

The improvement of reading skills of L1 and ESL children using a Response to Intervention (RtI) Model

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This study examined the development of literacy skills in children in a district that used a Response to Intervention (RTI) model. The district included children whose first language was English and children who were learning English as a second language (ESL). Tasks measuring phonological awareness, lexical access, and syntactic awareness were administered when the children entered school in kindergarten at age 5. Reading, phonological processing, syntactic awareness, memory, and spelling were administered in grade 7. When the children entered school, significant numbers of them were at risk for literacy difficulties. After systematic instruction and annual monitoring of skills, their reading abilities improved to the extent that only a very small percentage had reading difficulties. The results demonstrated that early identification and intervention and frequent monitoring of basic skills can significantly reduce the incidence of reading problems in both the ESL and language majority children.

La mejora de la habilidad lectora en niños monolingües y aprendices del idioma inglés como segunda lengua mediante el Modelo de Respuesta a la Intervención (RtI). Este estudio examinó el desarrollo de la habilidad lectora en una población escolar del distrito norte de Vancouver, en Canadá, donde se utilizó el modelo de Respuesta a la Intervención (RTI). Este distrito incluía niños cuya lengua materna era el inglés y niños que aprendían el inglés como segunda lengua (ESL). Se administraron tareas para medir la conciencia fonológica, el acceso léxico y la conciencia sintáctica en el momento en que los niños iniciaban la escolarización en el jardín de infancia a la edad de 5 años. Cuando se encontraban en 7º grado se administraron tareas para medir la habilidad lectora, la conciencia fonológica, la conciencia sintáctica, la memoria y las habilidades ortográficas. Cuando los niños se encontraban en jardín de infancia se identificó un número significativo en situación de riesgo de presentar dificultades específicas de aprendizaje. Después de una instrucción sistemática y supervisión anual de habilidades, sus capacidades de lectura mejoraron hasta tal punto que solamente un porcentaje muy pequeño continuaba presentando dificultades específicas de aprendizaje. Los resultados demostraron que la identificación e intervención temprana y la supervisión continua de habilidades básicas puede reducir de forma considerable la incidencia de problemas en la lectura tanto en población ESL como en población monolingüe.

Identifying children at risk for reading difficulties and providing timely intervention is of critical importance for our society. There are many reasons why this is the case. The social and psychological consequences of not providing effective remediation of learning disabilities, including dyslexia, are quite severe. For example, a high prevalence of reading disabilities has been identified among adolescent homeless youth and adolescents who have committed suicide (Barwick & Siegel, 1996; McBride & Siegel, 1997). In addition to academic problems such as grade retention (e.g., McLeskey & Grizzle, 1992), and school dropout (e.g., Lichtenstein & Zantol-Wiener, 1988; National Center for

Education Statistics, 1999), students with learning disabilities are at increased risk of developing social problems (e.g., Sabornie, 1994; Wiener & Schneider, 2002) and emotional difficulties, such as depression (e.g., Gregg, Hoy, King, Moreland, & Jagota, 1992). Reading failure has been shown to not only have a negative impact on academic achievement but also on extracurricular activities and peer relations (Stanovich 1986). As well, this is a population at risk for problems with self-concept (e.g., Boetsch, Green, & Pennington, 1996; Chapman, 1988), juvenile delinquency, and substance use and abuse (Beitchman, Wilson, Douglas, Young, & Adlaf, 2001). Obviously, early detection of children at risk for dyslexia and providing an intervention for them may reduce the incidence of subsequent cognitive, emotional and social difficulties.

The purpose of this present study was to examine factors influencing the development of reading and related skills in children, both children learning English as a second language (ESL) and children whose first language was English (L1). This study was conducted in the context of a model of response to intervention

(RTI). The RTI model stresses early identification and intervention and frequent monitoring of basic skills and is important for a variety of reasons. Children who fall behind in kindergarten and Grade 1 continue to fall further behind over time and their difficulties associated with reading persist through adulthood demonstrating that the consequences of untreated reading disabilities extend far beyond poor academic achievement (Stanovich, 1986; Lyon 1995). Support through early intervention for children with reading disabilities greatly increases the success of remedial programs and ameliorative interventions. When intervention is delayed until third grade or later the proportion of children whose reading disabilities are successfully corrected decreases dramatically demonstrating that early support can be critical in the prevention and treatment of learning disabilities (Lyon, 1995). In practice in many school districts, intervention does not start until grade three or later, when it may be too late because the learning difficulties may have become very resistant to remediation.

The RTI model used in this study focused on the entire population of a school district. The characteristic of this model included early identification of the children at risk for literacy problems, the provision of effective classroom based intervention, and the frequent monitoring of performance. Teachers were given the tools to monitor performance and were encouraged to pay special attention to the children identified at risk or who were having difficulties. Withdrawal from the classroom to work with a remedial teacher occurred when it was necessary. There was no labeling or categorization of students.

In efforts to provide support to all children, and to allow as many children as possible to acquire literacy skills, large scale prevention programs offer a possible alternative of instructional support delivery, such that the majority of children will acquire successful literacy skills with basic teaching strategies taught within the classroom. However, there will always be individuals who do not do not acquire sufficient skills in this manner and who need further assistance and more intensive support. The response to instruction is a model of prevention that offers support to a vast majority if not all individuals in a population initially and then, if needed, it provides additional involvement to those not benefitting from the initial intervention.

In the present paper, we examined the North Vancouver school district literacy program, an approach that is preventive in nature and targets the entire population of a school district. The three tier system is designed so that all students continue to receive primary intervention. Students receive additional intervention only as long as needed. In the implementation of a typical three tier system, primary intervention is designed to be proactive in nature with the goal to increase the likelihood of success so that the need for additional, more individual support is decreased. The second level of intervention is delivered to small specialized groups and is intended to prevent a worsening of an existing problem or the prevention of side effects due to an existing problem. Tertiary intervention, administered to the remaining is a rehabilitative effort where intervention is provided in effort to reduce the serious problem symptoms while increasing the positive assets of the individual.

The literacy development of both children whose first language was English and ESL children was examined in the context of this RTI model. Immigrant students typically enter the education system with limited English and with diverse language backgrounds. Reading is one of the challenges of school-based learning. Therefore, understanding more about reading processes

and the related cognitive processes will help enable different language groups to make the transition to a new language. The present study examines the development of reading skills students from kindergarten to Grade 7.

Method

Participants

Students who entered the school system in their kindergarten year were studied longitudinally until Grade 7. The students were from 30 different schools within one school district in Canada. Children were classified as ESL if they spoke a language other than English at home with their parents, siblings and grandparents. Most of the ESL speakers immigrated to Canada at an early age, although some were born in Canada. In order to examine the first and second objectives, the entire longitudinal population of 622 students (530 L1 and 92 ESL) was included. In the elementary schools in this school district, children with ESL backgrounds, despite very limited oral proficiency, received the same early classroom instruction in English as their non-ESL peers. Since the sample included an entire school district in a Canadian district, the sample represented a wide range of socioeconomic status (SES) backgrounds. The ESL children came from a variety of linguistic backgrounds; the sample included a total of 33 languages. The predominant native languages for the ESL children were Cantonese, Mandarin, Korean, Farsi and Spanish. Table 1 summarizes the descriptive statistics for this sample.

Trained graduate and undergraduate students conducted the assessments in the schools. Each child was individually assessed in a quiet room. The reading comprehension task was administered in a group setting in individual classrooms.

Kindergarten measures

Reading WRAT-3 reading subtest, blue form (Wilkinson, 1993): Children were asked to read as many words as possible from a list containing words of increasing difficulty (e.g., «in», «cat», «stretch», «triumph»). When 10 consecutive words were read incorrectly, the examiner discontinued the task.

Phonological processing

Rhyme Detection Task. This task is from the Phonological Awareness Test (Muter, Hulme, & Snowling, 1997). In this task, the child was shown four pictures. A picture of the target word appeared above three pictures. The child was asked which of the three words rhyme with the target word. For example: «what rhymes with boat? Foot, bike, or coat?» There were three demonstration

Table 1
Descriptive statistics by language group

Measures	ESL (N= 92)	L1 (N= 530)
Female	50	281
Male	42	249
Kindergarten age (months)		
M	64.08	64.29
SD	3.29	3.42

items and ten test items. If the child fails the demonstration item and the first five items, the administration discontinued. This task was administered to the children in kindergarten.

GFW Sound Mimicry. This subtest from Goldman, Fristoe, and Woodcock (1974) was used to assess children's skill at recognizing and reproducing sounds in English. In this task, the children needed to repeat pseudowords of increasing difficulty that had been read to them by the examiner. Pseudowords ranged in difficulty from vowel-consonant syllables (e.g., ab, id) to polysyllabic pseudowords (e.g., deponiel, bafmotbem). This task was administered to the children in kindergarten and is assumed to measure phonological memory.

Phoneme Deletion Task. This task is from the Phonological Awareness Test (Muter, Hulme & Snowling, 1997). In this task, the examiner presented the child with a picture of a word and the child was asked to delete a phoneme (initial or final) from the word. The task consists of eight initial phoneme deletion items, eight final phoneme deletion items and four demonstration items for each section. If the child failed the demonstration items and the first four test items, the task discontinued.

Syllable Identification and Phoneme Identification. These tasks are from the Phonological Awareness Test (Muter, Hulme & Snowling, 1997). In these tasks, children were required to complete words. In the syllable identification part, the examiner presented a picture (i.e., table) to the child. The examiner said the first part of the word (i.e., «ta») and asked the child to complete the word (i.e., «ble»). The task consists of eight syllable identification items and two demonstration items. If the child failed the demonstration items and the first four test items, the task was discontinued. In the phoneme identification task, the examiner presented a picture (i.e., fish) and said the first part of the word (i.e., «fi») and asked the child to complete the word (i.e., «sh»). The task consists of eight phoneme identification items and two demonstration items. If the child failed the demonstration items and the first four test items, the task was discontinued.

Verbal memory

The *Stanford Binet Memory for Sentences* subtest (Thorndike, Hagen, & Sattler, 1986): Children were asked to repeat sentences ranging in complexity from simple two-word sentences (e.g., «Drink milk») to complex sentences (e.g., «Ruth fell in a puddle and got her clothes all muddy»).

Syntactic awareness

Oral cloze (Willows & Ryan, 1986; Siegel & Ryan, 1989): The oral cloze task was designed to assess grammatical sensitivity. During this task, children heard 12 sentences with one word missing from each (e.g., «It was sunny day with a pretty _____ sky»). While reading each sentence, the examiner said «beep» whenever a word was missing, and the child attempted to provide the missing word. The children had to provide a word that would create semantically and syntactically well-formed sentences. The class of the missing word varied; nouns, adjectives, adverbs, prepositions, auxiliary verbs and conjunctions were used.

Lexical access

Rapid Automatized Naming: The RAN in kindergarten was used to assess lexical access (RAN; Denckla & Rudel, 1976). In

this task, the child needed to name 40 items on a page consisting of line drawings of five different items (i.e., tree, chair, bird, pear, car) repeated eight times. A practice trial of the five items was presented before the presentation of the 40 items to ensure the child knew the target words. The score was the time taken (in seconds) to complete the 40 items.

Grade 7 measures

The measures administered to the children in grade 7 were organized into five categories: reading and spelling, reading comprehension, memory, phonological processing, and language skills.

Reading WRAT-3 reading subtest, blue form (Wilkinson, 1993): Children were asked to read as many words as possible from a list containing words of increasing difficulty (e.g., «in», «cat», «stretch», «triumph»). When 10 consecutive words were read incorrectly, the examiner discontinued the task.

The Test of Word Reading Efficiency (TOWRE; Torgesen, Wagner, & Rashotte, 1999). The Sight Word Efficiency assessed the ability to read aloud real words. The subtest consists of a list of graded words printed on a single page. The student was given 45 seconds to read as many items as possible.

Reading comprehension

The Stanford Diagnostic Reading Test (Karlson & Gardner, 1994) is a standardized reading comprehension test whereby each child was asked to read short passages from a booklet and respond to multiple-choice questions about each passage within a time limit.

Working memory

Memory for Words. The Working Memory for Words (Siegel & Ryan, 1989) was administered. Each child was told that: «I am going to say some sentences and the last word in each sentence will be missing. I want you to tell me what you think the last word should be.» After a trial on completing a sentence, the examiner continued: «Now I am going to read two sentences. After each sentence, I want you to tell me the word that should go at the end of the sentence. When I finish the two sentences, I want you to tell me the two words that you said for the end of each sentence. Please tell me the words in the order that you said them». The child was given one practice item followed by 12 test items. Three trials were administered within each set of increasingly long sentences (2, 3, 4, 5). To minimize word-finding problems, the sentences were chosen so that the missing word was virtually predetermined. The task administration was discontinued when the child failed all the items at one level and the maximum score on the task was 12. The task was administered to the children in Grade 2 and 3. Examples of the sentences include: «In the baseball game, the pitcher throws the _____».

«On my two hands, I have ten _____».

Child's responses _____ (ball, fingers).

Working memory for numbers (Siegel & Ryan, 1989): Examiners asked children to count yellow dots within a field of blue dots arranged in a randomly determined irregular pattern on a 5 × 8 inch index card. For each set, the student was asked to recall the number of yellow dots on each card and the order in which s/

he presented with three trials within each set of cards. The number of cards in each set increased one at a time, starting with two cards and ending with a possible five cards. When all items in a given set were failed, the examiner discontinued the task.

Spelling

Wide Range Achievement Test- 3 (Wilkinson, 1993): Spelling (blue form). This subtest was administered in groups in Grades 2 and 3 to assess real word spelling. The children were presented orally with words of increasing difficulty, and the child was required to generate the correct spelling. Sample items included: must, enter.

Phonological processing

Comprehensive Test of Phonological Processing (CTOPP; Wagner, Torgesen, & Rashotte, 1999). The Elision subtest was administered to each participant. An increasingly difficult series of words were presented verbally and students were asked to delete syllables and phonemes, deleting smaller units as the items became more difficult (e.g., say «popcorn» without «pop»).

The Test of Word Reading Efficiency (TOWRE; Torgesen et al., 1999). The non word subtest assessed pseudoword reading. Students were given 45 seconds to read aloud as many words as possible from a list of nonwords. The nonwords followed regular spelling patterns, requiring students to quickly decipher pronunciations on the basis of their existing knowledge of grammar.

Woodcock Reading Mastery Test - Revised: Word attack, Form G (Woodcock, 1987): This subtest is made up of a list of pseudowords of increasing difficulty (e.g., «dee», «ap», «straced») to measure decoding skills. students were required to decode as many words as possible from the list. When all items in a given level were failed, the examiner discontinued the task.

Woodcock Johnson III Spelling of Sounds: The task requires the written spelling of nonwords according to English spelling rules.

Language

Syntactic awareness: The Oral Cloze task was used to assess syntactic awareness (Siegel & Ryan, 1988; Willows & Ryan, 1986). Each student was required to listen to the examiner read 20 sentences, each with a missing word, and for each sentence the student was told to provide a word that created a semantically and syntactically well-formed sentence. The class of the missing words varied, including nouns, adjectives, prepositions, and verbs.

Prefix/Suffix knowledge: In this task, students were presented with affixes and required to provide the meaning. Students were also asked to give an example that included the affix. The task was a paper and pencil task and was not timed.

Procedure

District wide reading programs

In considering the RTI model it is important to understand the reading instruction program in this district. In the North Vancouver school district, all children received phonological awareness instruction in kindergarten and grade I. The phonological awareness program, «Firm Foundations», was a classroom- based program for

both L1 and ESL students. The program and classroom activities also included early literacy skills development, letter-sound relationships, and language development. The students that were identified as being at risk for reading problems received additional phonological awareness training provided by the classroom and resource teachers in small groups and on an individual basis. For instance, small groups and individuals were provided with different activities in a play format such as rhymes, sound-symbol, early writing activity (journals), and letter identification activities (baking letter-shaped cookies). Overall, the intervention was provided three to four times a week for 20-25 minutes. The intervention occurred in the context of developing a language and literacy rich environment with story reading and retelling, journals, and reading children’s books of different levels. Students with ESL in the elementary school of this district receive the same classroom instruction as L1 speaking children.

In Grades 2 to 7, the district implemented the Reading 44 program (North Vancouver School District, 1999), a classroom program that was written by the teachers of North Vancouver. The program included the «Daily Dozen» or 12 reading strategies and instructional activities and graphic organizers for classroom use to encourage students to learn these strategies.

Results

Table 2 summarizes the classification of the at-risk students in kindergarten and the students with reading disabilities in grade 7 by language group. Both the numbers and percentages are presented. As there were three basic reading tests administered, we considered a low score on any one of them as a sign of a reading problem. We used both conservative (1 standard deviation or more below the mean) and liberal criteria (below the 25th percentile) as cut-off scores for a reading disability. As can be seen in Table 2, many of the students were at risk in kindergarten but very few had reading disabilities in Grade 7. There were few differences between the ESL and L1 students.

Another objective of this study was to compare the performance of the at risk students (L1 and ESL) to the not at risk students in kindergarten. Students were identified as being at risk for reading problems if their performance on the WRAT3 reading was at or below the 25th percentiles. Table 3 summarizes the performance in kindergarten of both language groups by their risk status classification. As can be seen in Table 3, the ESL children had

Table 2
Numbers (and percentages) of children at risk in kindergarten and reading disabled in Grade 7

Measures	ESL	L1
Kindergarten WRAT 3 reading below 25th percentile	28 (30.4)	119 (22.5)
Kindergarten WRAT3 reading below 85 SS	22 (23.9)	74 (14.0)
Grade 7 WRAT3 reading below 25th percentile	4 (4.3)	9 (1.7)
Grade 7 WRAT3 reading below 85 SS	2 (2.1)	4 (0.8)
Grade 7 WJ word Identification below 25th percentile	2 (2.1)	16 (3.0)
Grade 7 WJ word identification below 85 SS	1 (1.1)	4 (0.8)
Grade 7 WJ word attack below 25th percentile	5 (5.4)	23 (4.3)
Grade 7 WJ word attack below 85 SS	1 (1.1)	8 (1.5)

significantly lower scores on the phonological awareness, syntactic awareness and verbal working memory measures. Their scores on the reading measures were equivalent to the L1 children. It is important to note that they had been receiving instruction in English for about four months when this assessment was conducted so that they had acquired the same basic reading skills as the L1 children. However, the phonological and linguistic measures indicated that they were behind in the acquisition of these skills that are really important to reading, especially reading comprehension.

The children in this study were tested 8 years after the initial assessment in kindergarten. The results are shown in Table 4. As can be seen from Table 4 and as expected, the normal readers had much higher scores than the students with a reading disability but there were not differences between the ESL and the L1 children among the normally achieving readers. However, in many cases the ESL children with reading disabilities had higher scores than the L1 children with a reading disability. At first this finding may seem paradoxical but it is quite possible that access to another

sound system and orthography improved the metalinguistic skills of the ESL group, especially the children with reading problems, thus resulting in less impairment in performance.

Discussion

The number of children with reading problems decreased significantly as a result of the RTI approach. Most of the children identified as being at risk in kindergarten were reading at average or above average levels, even in reading comprehension

Table 3
Performance on kindergarten measures by language group and risk status

Measures	ESL		L1	
	Not at risk	At risk	Not at risk	At risk
Word reading				
WRAT reading percentile				
M	73.81	10.42	69.85	14.09
SD	14.64	7.22	16.36	7.02
Letter identification				
M	20.88	4.40	18.65	6.59
SD	4.97	3.58	5.43	4.72
Phonological Processing				
Rhyme detection				
M	5.48	4.04	7.35	5.94
SD	3.11	2.82	2.87	3.27
GFW percentile				
M	76.66	65.96	82.73	73.86
SD	26.26	28.08	19.05	24.42
Phoneme deletion (max 16)				
M	3.31	2.15	4.19	2.22
SD	4.36	3.67	4.91	3.47
Phoneme Identification				
M	2.67	1.23	3.31	1.52
SD	2.79	1.97	3.04	2.37
Syllable Identification				
M	4.88	3.04	5.03	3.39
SD	2.00	2.71	2.44	2.79
Memory				
Memory for sentences				
M	14.28	14.08	17.45	15.37
SD	3.60	3.55	3.75	3.67
Language				
Oral cloze				
M	1.51	.81	2.68	1.44
SD	1.97	1.10	2.87	2.19
Lexical Access				
RAN time				
M	72.38	82.04	66.08	78.64
SD	24.17	17.41	21.80	22.18

Table 4
Means and standard deviations by reader group on grade 7 measures

Measures	ESL		L1	
	Normal readers	Reading disability	Normal readers	Reading disability
Word reading				
WRAT reading percentile				
M	79.37	17.50	75.30	17.00
SD	16.14	5.19	16.55	5.65
TOWRE real word percentile				
M	73.54	44.25	71.13	21.89
SD	20.85	28.25	21.25	10.02
WJ word identification percentile				
M	77.98	35.75	79.37	23.33
SD	19.04	21.27	20.20	13.57
Phonological processing				
WJ word attack percentile				
M	76.75	26.75	77.61	27.00
SD	21.89	8.22	23.29	15.26
TOWRE pseudoword percentile				
M	76.66	23.00	74.16	15.44
SD	19.49	22.03	21.54	13.61
CTOPP Elision percentile				
M	62.63	26.25	64.22	34.22
SD	17.19	21.39	16.78	24.08
WJ spelling of sounds percentile				
M	69.33	32.00	71.66	30.89
SD	20.80	9.09	21.46	13.95
Working memory				
Working memory for words				
M	6.19	7.25	6.79	4.89
SD	1.93	.96	2.00	2.26
Working memory for numbers				
M	9.52	8.00	9.50	7.00
SD	1.65	2.94	1.85	2.74
Reading comprehension				
SDRT percentile				
M	65.32	55.25	66.08	22.22
SD	22.72	32.50	24.25	19.45
Language				
Oral cloze				
M	15.16	15.00	15.87	14.67
SD	2.60	2.45	2.23	2.74
Morphological awareness				
M	5.75	3.33	4.88	1.38
SD	3.13	4.93	3.07	2.39
WRAT spelling				
M	82.79	37.25	75.06	21.00
SD	16.55	10.21	20.01	18.12

assessments, even if English was not their first language. The RTI model depends on early identification of children at risk without labeling but with the opportunity for teachers to assess the children to understand the strengths and difficulties that the child may have. The early risk identification assessments need to be simple, brief and easy to administer but also should help the teacher understand the child's difficulties. The children in this study were monitored annually to assess their progress in reading and spelling and help was provided if they were experiencing difficulty. This RTI model is an alternative to extensive and expensive assessments and to the «wait to fail» approach that is characteristic of many school districts. Identification of potential difficulties must occur early. Intervention must begin at the early stages of literacy instruction.

We conducted studies of the relationship between socioeconomic level and reading and spelling skills. We were able to quantify the socioeconomic level of the catchment area of each school in the district. Within each school, the socioeconomic levels were relatively homogeneous. We found that when the children entered school there was a very strong correlation between socioeconomic level and basic literacy skills. The correlation was approximately .60, which is typically what is found in most studies of the relation between socioeconomic level and academic skills. After the children remained in school for a year and a half that relationship decreased significantly, indicating very powerful effects of schooling and the correlation was non significant by grade 3 (D'Angiulli, Siegel, & Hertzman, 2004). D'Angiulli, Siegel, & Maggi (2004) found that

the lowest SES groups, in both the ELL and the L1 groups improved the most as a function of schooling. The prevalence of dyslexia decreased significantly with more schooling, that is, the longer the children were exposed to the district wide reading programs. The improvement was greater for children at the lower socioeconomic levels. Systematic instruction in literacy skills was largely responsible in part for the decrease in influence of socioeconomic level. Typically, the relationship between socioeconomic level and literacy skills increases as children remain in school. However, the teaching in this district was responsible, at least in part, for the powerful effects.

In summary, the RTI model is a viable one and is an alternative to expensive and resource intensive approaches.

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