Specific Learning Difficulties Behavior Checklist*. Los niños que puntuaban igual o superior al percentil 75 en esta prueba de selección eran considerados niños en riesgo de padecer dificultades específicas de aprendizaje. La mitad de los niños se asignó al azar a una condición experimental donde recibieron una intervención en pequeño grupo con una duración diaria de 30 minutos a través del programa *Prevención de las Dificultades Específicas de Aprendizaje* (PREDEA). Esta intervención se inició a mediados del mes de diciembre y finalizó a mediados del mes de junio. La otra mitad recibía los servicios habituales de apoyo que tiene disponible la escuela. Los resultados mostraron que los niños que recibieron el programa curricular PREDEA alcanzaron puntuaciones superiores al grupo control en habilidades que mide el *Early Grade Reading Assessment Test* (EGRA), tales como la identificación del primer segmento fonológico en palabras, comprensión oral, conocimiento del sonido de las letras y fluidez en lectura oral de palabras en textos cortos.

The roots of the concept of Responsiveness to Intervention or RtI are attempts to find the best way to educate children who might be at risk for reading disabilities, by adjusting pedagogical strategies based on student response patterns (Grigorenko, 2009). Until recently, in the United States, the traditional way to identify students with Specific Learning Disabilities (SLD) was through the discrepancy model where student IQs were compared to their level of achievement (Kavale, 2002). However, educators and researchers alike have questioned this model as a means to define and identify students with SLD (Johnson, Mellard, & Byrd, 2005).

Most research on the validity of the IQ-achievement discrepancy model as a way to define learning disabilities (LD) has focused on differences in cognitive profiles within poor readers. The review of the literature shows that there are cognitive differences between dyslexics and poor readers outside of the word recognition module

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because these children differ in intelligence, but there is no indication that the nature of processing within the word recognition module differs at all for poor readers with and without IQ-discrepancy. In fact, many studies demonstrated that there is no evidence that dyslexics and poor readers were different in reading, mathematics or spelling skills or in other basic cognitive processes (v.g., Jiménez & García, 1999; Jiménez & Rodrigo, 1994; Jiménez, Siegel, O'Shanahan, & Ford, 2009; Rodrigo & Jiménez, 2000; Share, McGee, & Silva, 1989; Siegel, 1988, 1989, 1990, 1992; Stanovich, 1989).

Nevertheless, little attention has been paid to study whether poor readers with high IQ's are somehow more remediable than poor readers with low IQ's. Stanovich (1994) suggested that: «indirect validation of the idea of differentiating poor readers on the basis of IQ-discrepancies would derive from data showing that high- and low-IQ poor readers are differentially sensitive to specific educational interventions» (p. 22). Studies have also provided strong evidence that IQ has not predictive value over treatment outcomes (Hurford et al., 1994; Share et al., 1989). Share et al., (1989) used a similar way to the IQ stratification procedure used by Siegel (1988), to compare different IQ groups on rate of growth in reading, but they did not find consistent differences among the various groups in rate of growth in reading. Hurford et al., (1994) trained children at risk for reading disabilities and children at risk for becoming «garden-variety» poor readers. They found that both trained groups benefited from the training, therefore they concluded that it is possible to identify children at risk for reading difficulties and to significantly improve their phonological-processing and reading abilities independently of their IQs. Later, Vellutino, Scanlon and Lyon (2000) designed a study to evaluate the utility of using early and intensive intervention to help diagnose specific reading disability. They studied children who were initially selected from a large sample of kindergarteners. In the middle of their first-grade year, subsamples of impaired readers and normal reading controls were selected from the population of children who were not lost through attrition. To assess growth in reading over time word subtests were given to children in the poor and normal reader groups at least annually through the fourth grade. Findings indicated that no appreciable differences were found among the various groups on any of the IQ measures. IQ did not differentially predict response to remedial intervention because IQ scores did not differentiate between poor readers who were found to be readily remediated and poor readers who were difficult to remediate. In other words, the use of a discrepancy model alone provides limited information to educators on how they can support students who are at risk for learning disabilities (Semrud-Clikeman, 2005).

However, core components of RtI include high-quality classroom instruction, universal screening, continuous progress monitoring, research-based interventions, and fidelity of instructional interventions (Bradley, Danielson, & Doolittle, 2005; NRCLD, 2007). The concept of RtI is closely related to Reading First, a United States federally funded initiative designed to ensure that all kids are reading at grade level by the end of third grade, and to the reauthorization of the Individuals with Disabilities Education Improvement Act (IDEIA) (2004), which introduced RtI as possible alternative to the intelligence-achievement discrepancy for identifying SLD. RtI models may be implemented in various ways (Fuchs & Fuchs, 2006) and although they might differ in the number of levels of support schools provide, the overall framework of the model remains the same. The first tier is considered quality instruction and ongoing progress monitoring within the general education classroom. The second tier is small-group tutoring for students (perhaps 3-6) whose performance and rate of progress continues to lag behind their peers (i.e., students who have not made adequate progress in the core program, as assessed using progress monitoring measures such as the Dynamic Indicator of Basic Early Literacy Skills, or DIBELS). When students do not adequately respond to the second tier of intervention, the third tier provides intensive individualized interventions, usually in a special education setting after the process to determine special education eligibility has been completed (Fuchs, Mock, Morgan, & Young, 2003).

Nowadays, many states in the United States are becoming more sophisticated in their development and implementation of RtI models. Berkeley, Bender, Gregg, and Saunders (2009) designed a review study with the purpose of exploring how states are progressing with the implementation of RtI approximately 1 year after federal legislative guidelines were finalized. They concluded that most states are in some phase of RtI development, although approaches vary widely throughout the country.

In Spain, the special educational needs or LD, as in some other European countries such as the United Kingdom (McLaughlin et al., 2006), are identified when a pupil does not learn in the ordinary classroom setting and the teacher observes a difference between that pupil and the rest of the class's attainment regarding learning in subjects like reading, writing, and arithmetic that should have been achieved according to age or grade (see for a review Jiménez & Hernández-Valle, 1999). Therefore, there has not been tradition in this country in the use of IQ-achievement for identifying students with SDL. Recently, however, the last publication of *Ley Orgánica* 2/2006, May 3, of Education (LOE) uses the term, Specific Learning Disabilities, in the chapter on students with specific needs of educational support. In spite of this, there is no clear definition about what LD is or how children are identified with LD. Nevertheless, some Autonomous Communities in Spain like the Canary Islands region are regulating SLD identification that adds RtI as an option to use in the eligibility process. Indeed, the Dirección General de Ordenación e Innovación Educativa (DGOIE) is currently conducting and implementing an adapted form of the RtI model in several schools. Professional development and training modules are being developed by universities in the area (e.g., the DEA&NT research team from Department of Developmental and Educational Psychology at the University of La Laguna) in conjunction with the Department of Education of the Canary Government.

The present study was designed to assess the effectiveness of a tier 2 intervention in an RtI approach in kindergarten to second grade. We hypothesized that an RtI approach would be an effective and valid way to improve cognitive and reading skills in children who may be at-risk for long-term reading difficulties. To our knowledge, the Canary Islands is the first region in Spain to implement an RtI model. This initiative has been supported by the Government of the Canary Islands working jointly with the research team from the ULL. The pilot data collected in this study would be used to formalize a plan, supported by the Canary Islands Department of Education, to develop an RtI model for all schools in the Canary Islands.

Method

Participants

A sample of 1.123 Spanish children from fourteen schools districts participated in the study. Children came from urban zones

and from average socio-economic backgrounds, and their age range was between 5 years and 8 years 1 month (M= 77.6; SD= 11.3). Children who had sensory deficits, acquired neurological deficits, or other problems traditionally used as exclusionary criteria for LD were excluded from the study. All students were given the Spanish adaptation of The Hong Kong Specific Learning Difficulties Behavior Checklist at the beginning of the year (Ho, et al., 2002). Children who scored at or above the 75th percentile on the test were classified as «at risk» for early reading difficulties (N= 241). Half of these children (N= 121, age M= 75.9; SD= 11.1; 39 (23 male, 16 female) kindergartens, age M= 63.5; SD= 3.68; 46 first graders (23 male, 23 female), age M= 76.3; SD= 3.32; and 36 second graders (19 male, 17 female), age M= 89.6; SD= 6.24) were randomly assigned to a project-based intervention condition were they received supplementary intervention through the PREDEA curriculum in small groups from mid to late December and continued until mid June. The other half (N= 120; age M= 76.7; SD= 12.0; 39 kindergartens (26 male, 13 female, age M= 63.3; SD= 3.34; 43 first graders (26 male, 17 female), age M= 76.4; SD= 3.31; and 38 second graders (23 male, 15 female), age M= 90.9; SD= 6.48) received whatever remedial services were available at their schools. There were no significant differences in the distribution of participants as a function of gender χ^2 (1)= 2.09, p= .14, or age, F (1,237)= .27, p= .59.

Measures

The Hong Kong Specific Learning Difficulties Behavior Checklist (Ho, Chan, Tsang, & Lee, 2002). This checklist was developed with the input from experienced teachers, curriculum specialists and health professionals working with primary school age children with disabilities in the city of Hong Kong. The 97-item instrument is consistent with other school readiness measures, which include cognitive skills, language and literacy skills, quantitative skills, social competence and self-control. The checklist was designed for the purpose of early identification of students in need of extra support in the local context, based on the local Hong Kong curriculum. With the permission of authors from the Hong Kong Research Team we made a Spanish adaptation based on the local Canary Islands curriculum for the purpose of early identification of at-risk readers rather than a tool for tracking student progress and competence. We developed a 33-item checklist for kindergarten, a 51-item checklist for first graders, and a 65-item checklist for second graders.

Early Grade Reading Assessment Test EGRA (Gove, 2008). The development of EGRA began in October 2006, when United States Agency for International Development (USAID), through its EdData II proyect, contracted Research Triangle Institute (RTI) International to develop an instrument for assessing early grade reading. The objective was to help USAID partner countries begin the process of measuring, in a systematic way, how well children in the early grades of primary school are acquiring reading skills, and ultimately to spur more effective efforts to improve performance in this core learning skill. With the permission of RTI we made a Spanish adaptation (see more information about Spanish version in www.eddataglobal.org). This test includes the following subtests: (1) Letter name knowledge, (2) Letter sound knowledge; (3) Phonemic awareness, (4) Familiar word reading, (5) Unfamiliar nonword reading, (6) Passage oral reading and comprehension, (7) Listening comprehension, and (8) Dictation.

Letter name knowledge. In this test the complete alphabet (both upper- and lowercase) is presented and students are asked to provide the names (not the sounds) of all of the letters they can, within a one-minute period. The full set of letters of the alphabet is listed in random order, 10 letters to a row, using a clear, large, and familiar font in horizontal rows with each letter presented multiple times. The instructions were: «Here is a page full of letter of the alphabet. Please tell me the names of as many letters as you can—not the sounds of the letters, but the names.» After 60 seconds the examiner stops the task and he or she marks the final letter read with a bracket. The child's score for this subtest is calculated as the number of correct letters per minute. A test-retest reliability was used and the correlation was .78.

Letter sound knowledge. In this test the complete alphabet (both upper- and lowercase) is presented and students are asked to provide the sounds of all of the letters that they can, within a one-minute period. The full set of letters of the alphabet is listed in random order, 10 letters to a row, using a clear, large, and familiar font in horizontal rows with each letter presented multiple times. The instructions were: «Here is a page full of letter of the alphabet. Please tell me the sounds of as many letters as you can—not the names of the letters, but the sounds. After 60 seconds the examiner stops the task and he or she marks the final letter read with a bracket. The child's score for this subtest is calculated as the number of correct letters per minute. A test-retest reliability was used and the correlation was .60.

Phonemic awareness tests

For the *Isolation task* the examiner reads aloud a list of 10 simple, one-syllable and disyllabic words, one at a time. Students are asked to identify and sound out the first sound present in the word (as this is an auditory assessment there is no student handout, only an examiner coded sheet). The instructions were: «This is a listening exercise. You know that each letter has a sound. For example, the letter M can be sounded /mmm/. I will say a word two times. Listen to the word (e.g., mama (mum), and then tell me the first sound in that word (/m/). The examiner records the number of correct phonemes. This task had 2 examples and 10 items.

In the *Initial Sound Identification*, the children had to identify words that begun with the same sound. We used 10 sets of simple words and asked students to identify which of the three words began with a different sound than the other two words. The instructions were: «I am going to say three words two times. One of the words begins with a different sound than the other two. You tell me which word begins with a different sound». The examiner recorded the number of correct answers. This task had 2 examples and 10 items. A reliability analysis was used and the alpha coefficient was calculated for each task. In the *Isolation task* it was .91 and in the *Initial Sound Identification* it was .78.

Familiar word reading. A list of high-frequency words was selected on the basis of ratings generated from a normative study conducted by Guzmán and Jiménez (2001). The full set of familiar words is listed in random order, 5 words to a row, using a clear, large, and familiar font in horizontal rows with each word presented one time. The instructions were: «Here are some words. I would like you to read me as many words as you can (do not spell the words, but read them). For example, this word is: «luna». Let's practice: please read this word [point to the next word «boca»]. The examiner recorded the number of correct words per minute. A test-retest reliability was used and the correlation was .80.

Unfamiliar nonword reading. This subtest includes a list of 50 two-syllable nonwords, five per row, with the following patterns of letters (C= consonant, V= vowel): CV, VC, CCV, CVC. The instructions were: «Here are some made-up words. I would like you to read as many as you can. Do not spell the words, but read them. For example, this made-up word is «ut». Let's practice: please read this word [point to the next word «tijo»]. The child's score was calculated as the number of correct nonwords per minute. A test-retest reliability was used and the correlation was .80.

Passage oral reading and comprehension. The instructions were: «Here is a short story. I want you to read it aloud. When you have finished, I will ask you some questions about what you have read. Do you understand what you have to do? When I say «begin», read the story as best as you can. I will keep quiet and listen to you, unless you need help. Ready? Begin. The examiner recorded the number of correct words per minute. After 60 seconds the examiner says «Stop» and he or she marks the final word read with a bracket. This task had 2 examples and 5 items. A test-retest reliability was used for passage oral reading and the correlation was .77. For reading comprehension task a reliability analysis was used and the alpha coefficient was .94

Listening comprehension. This subtest involves a passage that was read aloud by the examiner; students then responded to oral comprehension questions or statements. The passage is 51 words long and it narrates an activity or event that is familiar to local children. Choice and inference questions are included. The instructions are: «I am going to read you a short story aloud once and then ask you some questions. Please listen carefully and answer the questions as best as you can. Do you understand what you have to do? Student scores were based on the number of statements they answered correctly. This task had 2 examples and 10 questions items. A test-retest reliability was used and the correlation was .66.

Dictation. The dictation sentence included 14 words in length and contained at least two difficult or «irregular» words. The instructions were: «I am going to read you a short sentence. Please listen carefully. I will read the whole sentence once. Then I will read it in parts so you can write what you hear. I will then read it again so that you can check your work. Do you understand what you have to do? Students were scored on a simple scale that captured accuracy for vowel and consonant sounds, spelling, spacing and direction of text, capitalization, and punctuation. Each category had a total of 3 possible points for total accuracy, 2 for accuracy, 1 for some accuracy, and 0 for no accuracy. During the analysis, these variables were added up for a single score variable. A test-retest reliability was used and the correlation was .73.

Intervention

A sample of 1.123 Spanish children from fourteen schools districts were given the Spanish adaptation of The Hong Kong Specific Learning Difficulties Behavior Checklist (for kindergarten and primary school pupils) (Hong Kong, Hong Kong, Specific Learning Difficulties Research Team) (Ho et al., 2002). All children were screened to determine initial risk status for reading difficulties. Children who scored at or above the 75th percentile on the test were classified as «at risk» for early reading difficulties. We decided to use this initial screening for risk status because it address the multifaceted nature of specific learning disabilities caused by deficits in basic processes such as memory, attention, and perceptual motor functions that may be differentially manifested in areas other than reading. Children identified as risk-readers were randomly assigned to one of two conditions (i.e, experimental vs. control group). The at-risk children assigned to the experimental group received a small group supplementary intervention 5 days a week (30 min per day) by trained teachers in a room outside their classrooms. Each group consisted of 4 or 6 children. The PREDEA intervention program was a modified and adapted to Spanish of Canary Islands version of the materials developed by the Institute for Reading Research – Teacher Education for Spanish speaking readers who are learning English as a second language (Mathes, Linan-Thompson, Pollard-Duradola, Hagan, & Vaughn, 2003). This adaptation was made by the DEA&NT research team from the University of La Laguna. All illustrations and tales are original and they were specifically developed for the PREDEA instructional program. The program focused on the five core components of beginning reading identified by the National Reading Panel (NRP) (NICHD, 2000) (phonemic awareness, vocabulary, word identification, fluency, and reading comprehension and oral comprehension) (see for a review about implications of NRP for instruction in the Spanish language, Jiménez & O'Shanahan, 2009).

Periodic assessments of literacy and related skills were administered to both, monitor progress and evaluate the effects of the intervention. This strategy rely on continuous monitoring of student progress as the basis for determining eligibility for a given tier of remedial intervention rather than psychometric procedures grounded in the IQ-achievement discrepancy. Group supervisory meetings were held approximately every fifteen days between teachers and project staff by videoconference because teachers were working in different islands. The PREDEA instructional program began in mid to late December and continued until mid June. All available at-risk children were pre- and post-tested by the Early Grade Reading Assessment Test EGRA (Gove, 2008) on letter name knowledge, letter sound knowledge, phonemic awareness, familiar word reading, unfamiliar nonword reading, passage oral reading and comprehension, listening comprehension, and dictation. In addition, we used progress monitoring measures such as alphabetic knowledge (i.e., letter knowledge name, letter knowledge sound, capital letter spelling, and lower-case letter spelling), isolation and phoneme segmentation, vocabulary, and fluency. The program included reading strategies and instructional activities to encourage students to learn these strategies. The activities and exercises are grouped into five different modules: a) phonological awareness where children have to manipulate the phonemes. For example, children listen attentively to a verse and they are asked to distinguish those words that begin with a certain phoneme, or they are asked to raise or to lower the thumb, according to whether the word said by the teacher begins with a certain phoneme or not; b) alphabetical knowledge: trying to guarantee the relation between phoneme – grapheme it is asked the child to write the letters that the teacher is saying and that simultaneously he or she pronounces while they write it. Also alphabetical cards are used as didactic materials; c) vocabulary: knowing that the acquisition of vocabulary contributes to develop a good level of fluency and comprehension, activities to promote the learning of new vocabulary are included for each lesson; d) oral and reading comprehension: by means of the reading of small texts at first to that the number of words is increasing progressively. Children were asked, for example, to do a scheme and explain orally following this scheme what they have understood of the well-read passage;

and e) fluency: one works this dimension almost transversely along almost all the components, though also there is specific training to promote reading speed with multisyllabic words.

Results

Progress monitoring and outcome measures

To assess the efficacy of the intervention program alphabetic knowledge (i.e., letter knowledge name, letter knowledge sound, capital letter spelling, and lower-case letter spelling), isolation and phoneme segmentation, vocabulary, and fluency measures were re-administered in February, March, April, and May. Table 1 contains means and standard deviations for each measure in the different assessment periods.

The results show that progress monitoring measures were significantly different across assessment periods in alphabetic knowledge, isolation and phoneme segmentation. However, Mauchly's test indicated that the assumption of sphericity had been violated in alphabetic knowledge (χ^2 (5)= 19.63, p<.01; (ε= .78); and isolation (χ^2 (5)= 24.20, p<.01, (ε= .81); therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity. The results show that progress monitoring measures were significantly different across different assessment periods in alphabetic knowledge F (2.34, 109.81)= 42.31, p<.001, η^2= .47; and isolation F (2.42, 125.91)= 5.32, p<.01, η^2= .09. With regard to the phoneme segmentation task there were significant differences across different assessments periods, F (3, 51)= 5.36, p<.01, η^2= .24. Post hoc tests revealed that the progress monitoring measures differed significantly between third versus first, and second and fourth assessment in alphabetic knowledge, t (94)= -8.95, p<.001, t (94)= -9.69, p<.001, t (94)= 7.47, p<.001, respectively. A linear tendency was significant F (1, 47)= 9.12, p<.01, η^2= .16 demonstrating that alphabetic knowledge increased during the intervention. With regard to the isolation task the progress monitoring measures differed significantly between second versus third and fourth assessment in initial sound identification, t (107)= 3.92, p<.01, t (107)= 2.35, p<.00, respectively. A cubic tendency was significant F (1, 52)= 16.10, p<.001, η^2= .23 demonstrating that the /l/ phoneme was more resistant to improve than phonemes /p/ and /e/ during the intervention. In the phoneme segmentation the progress monitoring measures differed significantly between the third and the fourth assessment t (106)= -3.75, p<.001. Again a cubic tendency was significant F (1, 53)= 6.23, p<.05, η^2= .10 demonstrating that children improved their phoneme segmentation from the third to the fourth assessment. Finally, we did not find significant differences between the progress monitoring measures in vocabulary and word naming accuracy, F (2, 39)= .31, p= .73, η^2= .01; F (3, 40)= 1.79, p= .16, η^2= .12, respectively. The mean scores obtained by children in word naming accuracy and vocabulary was

Table 1
Group means, standard deviations and t-Values in each tasks

	Assessment	M	SD	t		
				M1	M2	M3
Alphabetic knowledge	M1	3.75	.48			
	M2	3.77	.51	.23		
	M3	2.77	.66	-8.95***	-9.69***	
	M4	3.81	.64	.72	.35	7.47***
Initial sound identification	M1	5.72	.77			
	M2	5.42	.93	-2.26		
	M3	5.91	.45	1.60	3.92**	
	M4	5.77	.61	.41	2.35***	-1.55
Isolation	M1	5.48	1.14			
	M2	5.57	1.00	.62		
	M3	5.22	1.28	-1.25	-1.76	
	M4	5.91	.48	2.63	2.13	3.75***
Vocabulary	M1	6.00	.00			
	M2	5.93	1.34			
	M3	5.93	.80			
	M4	5.90	.30			
Word naming accuracy	M1	4.91	1.49			
	M2	5.33	1.34			
	M3	5.14	1.08			
	M4	5.33	1.34			

Note: M1= First assessment; M2= Second assessment; M3= Third assessment; M4= Fourth assessment.
** p<.01; *** p<.001

Table 2
Mean and standard deviation in age, phonemic awareness, letter name knowledge, letter sound knowledge, familiar word reading, unfamilar nonword reading, passage oral reading, reading comprehension, listening comprehension, and dictation as a function of different groups

		Experimental		Control	
		M	SD	M	SD
Age		75.96	11.18	76.76	12.04
Letter name knowledge	PRE	14.64	14.03	18.21	18.05
	POST	27.46	19.82	26.74	19.49
Letter sound knowledge	PRE	8.38	8.62	9.55	10.61
	POST	24.20	15.15	14.98	11.90
Isolation	PRE	5.44	3.64	5.65	3.49
	POST	8.08	3.23	6.38	3.29
Initial sound identification	PRE	3.41	2.50	3.83	2.56
	POST	5.64	2.81	5.71	2.68
Familiar word reading	PRE	10.62	15.22	14.32	16.95
	POST	26.31	19.80	26.99	18.97
Unfamiliar word reading	PRE	7.15	11.42	9.09	11.63
	POST	17.90	14.37	15.93	13.53
Oral reading passage	PRE	12.73	19.05	17.70	22.77
	POST	36.87	25.76	36.48	24.36
Reading comprehension	PRE	1.25	1.60	1.55	1.69
	POST	3.10	1.80	3.00	1.55
Listening comprehension	PRE	2.59	1.24	2.69	1.18
	POST	3.39	1.24	2.76	1.32
Spelling	PRE	2.29	3.11	3.00	3.00
	POST	5.94	4.19	5.94	4.37

high (both, range 0-6). For the vocabulary measure, we observed a ceiling effect in the first assessment.

We also administered letter name knowledge, letter sound knowledge, phonemic awareness (i.e., isolation and initial sound identification tasks), familiar word reading, unfamiliar nonword reading, passage oral reading and comprehension, listening comprehension, and dictation included in the Early Grade Reading Assessment Test EGRA as pretest-posttest measures. Table 2 contains means and standard deviations for the two groups in each of the pretest-posttest measures.

Experimental measures: oral language skills

Treatment effects on the phoneme segmentation, initial sound identification and listening comprehension tasks were analyzed using two-way analyses of covariance (MANCOVA) with treatment program (experimental vs. control) a between-subjects factor, and grade (kindergarten, first grade, second grade), and pretest as the covariate. The sets of dependent measures included (a) posttest phoneme segmentation, (b) posttest initial sound identification, and (c) listening comprehension.

Both the main effect of treatment program, [F (3,190)= 10.9; p<.000, η^2= .14], and the main effect of grade, [F (6,380)= 3.44; p<.003, η^2= .05] were significant. However, a treatment program × grade interaction was not reliable (F<1). Subsequent tests of simple main effects confirmed that there were differences in the posttest between experimental and control group in listening comprehension [F (1,192)= 11.4, p<.001, MSE= 15.99; η^2= .05], and isolation [F (1,192)= 22.5, p<.000, MSE= 146.23; η^2= .10]. These results indicate us that at-risk children that received PREDEA program benefited from the training because they improved their oral language skills and phoneme segmentation (see Figures 1 and 2). We also observed differences in the posttest between grades in isolation [F (2,192)= 5.28, p<.006, MSE= 34.33; η^2= .05] and initial sound identification [F (2,192)= 8.59, p<.000, MSE= 46.66; η^2= .08] indicating that older children had higher scores than younger children.

Experimental measures: reading and spelling skills

Treatment effects on the letter name knowledge, letter sound knowledge, familiar word reading, unfamiliar nonword reading, passage oral reading and comprehension, and dictation tasks were analyzed using two-way analyses of covariance (MANCOVA) with treatment program (experimental vs. control) a between-subjects factor, and grade (kindergarten, first grade, second grade), and pretest as the covariate. The sets of dependent measures included (a) posttest letter name knowledge, (b) posttest letter sound knowledge, (c) posttest familiar word reading, (d) posttest unfamiliar nonword reading, (e) posttest passage oral reading and comprehension, and (f) posttest dictation. Table 2 contains means and standard deviations for the two groups in each of the pretest-posttest measures.

Both the main effect of treatment program, [F (7, 90)= 2.83; p<.01, η^2=.18], and the main effect of Grade, [F (14,180)= 5.26; p<.000, η^2= .29] were significant. However, a treatment program × grade interaction was not reliable (F<1). Subsequent tests of simple main effects confirmed that there were differences in the posttest between experimental and control group in letter sound knowledge [F (1, 96)= 17.0, p<.000, MSE= 1781.24; η^2= .15], and

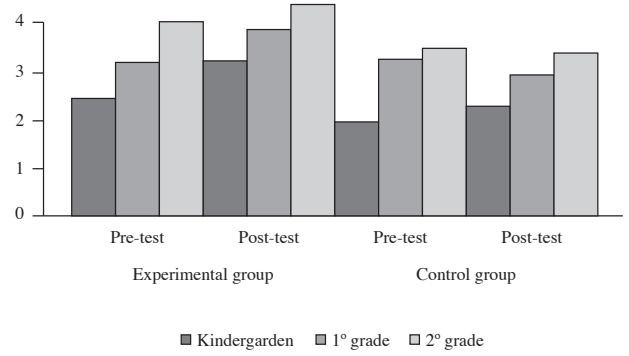

Figure 1. *Effects of treatment program on listening comprehension. Note: EG= Experimental Group; CG= Control Group*

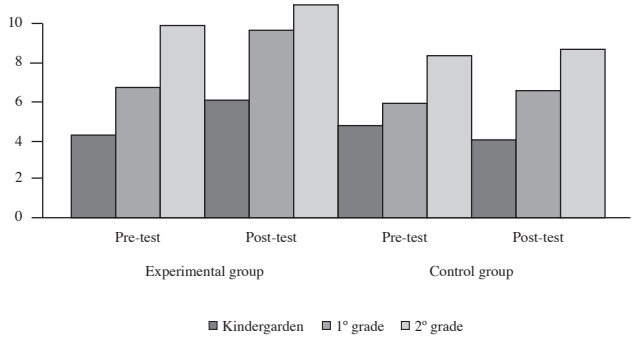

Figure 2. *Effects of treatment program on initial sound identification. Note: EG= Experimental Group; CG= Control Group*

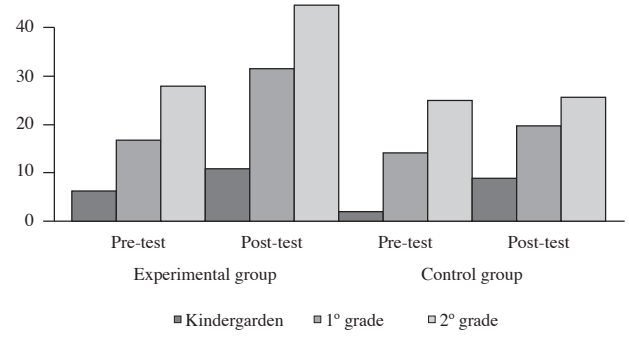

Figure 3. *Effects of treatment program on letter sound knowledge. Note: EG= Experimental Group; CG= Control Group*

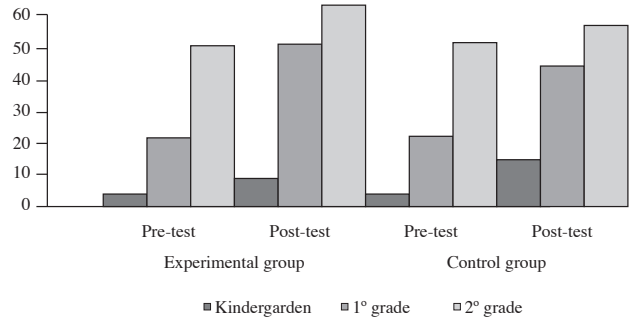

Figure 4. *Effects of treatment program on passage oral reading. Note: EG= Experimental Group; CG= Control Group*

passage oral reading [F (1, 96)= 4.31, p<.04, MSE= 628.53; η^2= .04]. These results indicate us that at-risk children that received PREDEA program benefited from the training because they improved in letter sound knowledge and oral reading in passage (see Figures 3 and 4). Also, there were differences in the posttest between grades in familiar word reading [F (2,96)= 36.1, p<.000, MSE= 2315.16; η^2= .43] , unfamiliar word reading [F (2,96)= 24.8, p<.000, MSE= 1366.80; η^2= .34], passage oral reading [F (2,96)= 23.1, p<.000, MSE= 3361.73; η^2= .32] , reading comprehension [F (2,96)= 18.2, p<.000, MSE= 20.44; η^2= .27], and dictation [F (2,96)= 10.8, p<.000, MSE= 77.42; η^2= .18] indicating that older children had higher scores than younger children. In the next section we will discuss the implications of these findings.

Discussion

To our knowledge this is the first study carried out with a Spanish monolingual population analyzing the effects of an RtI three-tier-model within a context of a collaboration between the Canarian Universities and the Department of Education of the Canarian Government in Spain. This three-tier-model is defined by three sequentially ordered intervention strategies. In this study we focused only on tier 2 that usually involves a small group intervention for children whose literacy difficulties are not resolved by appropriate adjustments to the classroom instructional program. In some RtI models universal screening identifies students for Tier 2 intervention (Vellutino et al., 1996), therefore, this study was designed to assess the effectiveness of second tier within the context of RtI in kindergarten, first and second grade. A critical step is the selection of a screening measure as a way to identify early those students who are likely to require supplemental instruction. Therefore, before the intervention, we reviewed the reading disability literature for constructs with strong predictive validity other than phonemic awareness, letter knowledge, word identification, and reading fluency. Jenkins, Hudson and Johnson (2007) reported that measures of expressive and receptive vocabulary, sentence imitation, story recall, working memory, and attention may have predictive value, especially in forecasting reading problems. Therefore, we decided to use the Spanish adaptation of The Hong Kong Specific Learning Difficulties Behavior Checklist as an initial screening tool for risk status because it addresses the multifaceted nature of specific learning disabilities caused by deficits in basic processes such as memory, attention, and perceptual motor functions that may be differentially manifested in areas other than reading.

We hypothesized that response to intervention (RtI) would be an effective and valid approach to improve cognitive and reading skills in children who may be at-risk for long-term reading difficulties. The results show that progress monitoring measures were significantly different across assessment periods in alphabetic knowledge, isolation and segmentation. This was not the case for vocabulary where a ceiling effect was observed in the first assessment. In addition, the results of the present study also indicate that at-risk children who received remedial intervention through the PREDEA program benefited from the training because they improved their oral language skills, phoneme segmentation, letter sound knowledge and oral reading fluency. Effect sizes were from small to medium and other studies, reviewed in the meta-analysis of reading interventions conducted by Wankek and Vaughn (2007), found effect sizes larger in the kindergarten and first-grade interventions. Another interesting finding was that the number of children classified as «at risk» for early reading difficulties decreased significantly as a result of the RtI approach. For instance, teachers reported after 3 months of the intervention that about twenty three percent of children did not need to follow the PREDEA program because most of these children were not considered as at-risk for early reading difficulties.

Since the publication of the results from the Vellutino et al. (1996) and Torgesen et al., (2001) studies, there have been a growing number of studies evaluating the RtI approach to learning disabilities classification and remedial planning (see for a review, Vellutino et al., 2008). Our findings are consistent with research showing that early identification and intervention can reduce subsequent reading failure (e.g., Snow, Burns, & Griffin, 1998; Torgesen, 2000).

This pilot experience has demonstrated that the RtI model is a viable model and is an alternative to expensive and resource intensive approaches. Therefore, the Department of Education of the Canarian Government has adopted RtI or tiered intervention policies as a common practice serving all students. More than one hundred schools are currently implementing the RtI model, a welcome shift from the wait-to-fail model historically favored in educational responses to struggling readers. This new experience is being supported by the Center on Teaching and Learning & The Institute of Educational Achievement at the University of Oregon in Eugene (EEUU). The Indicadores Dinámicos del Exito en la Lectura (Baker, Good, Knutson, & Watson, 2006) measures are being used by teachers as progress monitoring.

In sum, the results of the present study demonstrated that early identification, intervention and frequent monitoring of basic skills can significantly reduce the incidence or reading problems in Spanish monolingual students.

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