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In preparing for this address, I have read many articles and editorials authored by William M. Cruickshank (e.g., Cruickshank 1952, 1976, 1977, 1978, 1985). I think it is safe to say that Bill Cruickshank was a man of strong opinions and a prolific writer. Not only did he contribute to the very beginning of the field of learning disabilities (LD), he strongly advocated for students with LD. He firmly believed that students with learning disabilities needed very competent teachers, carefully crafted educational materials, and well-designed learning opportunities. He also believed that teacher education was very important to ensuring the progress of learners who face challenges; and, he believed in the power of collaboration – across disciplines in interdisciplinary teams and, in the case of the International Academy for Research in Learning Disabilities (IARLD) – across the globe. I am honoured to deliver this 2017 address that bears his name.

As early as 1952, Bill Cruickshank highlighted the importance of teacher education to the future prospects of students who face learning challenges. As he wrote, when president of the International Council of Exceptional Children,

In considering certain of the major issues regarding exceptional children in contemporary education, two problems immediately come to the fore. The first of these is concerned with the education of the specialist teacher, the second with the education of general classroom teachers at all levels. (Cruickshank, 1952, pp. 1-2)

Comments on the importance of teacher education and teachers’ professional learning, and the associated work that my colleagues and I are involved in at the Melbourne Graduate School of Education, will conclude my presentation. But to get to that point, we will map my own learning journey – as a teacher, a student, a researcher, a program developer, and a teacher educator – guided by salient quotes from William M. Cruickshank’s corpus of work.

Definition

The issue of definition is one wherein there are significant differences of opinion. I have written on this issue so often that I recently promised myself and several others that I would never discuss the matter again. (Cruickshank, 1985, p. 576)

In the Australian context, it is important to clarify what we mean by the terms learning difficulties and learning disabilities. In Australia, the group of students considered to have learning difficulties is much more broadly defined than in North America. Across all states and territories, in state schools, independent schools, and Catholic system schools, students with learning difficulties are considered to make up about 20% of the school age population. They are “a diverse group that demonstrates low achievement in academic subjects for a myriad of reasons” (Graham & Bailey, 2007, p. 386). Of these
students, about 5% are considered to have severe/specific learning difficulties or learning disabilities.

In talking specifically about the differences between the North American and Australian definitions, I note, however, that the report on the state of learning disabilities released in May 2017 by the National Center for Learning Disabilities (Horowitz, Rawe, & Whittaker, 2017) is called Understanding the 1 in 5, and focuses broadly on the learning and attention issues experienced by 20% of children in the United States. Our definitions of the students who are of particular interest to us as members of the IARLD may be converging over time. Our students with learning difficulties in Australia do not routinely attract funding, but they require instructional support.

**Students**

I like students – love them indeed. We get along well. (Cruikshank, 1978, p.6)

I have always been interested in supporting students who found learning a bit of a struggle. Immediately after my first year of teaching, I enrolled in graduate studies to learn more about how to work with my students, particularly how to better teach reading.

As for most teachers, the students in my first class are particularly memorable to me – along with the challenges they faced. One student I remember so clearly from my first class of 10-year-olds had significant reading difficulties: Decoding was a mystery to him, and his reading was beyond laborious. Yet, his listening comprehension skills were superior. Those 19 girls and 16 boys in my first class of Year 5s in a small hinterland Queensland state school and their learning, or lack of learning, gave direction to my career and a logic to the narrative of my professional life. Because I couldn’t teach Terry to decode fluently, I had to learn more about teaching reading to middle school students. Because Danielle had such problems with numbers and because Che read encyclopedias for fun in those pre-Internet days, I had to learn more about how to teach my students and how to put this knowledge about teaching into practice.

Bill Cruickshank’s students also influenced his career. He refers to his graduate students in the quote above, but he writes throughout his career about the students he worked with in Syracuse and Michigan – students with cerebral palsy, intellectual impairment, and learning disabilities – and his quest to provide them with the structure and instructional match they needed to experience success and to learn through his learning intervention.

**Learning Intervention and the 3H Strategy**

Regardless of the tools used, it is an absolute in considering the concept of the psychoeducational match that such evaluation and assessment be done, in order that teaching materials and the learning environment can be matched with the specific processing needs of the child under consideration. (Cruickshank, 1977, p.59)


*Learning Intervention* is also the title of the professorial position I hold, and of the master’s program that my colleagues and I offer inservice teachers, which includes a specialisation in specific learning difficulties. Our students who have learning difficulties, behavior difficulties, and social difficulties need teachers. They also need systematic, explicit teaching, automaticity – and intervention.

In my process of learning about learning intervention, I was very fortunate to work with Bernice Wong as she was continuing her work with meta-cognition and students with learning disabilities, as well as reading, and writing, and self-questioning strategies. My work with Bernice was focused on reading, particularly reading comprehension and question-answer relationships. In deciding on my research focus, I was again very aware of my first class of students and the learning profiles of two students in particular.

Terry was a student with great general knowledge but extremely poor reading skills. One school
day, when we had to complete a task quickly because it was almost lunchtime, I swapped a reading comprehension exercise for a listening comprehension exercise, and Terry’s scores were extraordinary: So low for reading comprehension; so high for listening comprehension.

And, then there was Simon, also a student in my first class. One day I was marking a comprehension task as a whole-group activity and, again, I was in a hurry. The task was to read a passage about the life of Galileo and answer questions. One of the questions was, “Name three inventions that Galileo’s work contributed to.” My students were able to tell me about the microscope and the telescope, but not the third invention. I prompted them by saying, “Come on, it’s in the passage.” Not thinking that the word (stethoscope) was unknown vocabulary for my students, I kept prompting them. “Come on. Doctors put these in their ears and test your heart.” Still no correct answer. “Come on, Year 5s. Doctors put these in their ears and test your heart with them. What is the answer?” Suddenly, Simon had an answer. “Miss, it’s an ear testicle!” I had not taken into account the vocabulary knowledge of my learners and the novelty of the word stethoscope.

3H Strategy: Study 1

My subsequent work looked at, in the first instance, using a self-instructional strategy to answer questions after reading a passage. In this study (Graham & Wong, 1993), I had 90 participants, 45 average readers and 45 poor readers from Years 5 and 6, and three conditions: didactic (or direct) teaching; self-instructional training; and a control condition.

The didactic teaching condition covered the specific instruction of what to do to answer questions after a passage, but it did not require overt traces of strategy use by the students. Students in the self-instruction condition learned three self-questions through self-instructional training. This training consisted of four stages (a) modeling by an adult or more knowledgeable other through the steps of the strategy; (b) overt guidance by the instructor; (c) faded self-talk; and finally (d) covert self-instruction. The students in the control condition were not taught a comprehension question-answering strategy, but were asked to complete the same assessments as the other two groups.

The strategy that was the focus of the study was the 3H Strategy (Where is the answer to this question found? Here, Hidden, or in my Head), which entailed teaching the students in the self-instructional training condition the following self-questions:

1. How will I answer this question?
2. What type of question is this?
3. Is my answer correct?

During self-instructional training, students initially used prompt cards to guide them, with the use of these prompts faded over time. As the teacher, I modeled the strategy, and the students followed – first overtly, then covertly. Students were also systematically asked to, “Think aloud for me, please.”

The finding of this study (see Figure 1) showed that training was significant. Specifically, self-instructional training was more effective than didactic teaching. What was also notable, qualitatively, was that students in the self-instruction condition were more engaged and active than their peers in the other conditions. They knew that they had to have good reasons for their answers to comprehension questions.

In revisiting this study in detail, I am reminded of the rich detail of many intervention studies. This is important because we are working in an age of “evidence,” and so much of what is considered evidence is related to meta-analyses and rankings of effect sizes. And yet, meta-analyses and meta-meta-analyses are subject to criticism because they average out so much important information about what actually makes an impact on the learning lives of students (Simpson, 2017; Wiliam, 2016a; Winne, 2017). As Wiliam (2016b) observed, “In education, ‘What works?’ is rarely the right question, because everything works somewhere, and nothing works everywhere, which is why in education, the right question is, ‘Under what conditions does this work?’ And, I would add, ‘For whom, does this work?’” (slide 30).

Though the 3H Strategy has been used widely across settings and students, going back to the original research in preparing this presentation reminded me of how carefully designed the studies were, even though the main thing that is remembered in relation to the 3H Strategy is that it cues students to think about where answers to questions are found using the mnemonic Here, Hidden, or in my Head.
3H Strategy: Study 2

The second study that focused on the 3H Strategy looked at a number of other features of interest to instructional intervention studies (Graham, 1992). It included a sample of students who were labeled learning disabled, as well as garden-variety poor readers, and a comparison group of average readers. Table 1 shows these students’ profiles on the pretest measures.

In this multiple-baseline study, students’ pre-skills were probed, and their performances were assessed before, during, and after the intervention, including in their classrooms and by delayed maintenance testing four months after the intervention was completed. Metacognitive awareness was targeted, and so was inference making, as a key comprehension skill.

In this research, features of the 3H Strategy made it a before-, during-, and after-reading strategy, with a self-questioning component. It was introduced through a metaphor of reading as travelling and used very simple training passages. From the descriptions of the 3H Strategy available on the web, it would seem as if the 3Hs are simply a guide for teachers. However, as designed, the 3H question-answer relationship strategy combines direct instruction and strategy instruction to support students’ comprehension skills.

Table 1
Pretest Profiles of Participants in the Second 3H Strategy Study

<table>
<thead>
<tr>
<th>Group</th>
<th>WRAT(^a) Word recognition standard score</th>
<th>W-J(^b) Word attack standard score</th>
<th>Modified PIAT(^c) Reading comp standard score</th>
<th>Modified PIAT(^c) Listening comp standard score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Learning disabled</td>
<td>85</td>
<td>(12.0)</td>
<td>80</td>
<td>(9.91)</td>
</tr>
<tr>
<td>Poor readers</td>
<td>95</td>
<td>(7.23)</td>
<td>85</td>
<td>(6.38)</td>
</tr>
<tr>
<td>Average readers</td>
<td>113</td>
<td>(3.23)</td>
<td>112</td>
<td>(11.77)</td>
</tr>
</tbody>
</table>

Note. \(^a\)Wide Range Achievement Test. \(^b\)Woodcock-Johnson. \(^c\)Peabody Individual Achievement Test.

Figure 1. The comparative effectiveness of a question-answer relationship strategy.
In this second study, the groups of LD and poor readers changed from being outperformed by their average peers at baseline, to outperforming the average students during training (see Figure 2). On maintenance and delayed maintenance testing, the trained students recorded scores similar to those of their average peers. The 10 LD students did better than the 16 poor readers throughout. Not only was their comprehension performance higher, so were also their metacognitive scores overall.

When it came to an examination of inferencing skills, in particular, successful inference making was dependent on strategy use (see Table 2). Components of the strategy and the students’ actual use of these parts of the strategy were investigated using conditional probabilities. Across Phase 1 and Phase 2 and then the maintenance and delayed maintenance sections of the study, traces of strategy use were examined. A trace score of 0 meant that there was no evidence in the students’ work about whether they had used the classification of the question and its answer as Here, Hidden, or in my Head, or any evidence of whether students had underlined appropriate information from the text when answering Here (text explicit) or Hidden (text implicit) question-answer relationships (QARs). A trace score of 0 was associated with only a .28 conditional probability of getting the comprehension answer correct. In contrast, if students had a trace score of 2, meaning that they identified the QAR and underlined appropriate text information, their likelihood of getting the answer right was 92%. Most interesting, however, the students who showed evidence of underlining the correct information where appropriate were almost as likely to have answered correctly on the delayed posttest, with a conditional probability of .91, as the students who had a trace score of 2. No wonder students made comments such as the following about the most useful features of the 3H Strategy to them:

- “With the 3H Strategy, I could understand the question more. And, with the underlining whenever I answered, I could check my answers. It’s right there for some and I can see that clearly now.”
- “The 3H Strategy helped me with the underlining. It helps with the information. I used to find an answer and then, you know, I lost it, and I lost it again. Now I find the answers and underline them, and I go back and check.”

These comments give an insight into the students’ modifications of the strategy they were taught, specifically the part they thought was most
efficient for them in terms of energy and effort cost and outcome benefit.

Exactly this kind of research about students’ modifications of an inculcated strategy was called for in the long version of Bernice Wong’s 1985 paper that explored issues in cognitive-behavioural interventions in academic skill areas (Wong, 1985). Looking at the personalisation of strategies remains very relevant to intervention research today as we work with issues of implementation, evaluation, fidelity, scale, student agency, and sustainability.

**Automaticity and QuickSmart**

The kinds of comments made by the middle school students who learned the 3H Strategy also remind us, as John Elkins (2001) wrote in his essay in honour of William M. Cruickshank that, Reading, writing, calculating and other mathematical skills are examples of culturally created tools that can themselves scaffold further learning. Thus those students who experience learning difficulties are doubly disadvantaged because they find it difficult to use these tools and are usually reliant on individual assistance. In most cases, students will need to be supported in an apprenticeship mode, often requiring individual attention till they can perform independently. However, practice is needed to consolidate newly learned skills. Lack of automaticity limits the ability to apply high-level thinking in literacy or Mathematics. (p. 190)

This echoes what William Cruickshank wrote in 1976 when describing the problems experienced by some students with learning disabilities and their solutions:

Research is required of a long-term nature. We do not need more studies of six or eight heterogeneously characterized children for three weeks for a few minutes a day in two learning climates to determine whether or not a cubicle is satisfactory or unsatisfactory! (p. 158)

In terms of my career, an opportunity to take what I had learned about learning intervention so far (that is, that a minimum number of sessions should be about three a week for 30 minutes; how to structure activities for success; the importance of outcome measures of near and far transfer and teaching for generalization) took shape at the University of New England (UNE) in partnership with Professor John Pegg, a mathematics educator and the director of the National Centre of Science, Information and Communication Technology and Mathematics Education in Rural and Regional Australia; and Dr. Anne Bellert, now at Southern Cross University (see, e.g., Graham & Bellert, 2005; Graham & Pegg, 2013; Graham, Bellert, & Pegg, 2007; Graham, Bellert, Thomas, & Pegg, 2007; Pegg & Graham, 2013).

Our work together was sparked by a visiting professor, Mike Royer, from the University of Massachusetts, Amherst, who spent six months at UNE in 1999. Mike showcased his computer-based academic assessment system (CAAS) in a seminar. He was using this system and a series of tasks to “diagnose” attention deficit hyperactivity disorder (ADHD), dyslexia, and garden-variety poor readers, but John and I saw the potential of this tool for monitoring performance during intervention.

Using the CAAS, a student responds verbally to a stimulus that appears on the computer screen (either a number sentence, 5 x 3, for example; or a word like *table*). The CAAS records the students’ response time, and then an instructor scores the response as either correct or incorrect. Finally, the CAAS automatically generates a progress graph.

<table>
<thead>
<tr>
<th>Trace Score</th>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Maintenance</th>
<th>Delayed</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.43</td>
<td>0.42</td>
<td>0.21</td>
<td>0.28</td>
</tr>
<tr>
<td>2</td>
<td>0.86</td>
<td>0.89</td>
<td>0.93</td>
<td>0.92</td>
</tr>
<tr>
<td>1</td>
<td>0.90</td>
<td>0.86</td>
<td>1.00</td>
<td>0.91</td>
</tr>
</tbody>
</table>

*Note.* 0 = no evidence of either question categorisation or underlining. 2 = evidence of both categorisation and underlining. 1 = evidence of underlining only.
Together, Anne, John, and I developed two interventions in basic academic skills for middle school students from Years 4 to 10 – one for literacy, focusing on word recognition and building to comprehension, and one for numeracy that emphasized number facts across all four operations and extended to problem solving. We received funding from a series of grants, including an Australian Research Council Discovery grant, to pilot these interventions, known as QuickSmart. (We chose the name QuickSmart to denote the aim of developing quick and confident skills alongside smart strategy use.) We began the intervention with 24 students in local Armidale, New South Wales, schools in the early 2000s.

When Anne took a consultant’s position at a relatively nearby Catholic diocese in 2003, she took the continuing trial of QuickSmart with her. In 2005, we had the opportunity to start work in Northern Territory schools, then with National Partnerships funding throughout New South Wales, and gradually across all Australian states and territories. At present, QuickSmart Central at UNE calculates that the program has involved over 30,000 students from more than 1,200 schools across the country.

QuickSmart is a Tier 2 intervention in terms of multilevel systems of support. It works with pairs of students who are showing difficulty with basic literacy or numeracy learning, who need extra practice to consolidate their skills and build confidence, or who may have gaps in their understanding for various reasons. Before commencing the program, all students complete a standardized test with Australian norms, the Progressive Achievement Tests (PAT), in mathematics or in vocabulary and comprehension. Test results, alongside teacher judgment, help inform selection for the program.

QuickSmart pairs work through a structured lesson format consisting of six 5-minute components led by an instructor, who ideally would be a teacher, but most often is a teaching assistant. Schools that adopt the program must have a QuickSmart coordinator, whose job is to troubleshoot difficulties and support instructors. Participating students participate in three 30-minute QuickSmart lessons every week for up to 30 weeks. The basic lessons in the literacy and numeracy programs mirror one another. However, the literacy program also includes two other lesson types: an initial lesson to introduce the focus passage and a culminating comprehension lesson to complete the lesson cycle.

There is a professional learning framework around the QuickSmart programs that is particularly important because of the large number of teaching assistants who run QS programs. When we started offering workshops to teachers, teaching assistants, and members of school leadership teams, few opportunities for professional learning were available to teaching assistants, so the professional development of paraprofessionals has been on our agenda for many years. Two-day workshops are offered on three occasions during the first year of a school’s involvement with the QuickSmart program, followed by other workshops in Year 2 and Year 3, as well as refresher workshops.

Except on the very first occasion, schools are asked to participate in all of the workshops by sharing data about their QuickSmart program and their QuickSmart kids. In the early stages of establishing the program and its robustness in schools, we also did a followup with students after one year and then five years. Every school involved in QuickSmart is considered a research site. Schools are encouraged to share the results of their QuickSmart students and comparison students, who are average achievers, with the staff at the SiMERR Research Centre. In return, they receive a report for their cohort alongside the scores of other anonymous schools in their cluster. The report also provides effect sizes for the growth of students using both computer-based assessment system data and the results from the PAT standardized texts administered at pre- and posttest.

A summary of data from the years 2011 to 2016 (see Table 3) shows the kind of results that students have earned through engagement with QuickSmart lessons and assessments. We have used the scores of average comparison students as a measure of the kind of gain scores QuickSmart students need to attain as a minimum. It is important to remember though that lower-achieving students need accelerated growth to narrow the achievement gap. Our results indicate that these students are recording at least a year’s growth for a year’s instruction, on average. The literacy graphs, for example, show the movement of students’ performance, measured in stanines, to be indicative of the movement of the curve to the right, reflecting improved performance, based on pre- and posttest standardized scores (see Figure 3).
For some students in the QuickSmart cohort, we have also been able to obtain NAPLAN data (see Table 4). NAPLAN data refers to the information collected from our nationwide testing of literacy and numeracy achievement for students in Years 3, 5, 7, and 9. As an example, the results from 135 middle school students from an unnamed diocese indicate that QuickSmart students’ gain score was 67.7 points over two years compared to 45.9 points for comparison students.

Working with so many schools over the years has led to some insights about what supports this particular intervention at the school level. Our current QuickSmart literacy leader within SiMERR, Lyn Alder, investigated the characteristics of high-performing schools and found that, not surprisingly, these were the schools that had:

- a stable staff of instructors who had attended the professional learning on offer;
- a dedicated QuickSmart room or space;
- a QuickSmart coordinator who was an experienced teacher, and often a member of the senior leadership group;
- clear criteria for students included into the QuickSmart program; and
- mechanisms for communicating to classroom teachers and parents about what students were doing, how well they were

Table 3
Example QuickSmart Literacy Summary Results From 2015

<table>
<thead>
<tr>
<th>Group</th>
<th>Students with paired data</th>
<th>Average gain score</th>
<th>Significance</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>All QuickSmart vocabulary</td>
<td>715</td>
<td>6.931</td>
<td>&lt;0.001</td>
<td>0.690</td>
</tr>
<tr>
<td>All comparison vocabulary</td>
<td>201</td>
<td>4.304</td>
<td>&lt;0.001</td>
<td>0.399</td>
</tr>
<tr>
<td>All QuickSmart comp</td>
<td>1039</td>
<td>6.033</td>
<td>&lt;0.001</td>
<td>0.572</td>
</tr>
<tr>
<td>All comparison comp</td>
<td>278</td>
<td>4.200</td>
<td>&lt;0.001</td>
<td>0.377</td>
</tr>
</tbody>
</table>

Note. Summary scale score results on the Progressive Achievement Test – Vocabulary – and Progressive Achievement Test – Comprehension.

Figure 3. Summary results of Quicksmart literacy in 2015.
Learning About Learning Intervention

One example of the kinds of mechanisms for connecting *QuickSmart* sessions to students’ classrooms came from a Queensland school early in 2017. The school arranged a “Showcase Morning Tea” for the teachers whose students participated in the program. It ran over two days to allow all teachers to attend, with the *QuickSmart* students in charge of demonstrating to their teachers what they did in *QuickSmart* lessons, how their results were recorded, and how what they were learning was useful in all classrooms. The principal of this high school also participated in and supported the showcase sessions.

Lastly, with regard to *QuickSmart*, we were successful in receiving a grant from Social Ventures Australia in 2016 to complete a randomized control effectiveness trial for the numeracy program. This is important for securing the evidence base of the program. The trial has begun with schools in a Sydney diocese using a waitlist control design. We have 480 Year 4 and Year 8 students involved from 12 primary schools and 11 secondary schools.

**Teacher Education and Professional Learning**

In terms of learning about learning intervention, this brings me to my current role within the Melbourne Graduate School of Education and the importance of the first quote I cited from Bill Cruickshank:

In considering certain of the major issues regarding exceptional children in contemporary education, two problems immediately come to the fore. The first of these is concerned with the education of the specialist teacher, the second with the education of general classroom teachers at all levels. (Cruikshank, 1952, pp. 1-2)

I have been a teacher educator since June 1994 when I returned to Australia from Canada. 1994 was also the first year that a special education course became mandatory for all preservice teacher candidates in New South Wales. I have been involved in developing, planning, and teaching such courses ever since.

One of the most noticeable trends throughout my career has been the blurring of special education and general classroom instruction (see Fuchs, Fuchs, & Stecker, 2010). Inclusive education in our schools necessitates that all teachers learn to respond to the needs of their learners through quality instructional practices and collaboration with colleagues and specialists. The students with learning difficulties who make up 20% (some say 30%) of the school-age population have much to gain from (a) teachers who are aware of universal design for learning approaches; (b) schools that adopt multiliter systems of support (like response to intervention (RtI)); and (c) assessment that is used to identify students’ learning needs, track their progress, and investigate the effectiveness of attempts to address these needs.

With the challenges of inclusive education in mind, my colleagues Jeanette Berman and Anne Bellert and I published *Sustainable Learning* in 2015. *Sustainable Learning: Inclusive Practices for 21st Century Classrooms* unpacks practices that facilitate implementation of teaching that matters and learning that lasts. It also introduces the responsive teaching framework – eight questions that guide inclusive

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### Table 4

<table>
<thead>
<tr>
<th>NAPLAN Scores</th>
<th>N</th>
<th>Pre-QS NAPLAN Score</th>
<th>Pre-QS SD</th>
<th>Post-QS NAPLAN Score</th>
<th>Post-QS SD</th>
<th>Gain</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>QuickSmart</em> students</td>
<td>135</td>
<td>418.80</td>
<td>66.81</td>
<td>486.50</td>
<td>52.52</td>
<td>67.70</td>
<td>1.13</td>
</tr>
<tr>
<td>Comparison students</td>
<td>85</td>
<td>493.90</td>
<td>61.04</td>
<td>539.80</td>
<td>57.55</td>
<td>45.90</td>
<td>0.77</td>
</tr>
</tbody>
</table>

Note. Combined NAPLAN results (scaled scores) for students who completed the *QuickSmart* (QS) program in 2013 and 2014 and their average-achieving comparison peers. The effect size represents improvement over a period of two years.
teacher practice as shown in Figure 4. Bill Cruickshank would have approved, as he was a true believer in clinical experience and the importance of teacher skill. He wrote that, in his opinion, “It is possible to speak definitively from the point of view of theory that has grown out of more than four decades of contact with these children” (Cruickshank, 1982, p. 337).

Since the beginning of 2016 to the end of June 2017, my colleague Jeanette Berman and I have been at Melbourne Graduate School of Education learning about learning intervention together. In reorienting our Master of Learning Intervention program for practising teachers, we have had cause to unpack what we mean by learning intervention and how it relates to responsive teaching and the more intense and targeted notion of educational casework (see Figure 5).

To bring these ideas together: Learning intervention is everything that effective teachers do to lead and support the learning of their students in the classroom and the school. Learning intervention is supported by the different layers of intervention that we have conceptualized akin to response to intervention, but with every aspect of students’ learning programs – whether implemented individually, in small groups, in the classroom, or elsewhere – linked to classroom learning, aimed towards classroom success and, ultimately, lifelong sustainable learning. In our model of layered learning intervention (Figure 6), the focus remains on the learning needs of students.

In my current role, it is also necessary to focus on the needs of preservice teacher candidates, and our inservice teachers enrolled in the Master of Learning Intervention. The inservice teachers who are working with us are looking to lead and coordinate processes of student support in their schools. Indeed, I believe that it is the coordination of support, the use of evidence to justify programs offered to all students, including students with learning difficulties, and the harmonization of approaches across schools and systems, that is our most salient challenge in the field of learning difficulties at present. As school funding models change, many systems will be looking for creative and coordinated ways to support students beyond the usual deployment of teaching assistants to assist individual students.
LEARNING INTERVENTION
Responsive teaching and educational casework

Figure 5. Responsive teaching and educational casework.

Educational casework

- Individual focus
- Whole-class focus

Responsive teaching

Small-group and individual longer term intervention
Small-group and individual short-term intervention
Responsive, differentiated classroom teaching

Figure 6. Berman and Graham’s (2018) model of layers of learning intervention.
As past Cruickshank addresses have established (I am thinking here particularly of the lecture delivered by Tom Scruggs on learning disabilities and instructional programming), we know a great deal about what we should be doing for students with learning difficulties. Students who have learning difficulties (and concomitant behaviour difficulties and/or social difficulties) need teachers. They need systematic, explicit teaching, practice to establish automaticity – and intervention. The challenge of the future lies in structuring, implementing, and evaluating this work in schools, and throughout systems, to ensure that evidence-based learning intervention is available as a matter of course to all those who need it.

References


Executive Functioning and Psychopathology in Psychotherapy for Adolescents With Specific Learning Disorders

DAPHNE KOPELMAN-RUBIN1,4, ANAT BRUNSTEIN KLOMEK1,4, MICHAL AL-YAGON2, LAURA MUFSON3, ALAN APTER1,4 AND MARIO MIKULINCE1

Abstract

This study examined the contribution of executive functioning (EF) to improvements in psychiatric symptomatology following I Can Succeed (ICS; Kopelman-Rubin, 2012) psychotherapy, a skill-enhancement intervention designed to target EF and socio-emotional aspects of specific learning disabilities (SLD). Forty adolescents with SLD underwent ICS in an open clinical trial. Executive functions and psychiatric symptomatology were measured before and after treatment plus at a six-month followup. Findings indicated that greater improvement in EF (specifically inhibitory control and semantic fluency) during psychotherapy was linked with lower severity of internalizing symptoms at the end of treatment. In addition, only better baseline inhibitory control was linked to greater improvement in the severity of both internalizing and externalizing symptoms from the end of treatment to the six-month followup. The findings highlight the importance of addressing EF and psychopathology symptoms in psychotherapy with adolescents with SLD.

Keywords: Adolescents, Specific Learning Disorders, Psychological Intervention, Executive Functions, Psychopathology Symptoms

Specific learning disorder (SLD) is one of the most common neurodevelopmental disorders in children and adolescents, with 5-15% prevalence rates across languages and cultures (Diagnostic and Statistical Manual of Mental Disorders [5th ed.; DSM-5], American Psychiatric Association, 2013). SLD often co-occurs with other neurodevelopmental disorders such as attention deficit-hyperactivity disorder (ADHD) (e.g., Barkley, 2014; DuPaul, Gormley, & Laracy, 2013), as well as psychiatric disorders such as anxiety, depression (e.g., Capozzi et al., 2008; Goldston et al., 2007; Sideridis, 2007), and conduct disorders (Carroll, Maughan, Goodman, & Meltzer, 2005).

Further, SLDs are also frequently associated with deficits in the cognitive processes known as executive functioning (EF) (Meltzer & Krishnan, 2007) – an umbrella term used to describe mental functions such as problem solving, reasoning, planning, and cognitive flexibility (Blair & Razza, 2007). Core EFs include cognitive inhibition, verbal fluency, working memory, and selective attention (Diamond, 2013) as well as self-control and self-regulation (e.g., Miyake et al., 2000). Verbal fluency tasks are among the most common and widely used measures of EF (Lezak, Howieson, Bigler, & Tranel, 2012) in both research and clinical practice in the fields of clinical and educational neuropsychology (Gonçalves et al., 2017). Semantic verbal fluency involves semantic knowledge, construction of semantic associations in one’s memory and retrieval, and controlled search (Kave, 2006), all related to EF (Hurks et al., 2010).

1. Interdisciplinary Center (IDC) Herzliya; 2. Tel Aviv University; 3. Columbia University; 4. Schneider Children’s Medical Center of Israel

Students diagnosed with SLD experience difficulties with complex academic tasks that require the ability to plan one’s time and organize and prioritize information (Diamond, 2013). They also exhibit difficulties in distinguishing major ideas from details and monitoring progress in goal-oriented actions (Blair & Razza, 2007). In addition, these students often experience difficulties in the social realm, including social understanding and judgment, emotion regulation, and behavioral control (Meltzer & Krishnan, 2007). As a result, adolescents diagnosed with SLD frequently experience maladjustment within social and academic domains.

To date, most interventions among children and adolescents with SLD have focused on enhancing learning skills, such as reading (Lovett, Barron, & Frijters, 2013; Siegel & Mazabel, 2013; Solis et al., 2012), writing (Graham, Harris, & McKeown, 2013), and mathematics (Fuchs, Fuchs, Schumacher, & Seethaler, 2013). Various kinds of cognitive-skill interventions have also been used, such as working memory training (Groppr, Gotlieb, Kronitz, & Tannock, 2014). Finally, interventions targeting socio-emotional aspects of SLD have also been quite common, such as group therapy (Freilich & Shechtman, 2010; Mishna & Muskat, 2004), cognitive behavior therapy (Kroese, Dagnan, & Loumidis, 1997), social skills training (Vaughn, LaGreca, & Kuttler, 1999), and academic motivational programs (Brier, 2007).

Based on a meta-analysis of studies that have examined social skills programs for children with SLD, Kavale and Mostert (2004) concluded that although findings revealed limited efficacy for social skills training, in light of the importance of social skills in dealing with social situations, these interventions should not be dismissed. They further suggested that there may be a need for closer coordination between academic remediation and social skills training and that these interventions should be “rebuilt” as part of a comprehensive treatment for students with SLD. Moreover, Palombo (2001) suggested that the treatment of children with SLD should include work with parents, teachers, and other professionals who maintain close relations with the children.

These suggestions, and the accumulating knowledge about the reciprocal influences between SLD, EF, social-emotional functioning, and psychopathology (e.g., Blair & Diamond, 2008; Matison & Mayes, 2010), point to a need for a comprehensive therapy that would target all of these aspects as interconnected components of multilayered phenomena.

### I Can Succeed (ICS)

We previously published a study on the feasibility and acceptability of a new psychotherapy intervention called I Can Succeed (ICS; Kopelman-Rubin et al., 2012) for adolescents diagnosed with SLD. A manual-based psychotherapy, ICS aims to promote the interpersonal, emotional, and academic functioning of adolescents with SLD and related psychiatric disorders. As such, it targets both the EF and socio-emotional aspects of SLD and enhances skills in three major areas: intrapersonal (increasing and promoting levels of self-awareness of both strengths and weaknesses, developing self-direction towards setting goals while establishing priorities and providing organizational strategies); interpersonal (effective communication, decision making/problem solving, and self-advocacy); and school/community (strengthening the family-school relationship by choosing a significant figure at school to accompany the process of psychotherapy and guiding parents about effective communication with school staff).

The ICS protocol consists of two phases: acute and followup. The acute phase includes 13 weekly, 50-minute sessions (over a three-month period). The followup phase includes six sessions over an 18-month period (conducted 2 weeks and 1, 3, 6, 12, and 18 months after treatment ends). Most of the sessions are individual 50-minute sessions; however, parents may attend up to four sessions.

The intervention integrates ongoing work with the adolescent’s school, including one session at school with school staff, parents, and the adolescent. (For additional details about ICS, see the procedure section below and Kopelman-Rubin et al., 2012). Previous publications showed significant pre-/post-improvements on measures of internalizing and externalizing symptoms (Kopelman-Rubin et al., 2012) and significant positive changes in feelings of loneliness, attachment orientations towards parents, and attachment-related representations of teachers (Brunstein Klomek et al., 2013).
Purpose of the Study

The current study examined the contribution of EF to an improvement in psychiatric symptomatology resulting from ICS psychotherapy. We formed the following hypotheses:

1. An adolescent’s baseline levels of EF (inhibitory control and verbal fluency) will predict the psychiatric symptom severity level at both the end of the acute phase of treatment and the six-month followup.

2. EF improvement (delta) during ICS intervention will predict the psychiatric symptom severity level at both the end of the acute phase of treatment and the six-month followup.

Method

Participants

The participants consisted of 40 adolescents diagnosed with SLD and their parents. All participants were junior-high-school students, with a mean of 7.44 years of schooling. All of them resided in central Israel. The majority came from a middle-class socioeconomic background and fairly well-educated families (see Table 1).

All the participants went through a comprehensive psycho-educational assessment (performed by school psychologists) and a semi-structured psychiatric interview (MINI-KID; administered by child and adolescent psychiatrists). Inclusion criteria consisted of an SLD diagnosis, normal range of IQ, and regular class attendance. Exclusion criteria included suicidal ideation and psychosis. The participants were either self-referred or referred by community service providers (schools and municipal psychological services).

All were diagnosed with learning disorders, and 77.5% (n = 31) had more than one learning disorder, particularly co-morbid reading disorder and written expression disorder. The sample reported high co-morbidity of other psychiatric disorders (see Table 1). Three adolescents dropped out after the third session, and one did so after the fourth session. These participants were not significantly different from the other participants in terms of demographic characteristics, including age, severity of learning disorders, psychiatric comorbidity, parents’ age, educational level, and socio-economic status (SES). Ten participants were treated with medication prior to ICS intervention. During ICS, nine participants began taking medication, and two stopped doing so. Sixteen participants were taking methylphenidate, and one was taking an SSRI (selective serotonin reuptake inhibitor).

Measures

The following measures were administered to parents and/or the adolescent participants.

Demographic questionnaire. Parents completed a demographic questionnaire to gain information regarding age, grade, gender, racial/ethnic background, household composition, and social-economic status (SES).

The Mini-International Neuropsychiatric Interview for Children and Adolescents (MINI-KID; Sheehan et al., 2010). The MINI-Kid is a short, comprehensive, structured diagnostic interview for DSM-IV and ICD-10 psychiatric disorders in children and adolescents. It measures 25 diagnoses, including mood disorders, anxiety disorders, substance use disorders, Tourette’s disorder, ADHD, oppositional defiant disorder (ODD), conduct disorder (CD), psychotic disorders, eating disorders, trauma-related disorders, and pervasive developmental disorder.

Standardized Brain Resource Cognition assessment (IntegNeuro™) (Brain Resource, Ltd., 2009). IntegNeuro is a touchscreen-based, computerized battery that evaluates the following domains of cognitive functioning: motor speed, attention/vigilance, working memory, verbal learning, visual learning, speed of processing, language, reasoning and problem solving, and social cognition. It takes most children and adolescents approximately 60 minutes to complete (Silverstein et al., 2010). This neurocognitive assessment has demonstrated good reliability against paper-and-pencil tests as well as good test-retest reliability (Clark et al., 2006). We also used the Stroop color-naming task to measure inhibitory control and verbal fluency.

Child Behavior Checklist (CBCL; Achenbach, 1991). This Hebrew adaption of a standardized instrument for rating children’s behavior (Zilber, Auerbach, & Lerner, 1994) includes 112...
Table 1
Demographic Characteristics of the Sample

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>% / M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Adolescent Characteristics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>12</td>
<td>30%</td>
</tr>
<tr>
<td>Male</td>
<td>28</td>
<td>70%</td>
</tr>
<tr>
<td>Grade</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>6th grade</td>
<td>1</td>
<td>2.5%</td>
</tr>
<tr>
<td>7th grade</td>
<td>24</td>
<td>60%</td>
</tr>
<tr>
<td>8th grade</td>
<td>13</td>
<td>32.5%</td>
</tr>
<tr>
<td>9th grade</td>
<td>2</td>
<td>5%</td>
</tr>
<tr>
<td><strong>Learning Disability Diagnosis (DSM-IV-TR)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reading Disorder</td>
<td>27</td>
<td>67.5%</td>
</tr>
<tr>
<td>Disorder of Written Expression</td>
<td>25</td>
<td>62.5%</td>
</tr>
<tr>
<td>Mathematics Disorder</td>
<td>11</td>
<td>27.5%</td>
</tr>
<tr>
<td>Reading and Writing</td>
<td>18</td>
<td>40%</td>
</tr>
<tr>
<td>Reading, Writing, and Mathematics</td>
<td>4</td>
<td>10%</td>
</tr>
<tr>
<td>Reading and Mathematics</td>
<td>5</td>
<td>12.5%</td>
</tr>
<tr>
<td>Writing and Mathematics</td>
<td>5</td>
<td>12.5%</td>
</tr>
<tr>
<td><strong>DSM-IV Comorbidity Diagnosis</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADHD</td>
<td>21</td>
<td>52.5%</td>
</tr>
<tr>
<td>Anxiety Disorders</td>
<td>11</td>
<td>27.5%</td>
</tr>
<tr>
<td>Major Depression Disorder</td>
<td>3</td>
<td>7.5%</td>
</tr>
<tr>
<td>Oppositional Deficient Disorder</td>
<td>3</td>
<td>7.5%</td>
</tr>
<tr>
<td>Tourette's Disorder and Tic Disorder</td>
<td>1</td>
<td>2.5%</td>
</tr>
<tr>
<td><strong>Parents and Family Characteristics</strong></td>
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<td></td>
</tr>
<tr>
<td>Mother's age</td>
<td>40</td>
<td>43.1 (4.45)</td>
</tr>
<tr>
<td>Father's age</td>
<td>39</td>
<td>44.77 (5.1)</td>
</tr>
<tr>
<td>Mother's education level</td>
<td>40</td>
<td>14.16 (2.45)</td>
</tr>
<tr>
<td>Father's education level</td>
<td>39</td>
<td>13.71 (2.89)</td>
</tr>
<tr>
<td><strong>Family Income</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Below average</td>
<td>5</td>
<td>12.5%</td>
</tr>
<tr>
<td>Average</td>
<td>27</td>
<td>67.5%</td>
</tr>
<tr>
<td>Above average</td>
<td>8</td>
<td>20%</td>
</tr>
</tbody>
</table>

*Includes ADD/ADHD; **20% (n = 8) had psychiatric comorbidity; ***Determined based on parents' self-report demographic questionnaire.
behavioral items scored on a 3-point scale (0 = not true; 1 = somewhat or sometimes true; 2 = very/often true). Achenbach’s principal-components analysis yielded two subscales: internalizing problems scale (.870; .751; .869; N of items = 32) and externalizing problems scale (.893; .853; .869; N of items = 35). Higher CBCL scores indicate more maladaptive behaviors.

Procedure

At baseline, all the adolescent participants underwent a comprehensive psycho-educational assessment administered by educational psychologists; a structured psychiatric interview administered by psychiatrists; and the standardized IntegrNeuro battery assessment administered by trained undergraduate psychology students. The participants underwent the IntegrNeuro battery assessment once again at the end of the acute phase of treatment. Parents completed the CBCL three times: at the start to establish a baseline, at the end of the acute phase of treatment, and at the six-month followup.

The IRB of the Schneider Children’s Medical Center of Israel and the Interdisciplinary Center (IDC) Herzliya approved the study.

The Intervention – I Can Succeed (ICS)

I Can Succeed (ICS; Kopelman-Rubin et al., 2012) is a manual-based psychotherapy intervention aimed at addressing both academic EF skills and social-emotional skills of adolescents who have been diagnosed with SLD. The intervention consists of an acute phase (13 weekly sessions) and a followup phase (6 sessions over a period of 18 months). During the acute phase, the ICS protocol includes a meeting at the school in which the adolescent’s teacher is included. The current study included only the first six months of followup sessions. Most sessions of both the acute and the followup stages were conducted on an individual basis; however, parents may have attended up to four sessions. Each session lasted 50 minutes, with the exception of the first session, which lasted 70 minutes.

The starting point of ICS is the conceptualization of academic EF and the emotional and interpersonal components of SLD as interconnected aspects of a complex, multilayered phenomenon. ICS attempts to encompass intrapersonal as well as interpersonal domains. The interpersonal domain aspects of the intervention are theoretically grounded in Interpersonal Psychotherapy for Depressed Adolescents (IPT-A) (Mufson, Dorta, Moreau, & Weissman, 2004a, 2004b).

The intervention consists of the following modules: psychoeducation about SLD and the unique neuropsychological profile of the teen; self-awareness of both personal strengths and weaknesses; developing self-direction towards setting realistic goals and establishing priorities; improving organizational strategies; interpersonal communication skills; decision-making/problem-solving skills; self-advocacy skills (i.e., learning to effectively express what I need and what would help me); and strengthening the adolescent-parent and the family-school relationships (by choosing a significant figure at school to support the process and guide the adolescent and parents with regard to effective communication with the school staff about school-related issues). (See Kopelman-Rubin et al., 2012, for a detailed description of the intervention.)

Nine therapists delivered ICS in an outpatient psychiatric clinic as part of an open clinical trial. The therapists were trained in the intervention at a six-day workshop. Biweekly group supervision, led by an expert educational psychologist, was provided during the trial and all sessions were recorded to ensure adherence to the manual.

Data Analysis

In order to examine the pattern of associations among predictors and outcome measures, we conducted a series of Pearson correlations. Next, we examined whether the adolescents’ baseline levels of EF (T1) and changes in EF from T1 to T2 (at the end of the acute phase of treatment) predicted their levels of psychopathology (internalizing and externalizing symptoms’ severity) at the end of the acute phase of treatment (T2). We also checked whether there was a change in psychopathology severity between the end of treatment and the six-month followup (T2 to T3). To do so, we conducted a series of multiple-regression analyses. Specifically, we introduced the measures of the Stroop color-nam-
Executive Functioning and Psychopathology in Psychotherapy for Adolescents
With Specific Learning Disorders

Results

Missing Data Analysis

Overall, 5.83% of the data were missing. According to Little’s (1988) MCAR test, the data were completely missing at random, \( \chi^2_{(33)} = 28.39, p = .70 \). No indications of heteroscedasticity were found.

Associations Between Major Study Measures

Correlation coefficients, which are based upon the pooled results of the multiple imputation, are presented in Tables 2 (among predictors) and 3 (among outcome measures). Analysis of the predictors revealed that EF scores did not correlate significantly with each other, indicating high discriminant validity. Analysis of the outcome measures, on the other hand, revealed significant correlations (see Table 3) and that greater improvement in one psychopathology measure was linked with greater improvement in the other psychopathology measures.

Severity Level of CBCL Symptoms

We used the two CBCL broadband syndrome scales, internalizing – referring to 30 internalizing behaviors such as withdrawal, somatic complaints, and expressions of anxiety/depression – and externalizing – referring to 30 externalizing behaviors such as delinquency and aggressiveness.

Analysis revealed that CBCL symptoms decreased during treatment. Specifically, before the intervention, 42.5% were in the clinical and subclinical range of internalizing problems and 22.5% in those ranges for externalizing problems, whereas after treatment, the numbers were 24.3% and 13.5%, respectively. Further, at the six-month followup, only 11.1% (\( p < .001; \) i.e., significant reduction) and 7.4% (\( p = .16; \) nonsignificant reduction) were in the clinical and subclinical range of internalizing and externalizing problems, respectively.

The Contribution of EF to Psychopathology Levels at the End of the Acute Phase of Treatment and at the Six-Month Followup

The pooled results of the multiple imputation are presented in Table 4. As illustrated, the analyses indicated that the greater improvement in inhibitory control (as indicated by the Stroop score) from T1 to T2, and in semantic fluency, was linked to lower severity of internalizing symptoms at the end of treatment, but not to the severity of externalizing symptoms. In addition, only better inhibitory control (as indicated by the Stroop score) before treatment (T1) was linked to greater improvement in the severity of internalizing and externalizing symptoms from the end of treatment (T2) to the six-month followup (T3). Semantic fluency was not related to the change of severity of internalizing and externalizing symptoms.

Controlling for ADHD/ADD and other measures, as described above, made it possible to conclude that all of the effects of EF on psychopathology were significantly above and beyond the contribution of ADHD/ADD, any change in medication, and baseline levels of psychopathology.
### Table 2
Correlation Coefficients to Examine the Pattern of Association Between Predictors Accompanied by Means and Standard Deviations

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<tbody>
<tr>
<td>1</td>
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<tr>
<td>2</td>
<td></td>
<td>.10</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>-.64***</td>
<td>-.09</td>
<td>--</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>.16</td>
<td>-.31*</td>
<td>-.19</td>
</tr>
</tbody>
</table>

**Mean**

<table>
<thead>
<tr>
<th></th>
<th>10.60</th>
<th>17.38</th>
<th>1.26</th>
<th>-70.15</th>
</tr>
</thead>
</table>

**SD**

|       | 2.99  | 3.92  | 3.03 | 87.48  |

* *p < .05, ***p < .001.

### Table 3
Correlation Coefficients to Examine the Pattern of Association Between Outcome Measures Accompanied by Means and Standard Deviations

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
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<tr>
<td>2</td>
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<td>.48**</td>
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<td>3</td>
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<td>-.64***</td>
<td>-.29</td>
<td>--</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>-.49**</td>
<td>-.69***</td>
<td>.66***</td>
</tr>
</tbody>
</table>

**Mean**

|       | 7.59 | 6.92 | 0.43 | -1.83 |

**SD**

|       | 6.39 | 6.02 | 9.00 | 4.76  |

* *p < .05, **p < .01, ***p < .001.

### Table 4
Regression Coefficients for Predicting Psychopathology EF Scores

<table>
<thead>
<tr>
<th></th>
<th>Δ Externalizing</th>
<th>Δ Internalizing</th>
<th>Externalizing</th>
<th>Internalizing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
<td>SE</td>
<td>b</td>
<td>β</td>
</tr>
<tr>
<td>Psychopathology</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1</td>
<td>-30</td>
<td>0.10</td>
<td>-0.20*</td>
<td>-13</td>
</tr>
<tr>
<td>Medicine</td>
<td>.21</td>
<td>1.56</td>
<td>2.23</td>
<td>-03</td>
</tr>
<tr>
<td>ADHD</td>
<td>-0.9</td>
<td>1.43</td>
<td>-0.81</td>
<td>-16</td>
</tr>
<tr>
<td>Stroop</td>
<td>-.27</td>
<td>0.75</td>
<td>-1.27~</td>
<td>-.37</td>
</tr>
<tr>
<td>ΔStroop</td>
<td>-.12</td>
<td>0.74</td>
<td>-0.58</td>
<td>-.02</td>
</tr>
<tr>
<td>Semantic fluency</td>
<td>-.22</td>
<td>0.93</td>
<td>-1.07</td>
<td>-.06</td>
</tr>
<tr>
<td>ΔSemantic fluency</td>
<td>.19</td>
<td>0.89</td>
<td>0.92</td>
<td>.19</td>
</tr>
</tbody>
</table>

\[
R^2 = 36.4\% \quad R^2 = 23.5\% \quad R^2 = 47.0\% \quad R^2 = 41.5\%
\]

Note. ~p < .10, *p < .05, **p < .01, ***p < .001. Δ = change.
Discussion

The present study examined whether adolescents’ baseline levels of EF (inhibitory control and verbal fluency) and their improvement (delta) during ICS psychotherapy can predict their psychiatric symptom severity level (at both the end of the acute phase of treatment and the six-month followup).

The major results indicate that better baseline inhibitory control (but not verbal fluency) was linked to greater improvement in the severity of internalizing and externalizing symptoms from the end of the acute phase of treatment to the six-month followup. In addition, greater improvement in both inhibitory control and verbal fluency during treatment was linked to lower severity of internalizing (but not externalizing) symptoms at the end of treatment.

Implications for Practice

Our findings are consistent with those of previous studies of typically developing students in showing that interventions targeting EF prevent the development of later psychopathology (Riggs, Greenberg, Kusche, & Pentz, 2006), and suggest that the protective role of EF is also applicable to adolescents with SLD.

The current results are also in line with the literature on the link between EF and psychopathology (e.g., Martel, Nikolas, & Nigg, 2007; Riggs et al., 2006; Rinsky & Hinshaw, 2011) and the role of EF in social functioning. Thus, our findings encourage implementation of EF-focused prevention programs for adolescents with SLD, especially those showing EF deficits.

These findings also support ICS’s basic assumption regarding the importance of addressing both EF and psychopathology symptoms as being interconnected and the importance of targeting both EF and psychopathology symptoms in treatment of teens with SLD. The objectives of the ICS intervention are to enhance the abilities of teens with SLD to plan and choose possible actions in social situations, to develop better organizational skills, and to be able to inhibit impulsive responses in order to better advocate for themselves. All of these skills incorporate both EF and social-emotional skills.

The finding that greater improvement in EF during treatment was only linked to lowered severity of internalizing symptoms at the end of the acute phase of treatment, and not to externalizing symptoms, may be explained by the fact that ICS is theoretically grounded in IPT-A. IPT-A focuses upon internalizing problems (Mufson et al., 2004a) and, therefore, improvement of EF during ICS might have facilitated the acquisition of skills specifically targeted to improve coping with internalizing symptoms.

Limitations

The study has several limitations. First, this is a feasibility study, and treatment was carried out in an open clinical trial rather than a randomized controlled trial. Second, the sample size was small, allowing for examining the contribution of only two EF functions. Since EF seems to play an important role in the improvement of psychopathology symptoms, it is important to examine the contribution of other EF functions upon psychiatric outcomes among adolescents who have been diagnosed with SLD and who are treated with psychotherapy.

References


A Not-So-Simple View of Adolescent Writing

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Abstract

According to the Simple View of Writing, four primary skills are necessary for successful writing (Berninger & Amtmann, 2003; Berninger & Winn, 2006). Transcription skills (e.g., handwriting, spelling) represent lower-order cognitive tasks, whereas text generation skills (e.g., ideation, translation) represent higher-order writing/cognitive abilities. Self-regulatory executive functions include the attentional and regulatory abilities that help manage the writing process, and working memory represents the cognitive complexity of the writing process. Exploratory factor analysis was used to explore the relations amongst the components of the Simple View of Writing. A one-way ANOVA tested for differences between struggling and non-struggling writers on the observed variables. Results revealed a two-factor model, suggesting writing is more multidimensional. Statistically significant differences were observed between struggling and non-struggling writers on all measures except the Behavior Rating Inventory of Executive Function – Self-Report and the Graphic Speed task of the Detailed Assessment of Speed of Handwriting.

Keywords: Writing, Simple View of Writing, Adolescents

Successfully coordinating the processes of writing is complex, as many researchers have scientifically modeled (see Graham, 2006, for a review). Writing models themselves also have varying degrees of complexity (e.g., Berninger, Mizokawa, & Bragg, 1991; Berninger & Winn, 2006; Hayes, 1996; Hayes & Flower, 1980). However, according to Hayes (1996), modeling often relies on incomplete parts from which more specific models can be built; even Graham (2006) refers to the models he reviews as incomplete. Thus, further modeling offers promise for creating a richer, more nuanced understanding of writing (Graham, 2006).

Following upon Hayes and Flower’s (1980) pinnacle processing model of writing and its subsequent revisions, the Simple View of Writing (SVW) has more recently become a prominent developmental writing model. Early conceptions of the SVW postulated that writing is the product of two processes – the lower-order skill of spelling and the higher-order skill of ideation (Juel, Griffith, & Gough, 1986).

Later work by Berninger and colleagues to understand beginning and developing writing (e.g., Berninger & Swanson, 1994; Berninger et al., 1991; Berninger, Whitaker, & Swanson, 1992) also resulted in a SVW model (see Berninger & Amtmann, 2003; Berninger et al., 2002). Berninger and colleagues represented their model as a triangle, with transcription and self-regulatory executive functions (EF) serving as the base and text generation posited as the “vertex” (Berninger & Amtmann, 2003, p. 349; Berninger et al., 2002, p. 292), with the entire structure situated within a working memory (WM) environment.

Using advancements in brain research and technology, Berninger and Winn (2006) updated the model, forming the “not-so-simple view of internal functional writing systems” (p. 97). This updated model retained the original components of the initial model, but provided greater clarity about the components of WM and self-regulatory EFs and suggested that long-term memory (LTM) is also activated during planning, reviewing, and
revising, and that short-term memory (STM) is activated during reviewing and revising.

This study drew on an understanding of the SVW from the work of Berninger and colleagues (Berninger & Amtmann, 2003; Berninger et al., 2002; Berninger & Winn, 2006). Swanson and Berninger’s earlier work remains key literature in the field of writing for understanding relations between WM and STM, and text generation and transcription-related skills. When possible, more recent literature is cited, but with the dearth of literature related to secondary learners, earlier work is included to supplement and support hypothesized interactions.

Although the SVW remains a highly visible theoretical model across the elementary writing literature and occasionally at the middle school level, the model lacks specificity about the component skills necessary for text generation (Kim & Schatschneider, 2017) and the relations amongst the component skills at the high school level. Thus, this study sought to specifically address the current gap in the literature for the SVW as it relates to high school students, given the intractable and entrenched writing needs of adolescent struggling writers and the centrality of writing to postsecondary success. However, it is important first to understand how each of the components of the SVW contributes to the development of writing and the potential implications of these components for adolescent writers, because knowledge of and the relation(s) of the components may help researchers and teachers understand the challenges that adolescents are encountering in writing and can later be used to inform the development of corresponding instructional and intervention practices.

Component Skills of the SVW

The SVW consists of four primary components: transcription, self-regulatory EFs, text generation, and WM. Each is described below.

Transcription

According to the SVW model, students who spend a considerable portion of their writing time focusing on transcription (e.g., forming letters and spelling words) have fewer cognitive resources remaining to devote to higher-order processes like planning and ideation. The role of transcription skills in the production of writing (e.g., resulting in more fluent and detailed text and improved composition) is well supported at the elementary level (see Berninger, 1999; Berninger et al., 2002; Graham, Berninger, Abbott, Abbott, & Whitaker, 1997; Kim, Al Otaiba, Wanzek, & Gatlin, 2015; Wagner et al., 2011). However, the extent to which transcription skills continue to impact adolescent writers is unclear, even though transcription deficits are often a persistent struggle for individuals with learning disabilities well into the intermediate years (McCutchen, 1996, 2011), and the speed of writing is a direct effect/predictor of writing at age 16 (Dockrell, Lindsay, & Connelly, 2009), with handwriting fluency beginning to plateau around junior high for typically developing writers (Graham, Berninger, Weintraub, & Schafer, 1998).

Self-Regulatory EFs

Self-regulatory EFs are the other base of the SVW. According to Berninger and Amtmann (2003), EFs within the model include conscious attention, planning, reviewing, revising, and strategies for self-regulation. As a writer matures, the EFs that regulate processes shift from “other-regulation” (e.g., regulation offered via teachers, parents, and peers) to “self-regulation” (Berninger & Amtmann, 2003, p. 350). This transition is the result of both brain maturation and instruction (see also Berninger & Richards, 2002), suggesting that self-regulatory skills develop over time, including through adolescence (Effeney, Carroll, & Bahr, 2013).

Text Generation

Text generation, positioned as the vertex of the SVW model, draws on both ideation and the translation of those ideas into language representations (especially at the sentence and text/discourse level) in WM (Berninger et al., 2002). In an early study, Juel et al. (1986) described ideation as the generation and organization of ideas during writing. However, this dynamic, complex process of generating text remains largely underdeveloped in the literature, even at the elementary level (Kim & Schatschneider, 2017), where text generation is often posited as an outcome of the other components of the model, and said to be influenced by transcription skills (Abbot, Berninger,
A Not-So-Simple View of Adolescent Writing

& Fayol, 2010; Berninger et al., 2002), which, in turn, mediate the relationship between writing and WM – the final component of the model (Kim & Schatschneider, 2017). Even though recent research on the SVW has equated text generation with oral language skills (Kim & Schatschneider, 2017), it is unclear what Berninger and colleagues intended when they specified the model (e.g., Berninger & Amtmann, 2003). Thus, it is premature to assume that text generation is synonymous with oral language generation, though Berninger’s work has continued to emphasize writing as foremost oral language representation.

WM

Within the SVW, WM is believed to constrain students’ transcription, text generation, and self-regulation skills. According to Cowan (2014), WM may be defined as “the small amount of information that can be held in an especially accessible state and used in cognitive tasks” (p. 198; e.g., planning, comprehension, reasoning, and problem-solving). The writer is required to maintain a series of processes and information in mind as he/she actively creates text. Concepts from LTM must be accessed and stored in WM as the writer decides on what, why, and how to write (Swanson & Berninger, 1996); this continues to be important throughout planning, translating, reviewing, and revising (Berninger & Winn, 2006), with STM also central to the reviewing and revising processes. Thus, the interplay of transcription, self-regulatory EFs, and text generation – in involving LTM, STM, and WM – might result in cognitive capacity limitations, which can impact “the number of writing processes that the writer can manage simultaneously, but also the very nature of those processes” (McCutchen, 1996, p. 320).

Purpose of the Study

Although the SVW remains a highly visible and informative model, critical aspects of the model require additional support, especially if research is to invoke the SVW as an appropriate and rigorous theoretical model. Specifically, studies are needed to structurally evaluate the entire model and to evaluate it across the age span.

Building on the extant literature and the component structure of the SVW, this study took an integrat-ed or holistic approach to assess the complete model (rather than the relationship between selected components) in order to explore the relations of the component skills at ninth grade, seeking to address a gap in the present research, which has primarily focused on beginning writing. That is, we sought to answer the question: Can a measurement model be fit to the data? If not, what is the factor structure of the data? A secondary aim of the study was to explore differences between struggling and non-struggling writers across the observed variables.

Method

Participants

Participants in this study included 69 ninth-grade students from a large suburban public high school in the midwestern United States (57% female; mean age = 14.38 years). All students were enrolled in one of five English classes taught by the same certified English teacher, who was in her second year of teaching. Three of the five classes included support from a certified special education teacher in his first year of teaching.

Consenting students represented a diverse sample: 57% White; 43% of another race (2.90% Asian, 18.84% Black, 13.04% Hispanic, and 8.70% Multiracial); and 49% received a free or reduced-price lunch. Two students (2.90%) received special education services, and one student (1.45%) received services under Section 504 of the Rehabilitation Act of 1973. No students were identified as English language learners. For students for whom state testing data were available, scores on the state assessment in Communication Arts (grades 3–7) or English Language Arts (grade 8) (range \(n = 42–58\)) revealed that 23.9–38.1% performed at or below basic, indicating incomplete command of grade-level skills.

Measures

Careful consideration was taken in selecting assessments for the study. As in much of the previous literature, standardized assessments were preferred. However, because this sample included ninth-grade students, age-appropriate assessments were necessary. Moreover, due to limitations in available instruments for assessing self-regulatory EFs (e.g.,
self-report questionnaires specific to writing, like Petrić and Czár’s 2003 scale, was not designed for adolescents) and WM (e.g., no longer available or used in previous studies with elementary-aged students), alternative measures had to be selected.

Nonetheless, all selected assessments were chosen because they captured performance in areas strongly related to the components of the SVW. In this study, transcription referred to spelling and handwriting, self-regulation was measured by a standardized self-report inventory of EF and the ability to plan before writing, text generation was assessed by a student’s ability to generate text at the sentence and paragraph/essay level (i.e., written discourse), and WM was measured by the ability to recall a set of information in a particular sequence.

**Spelling.** The Spelling subtest of the *Wechsler Individual Achievement Test – III (WIAT-III)* (Wechsler, 2009) is a comprehensive, diagnostic standardized assessment of student academic achievement designed for children in grades pre-K through 12. The Spelling subtest contains 63 letter sounds/words ascending in difficulty. Letter sounds are presented to students in the context of a word; and each word is dictated orally, used in a sentence, and then stated again.

Unlike the standardized directions, all letter sounds/words were administered to students in medium-sized groups (11–16 students); basals and ceilings were scored later by the primary investigator. Age-based reliability coefficients for the Spelling subtest range from .95–.97 for students ages 13–16 (Breaux, 2009). The stability coefficient of the Spelling subtest is strong, with a corrected $r$ of .92 (Breaux, 2009).

**Handwriting.** The *Detailed Assessment of Speed of Handwriting (DASH)* (Barnett, Henderson, Scheib, & Schulz, 2007a), a standardized handwriting assessment, was used to assess students’ handwriting abilities. This assessment includes five subtests (Copy Best, Alphabet Writing, Copy Fast, Graphic Speed, and Free Writing) that evaluate different aspects of handwriting speed, including fine-motor and precision skills, quick and accurate production of well-known alphabetic symbols, the ability to vary handwriting speed, and free writing (Barnett, Henderson, Scheib, & Schulz, 2007b).

The Copy Best and Copy Fast subtests ask students to copy the familiar sentence “The quick brown fox jumps over the lazy dog” as quickly as possible in two minutes in their best and, later, in their fast handwriting. In the Alphabet Writing subtest, students write the letters of the alphabet in order in lowercase for one minute. During the Graphic Speed task, students make an X within a series of circles; the lines of the X must touch the smaller circle, but not exceed the larger circle. This task is timed for one minute, but is not used to derive the total standard score. The final task is a Free Writing essay on “My Life.” Students can write on any topic of their life; they are provided with a filled-in graphic organizer to assist in thinking about relevant topics, but they are not limited to those topics. The task is timed for 10 minutes, with time markers every two minutes.

Inter-rater reliability is high across the Copy Best, Alphabet Writing, Copy Fast, and Free Writing tasks, with intra-class correlations greater than .99. Inter-rater reliability is much lower for the Graphic Speed task, with an intra-class correlation of .85. Total score test-retest reliability is above .80, with Spearman correlation coefficients of .72 (Copy Best), .75 (Copy Fast), .92 (Alphabet Writing), .87 (Free Writing), and .89 (Total Score) for a sample of students ages 14–15 years. Internal consistency of the DASH is high, with Cronbach alphas between .83 and .89 for students who are 13–15 years of age. Criterion validity with the Movement ABC-2 test administered concurrently reveals positive, but low correlations at or below .4 (Barnett et al., 2007b).

**Writing measures.** To generate student writing at the sentence level, the Sentence Composition subtest of the *WIAT-III* (Wechsler, 2009), which includes Sentence Building and Sentence Combining, was administered. The Sentence Building task requires students to generate a complete sentence that correctly uses the target word in context. The Sentence Combining task requires students to accurately combine two or three target sentences into one sentence that includes the essential information from the target sentences while maintaining the same meaning.

All standardized scoring procedures were followed. Age-based reliability coefficients for Sentence Composition range from .84–.88 for students ages 13–16 (Breaux, 2009). The stability coefficient for Sentence Composition is moderate, with a corrected $r$ of .76 (Breaux, 2009).

To generate student writing samples at the paragraph/essay level, the Essay Composition sub-
test of the WIAT-III was administered. This subtest measures students’ expository writing in response to the prompt, “Write about your favorite game. Include at least 3 reasons why you like it.”

All standardized administration and scoring directions were followed for the total number of words written as well as Theme Development and Text Organization. Age-based reliability coefficients for Essay Composition range from .87–.88 for students ages 13–16 (Breaux, 2009). The stability coefficient for Essay Composition is strong, with a corrected $r$ of .91 (Breaux, 2009).

**Self-regulation.** The Behavior Rating Inventory of Executive Function – Self-Report (BRIEF-SR) (Guy, Isquith, & Gioia, 2004a) is a standardized psychological student self-report instrument of 80 items that is designed to assess children’s and adolescents’ views of their EF and self-regulatory behaviors across typical, everyday environments (Guy, Isquith, & Gioia, 2004b). All items are negatively worded and use a 3-point scale response format (1 = never a problem, 2 = sometimes a problem, and 3 = often a problem). Items include statements such as, “I don’t plan ahead for school assignments,” “I have problems organizing my written work,” and “I talk at the wrong time.”

Cronbach alpha coefficients range from .72–.87 for the clinical scales and are slightly higher for the Behavioral Regulation Index (BRI; .93), Metacognitive Index (MI; .95), and Global Executive Composite (GEC; .96) (Guy et al., 2004b). Stability coefficients range from .59–.85 and .84–.89 for the clinical scales and indices, respectively, over a period of 1–10 weeks (Guy et al., 2004b). Validation information (e.g., content, convergence-discriminant, and criterion validity) is not sufficiently available for the BRIEF-SR. For the purposes of this study, only the GEC, BRI, and MI composite scores, and the WM and Planning/Organization clinical scales were fully calculated; raw scores were converted to $t$ scores following the standardized scoring procedures.

Students also completed a five-minute planning measure similar to that of Vanderberg and Swanson (2007), as planning is a self-regulated writing technique that can impact the quality of one’s writing (e.g., Spivey & King, 1989). To assess their observable planning, students were provided with a blank sheet of paper prior to completing the WIAT-III Essay Composition subtest and instructed, “If you’d like, you can use this blank page to plan what you will write.” Students’ planning was evaluated using a 5-point holistic, qualitative rubric used and explained previously in the literature (see Berninger, Whitaker, Feng, Swanson, & Abbott, 1996; Vanderberg & Swanson, 2007; Whitaker, Berninger, Johnston, & Swanson, 1994).

**Memory measures.** The five subtests composing the Working Memory Index (WMI) of the Wechsler Intelligence Scale for Children – V (WISC-V) (Wechsler, 2014a) were individually administered. The WISC-V is a standardized assessment that measures a student’s intellectual or cognitive ability, and is appropriate for students aged 6–16 years. All measures of the WMI were administered (e.g., Digit Span [Forward, Backward, Sequencing] and Picture Span) in addition to Letter Number Sequencing (LNS; which is optional), and scored according to the standardized set of directions.

Average reliability coefficients across the Digit Span subtest for students ages 13–16 range from .79–.85 for the Forward task, .78–.82 for the Backward task, and .77–.85 for the Sequencing task. Overall average reliability coefficients are .81, .80, and .82 for Forward, Backward, and Sequencing, respectively, and stability coefficients (corrected $r$) are .82, .76, and .79 (Wechsler, 2014b). Average reliability coefficients across ages 13–16 on the Picture Span subtest range from .83–.85, with an overall reliability coefficient of .85, and a stability coefficient (corrected $r$) of .80 (Wechsler, 2014b). Average reliability coefficients across ages 13–16 for the LNS subtest range from .82–.89, with an overall reliability coefficient of .86 and a stability coefficient (corrected $r$) of .82 (Wechsler, 2014b).

**Procedures**

All assessments were administered by the first author and one trained instructional coach (a certified special education teacher) from the participating school district during students’ scheduled English classes. Tasks were completed across 17 days within a 6-week period from November–December 2015. WISC-V measures were administered individually, while all other measures were administered in groups of 11–16 students. Throughout the study, data were collected on the time of ad-
administration per assessment and/or per assessment session for a small sample of students and classes. Total administration time using mean scores was 139 minutes. Administration of all measures – including subtests – was stratified across classes.

Reliability

Reliability with the instructional coach was set at 100% for administration of all measures. On the initial check-out session, the instructional coach secured 51 of a possible 55 points on the reliability form for 93% accuracy. Inaccuracies were reviewed immediately. Approximately one week later, the principal investigator presented the instructional coach with short retrials on the items missed. These were completed with accuracy and discussed.

Inter-scorer reliability across measures was set at a minimum of 90%. All individuals who assisted with scoring were trained by the principal investigator on the requisite procedures. Scorers assisting on scoring the WIAT-III Sentence Composition subtests, Essay Composition, and the DASH had not participated in any level of data collection.

Data Analysis

Structural equation modeling (SEM) and exploratory factor analysis (EFA) using IBM SPSS AMOS 22 were used to examine whether the hypothesized model fit the data (i.e., to confirm the null hypothesis that the measurement model of the SVW is correctly specified) and to identify the number of factors represented by the data. Model fit was evaluated using chi-square statistics ($\chi^2$), the comparative fit index (CFI), Tucker-Lewis index (TLI), root mean square error of approximation (RMSEA), and standardized root mean square residuals (SRMR). In SEM, chi-square values should be nonsignificant, and Hu and Bentler (1998, 1999) have recommend that CFI and TLI be at least .95, with cutoff values of .06 for RMSEA and .08 for SRMR. One-way analysis of variance (ANOVA) was also run to determine whether statistically significant differences existed between struggling and non-struggling writers on the observed variables.

Results

Descriptive Statistics

As displayed in Table 1, students’ mean performance on the standardized academic and cognitive measures, along with the self-regulation measure, were in the average to above-average range. Measures demonstrated low to acceptable reliability (Cronbach’s $\alpha$s = .56–.78).

Tables 2 and 3 show inter-correlation coefficients and covariances, with variances reflected on the diagonal in bold on Table 3. Transcription and text generation measures were somewhat weakly to strongly related ($.13 \leq r_s \leq .86$). WM was similarly correlated with the transcription and text generation skills ($.07 \leq r_s \leq .50$). Self-regulation EFs were weakly to moderately negatively correlated with WM ($-.34 \leq r_s \leq -.09$) and weakly correlated with the transcription and text generation skills ($-.25 \leq r_s \leq .06$). As with the inter-correlations, all covariances were positive with the exception of those with the BRIEF-SR. This was to be expected as items are negatively worded and were not reverse-coded.

Evaluating the Measurement Model

In order to verify that writing is composed of various factors, and that each variable uniquely contributes, SEM was used to evaluate the fit of the hypothesized measurement model (see Figure 1). As illustrated, the model exhibited poor model fit ($\chi^2(21) = 40.709, p = .006, CFI = .855, TLI = .751, RMSEA = .117, SRMR = .088$), and the matrix was non-positive definite. According to Kline (2011), a non-positive definite matrix may occur when (a) the data do not provide enough information (e.g., small sample size, only two indicators per factor); (b) the model contains too many parameters; (c) the sample contains outliers or the data are not normally distributed; (d) there is underidentification of factor covariances; or (d) the measurement model is misspecified.

In an effort to account for the use of composite scores, two additional iterations of the model were evaluated using only the MI, before being evaluated using the WM and Planning/Organization scales.
Table 1

Descriptive Statistics

<table>
<thead>
<tr>
<th>Measure</th>
<th>All Students</th>
<th>Above 25th %tile</th>
<th>At or Below 25th %tile</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working Memory Index (WMI)</td>
<td>101.44</td>
<td>102.98</td>
<td>89.63**</td>
<td>8.61</td>
</tr>
<tr>
<td>Letter Number Sequencing*</td>
<td>9.71</td>
<td>10.18</td>
<td>6.13*</td>
<td>25.99</td>
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<tr>
<td>WIAT-III Spelling</td>
<td>104.83</td>
<td>107.89</td>
<td>81.50**</td>
<td>36.79</td>
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<tr>
<td>WIAT-III Sentence Composition</td>
<td>101.42</td>
<td>104.69</td>
<td>76.50**</td>
<td>39.63</td>
</tr>
<tr>
<td>Planning</td>
<td>3.04</td>
<td>3.20</td>
<td>1.88*</td>
<td>10.28</td>
</tr>
<tr>
<td>WIAT-III Essay Composition</td>
<td>106.30</td>
<td>108.30</td>
<td>91.13*</td>
<td>18.48</td>
</tr>
<tr>
<td>WIAT-III EC WC</td>
<td>112.83</td>
<td>114.61</td>
<td>99.25**</td>
<td>11.72</td>
</tr>
<tr>
<td>WIAT-III EC TD</td>
<td>98.33</td>
<td>100.26</td>
<td>83.63**</td>
<td>10.82</td>
</tr>
<tr>
<td>BRIEF-SR GEC</td>
<td>57.88</td>
<td>57.46</td>
<td>61.13</td>
<td>.80</td>
</tr>
<tr>
<td>BRIEF-SR BRI</td>
<td>56.59</td>
<td>56.13</td>
<td>60.13</td>
<td>1.04</td>
</tr>
<tr>
<td>BRIEF-SR MI</td>
<td>57.80</td>
<td>57.41</td>
<td>60.75</td>
<td>.61</td>
</tr>
<tr>
<td>BRIEF-SR WM</td>
<td>58.96</td>
<td>59.02</td>
<td>58.50</td>
<td>.93</td>
</tr>
<tr>
<td>BRIEF-SR PO</td>
<td>56.97</td>
<td>56.53</td>
<td>60.38</td>
<td>1.00</td>
</tr>
<tr>
<td>DASH</td>
<td>97.29</td>
<td>99.53</td>
<td>80.25**</td>
<td>17.08</td>
</tr>
<tr>
<td>Graphic Speed</td>
<td>9.77</td>
<td>13.79</td>
<td>13.22</td>
<td>2.76</td>
</tr>
</tbody>
</table>


Results of a factor analysis using the composite scores for Essay Composition and the BRIEF-SR (using maximum likelihood estimation with an oblique rotation in IBM SPSS) revealed a 2-factor model with good fit ($\chi^2 = 14.725, df = 19, p = .740$), explaining 54% of the variance; eigenvalues were above

Exploring the Factor Structure

Modification indices calculated throughout these iterations suggested adding a covariance between residual terms for variables on different factors. However, adding such residual covariances is an unacceptable modification, as adding residual covariances for these items tends to suggest that they are potentially measuring similar constructs. Thus, it was necessary to explore the factor structure.
Table 2
Inter-Correlation Coefficients

<table>
<thead>
<tr>
<th></th>
<th>LNS</th>
<th>WMI</th>
<th>Spell</th>
<th>SC</th>
<th>Plan</th>
<th>WC</th>
<th>TD</th>
<th>EC</th>
<th>BRIEF_WM</th>
<th>BRIEF_PO</th>
<th>BRIEF_BRI</th>
<th>BRIEF_MI</th>
<th>BRIEF_GEC</th>
<th>DASH</th>
<th>GS</th>
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<tr>
<td>LNS</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WMI</td>
<td>.50**</td>
<td>.50**</td>
<td>.50**</td>
<td>.50**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.09</td>
<td>.10</td>
<td>.23</td>
<td>.24**</td>
<td>.24**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spell</td>
<td>.42**</td>
<td>.49**</td>
<td>.42**</td>
<td>.42**</td>
<td>.24*</td>
<td>.27*</td>
<td>.27*</td>
<td>.27*</td>
<td>.14</td>
<td>.12</td>
<td>.09</td>
<td>.08</td>
<td>.09</td>
<td>.71**</td>
<td>.27*</td>
</tr>
<tr>
<td>SC</td>
<td>.50**</td>
<td>.50**</td>
<td>.50**</td>
<td>.50**</td>
<td>.24*</td>
<td>.27*</td>
<td>.27*</td>
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<td>.09</td>
<td>.08</td>
<td>.09</td>
<td>.71**</td>
<td>.27*</td>
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<tr>
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Note. ** = p ≤ .01, 2-tailed. * = p ≤ .05, 2-tailed. LNS = Letter Number Sequencing subtest of the Wechsler Intelligence Scale for Children – V (WISC-V); WMI = Working Memory Index of the WISC-V; Spell = Spelling subtest of the Wechsler Individual Achievement Test – III (WIAT-III); SC = Sentence Composition subtests of the WIAT-III; Plan = Planning; WC = Word Count score for Essay Composition subtest of the WIAT-III; TD = Theme Development and Text Organization score of the Essay Composition subtest of the WIAT-III; EC = Essay Composition subtest of the WIAT-III; BRIEF_WM = Working Memory scale of the Behavior Rating Inventory of Executive Function – Self-Report (BRIEF-SR); BRIEF_PO = Planning/Organization scale of the BRIEF-SR; BRIEF_BRI = Behavioral Regulation Index of the BRIEF-SR; BRIEF_MI = Metacognition Index of the BRIEF-SR; BRIEF_GEC = Global Executive Composite of the BRIEF-SR; DASH = Detailed Assessment of Speed of Handwriting; GS = Graphic Speed subtest of the DASH.

1.0 when modeling using the BRIEF-SR GEC. The 2-factor model specified by the output consisted of one factor that included memory and more transcription-level variables (WMI, LNS, Spelling, Sentence Composition, and the BRIEF-SR GEC) and another factor that included text generation and writing fluency-level variables (Essay Composition, DASH, and Planning). The Graphic Speed subtest of the DASH did not appear to load on either factor (see Table 4). Factor loadings of .4 or higher were deemed appropriate for accepting an observed variable as a representation of the latent factor.

Two additional EFAs were also explored. When modeling using the BRIEF-SR MI, the factor analysis revealed a 3-factor model with good fit ($\chi^2 = 11.418, df = 12, p = .493$), explaining 65% of the variance. When modeling using the WM and Planning/Organization scales of the BRIEF-SR and the Word Count and Theme Development and Text Organization scores from the Essay Composition subtest of the WIAT-III, a 4-factor model with good fit was obtained ($\chi^2 = 13.096, df = 17, p = .730$), explaining 70% of the variance; eigenvalues were above 1.0 for each (see Table 4).

However, both models were discarded because one factor was primarily supported by one variable, adding nothing interesting to the model. Thus, the most parsimonious model, the 2-factor model (Transcription/Memory + Text Generation), was retained. Even after modeling with the uncom-
Table 3  
Covariance-Variance Matrix

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Note. Variances appear on the diagonal in bold. LNS = Letter Number Sequencing subtest of the Wechsler Intelligence Scale for Children – V (WISC-V); WMI = Working Memory Index of the WISC-V; Spell = Spelling subtest of the Wechsler Individual Achievement Test – III (WIAT-III); SC = Sentence Composition subtests of the WIAT-III; Plan = Planning; WC = Word Count score of the Essay Composition subtest on the WIAT-III; TD = Theme Development and Text Organization score of the Essay Composition subtest on the WIAT-III; EC = Essay Composition subtest of the WIAT-III; BRIEF_GEC = Global Executive Composite of the Behavior Rating Inventory of Executive Function – Self-Report (BRIEF-SR); DASH = Detailed Assessment of Speed of Handwriting; GS = Graphic Speed subtest of the DASH; BRIEF_WM = Working Memory scale of BRIEF-SR; BRIEF_PO = Planning/Organization scale of the BRIEF-SR; BRIEF_BRI = Behavioral Regulation Index of the BRIEF-SR; BRIEF_MI = Metacognition Index of the BRIEF-SR.

bined composite scores, similar variables continued to group consistently and load on similar factors.

Performance of Struggling Writers

Performance at or below the 25th percentile on the WIAT-III Writing Composite score was selected as the cutoff for students who struggle with writing, as performance below this cut-score is indicative of a student who performs below average in writing compared with a normative sample. Eight students (n = 8) within the sample met this criterion. The subsample of struggling writers performed in the low-average and below-average ranges across most of the standardized assessments. One-way ANOVAs revealed statistically significant differences between students who scored at or below the 25th percentile on the WIAT-III Writing Composite and students who scored above the 25th percentile on all measures except the BRIEF-SR and the Graphic Speed subtest of the DASH (refer to Table 1).

Discussion

The purpose of this exploratory study was to test the SVW model in order to explore the relations amongst transcription, text generation, self-regulation, and WM at ninth grade.
Relative Associations of the Components of Writing: The Present Study

In line with previous research (e.g., Berninger et al., 2002; Kim, Al Otaiba, Sidler, Greulich, & Paranik, 2014; Kim et al., 2015; Puranik, Lombardino, & Altman, 2008; Wagner et al., 2011), this study confirms that writing is multidimensional rather than a single construct. However, unlike the previous research that has identified factors specific to singular constructs of the SVW (e.g., transcription and text generation) (e.g., Graham et al., 1997) or factors identified with oral language abilities and reading (see Abbott & Berninger, 1993; Abbott et al., 2010), the findings of the present study suggest that factors of writing at the high school level are multidimensional and do not appear as singular constructs that can be individually evaluated. In further examining the factors from this study (Transcription/WM + Text Generation), a few interesting findings emerge.

First, the composition of the factors identified in this study point to the complex and embedded cognitive structures of writing (Berninger & Amtmann, 2003; Berninger & Winn, 2006; McCutchen, 1996). Indeed, the first factor is representative of both transcription and memory. Theoretically, this association is plausible, given that Swanson and Berninger (1996) noted that transcription skills are more closely related to STM, and text generation skills are more closely related to WM. While the current study used
measures that purportedly assess WM, it could be argued that these tasks are not pure representations of WM as students were not expected to hold anything in mind while manipulating extraneous information. Moreover, Berninger et al. (2002), Berninger and Amtmann (2003), and Berninger and Winn (2006) suggested that WM within the model of the SVW must simultaneously tap both LTM and STM, depending on the task being completed.

Second, the Graphic Speed subtest of the DASH did not load strongly on either factor of the accepted model. Though this subtest did not provide an impact in the present study, Berninger and colleagues (e.g., Berninger & Amtmann, 2003; Berninger et al., 2002; Berninger & Winn, 2006) suggested that visual-spatial abilities are important to writing, and Baddeley and Hitch (1974) included a visual-spatial sketchpad within their dual processing model of WM. The lack of an association of visual-spatial abilities as captured through the Graphic Speed task in the current study warrants further investigation.

Third, the Sentence Composition measure was more strongly related to transcription- and memory-level skills than to text generation skills. According to the SVW, transcription-level skills are typically thought of as letter- and word-level abilities, whereas text generation is more representative of connected text, in which students are expected to string words together to form thoughts at a sentence level or higher. However, it may be that for high school students, the ability to generate and combine sentences is a basic or lower-level writing skill that is essential for generating connected text. It is possible that efficiency with sentence writing skills for high school students enables them to expend more cognitive resources on crafting more involved text (Kim et al., 2015).

Fourth, the Essay Composition measure from the WIAT-III was more strongly related to text generation. Kim et al. (2015) reported that the theme and organization score of the Essay Composition subtest of the WIAT-III was predictive of a writing quality factor rather than a writing productivity factor in their sample of second- and third-grade students. Thus, it may be that as students grow older, the functions or dimensions of the measure change, given that older students are more likely to generate longer text. Even when the Essay Composition subtest was broken into its component parts – Word Count and Theme Development and Text Organization – the EFAs revealed similar factor structures.

Fifth, the correlation between the WMI and the BRIEF-SR GEC was small to moderate and negatively statistically significant (r = – .32; p ≤ .01). This tends to suggest a negative relationship between these items, in which an increase in WM would result in a decrease of negative or ineffective EFs. As Kane, Bleckley, Conway, and Engle (2001) and Kane et al. (2007) have suggested, along with Cowan (2014), differences in WM may reflect the ability to maintain attention and focus throughout an activity. It is possible that the same is true for writing.

Finally, the two self-regulatory EF measures loaded on different factors within this study, even when compound variables were broken apart (e.g., breaking apart Word Count and Theme Development and Text Organization scores from the Essay Composition subtest of the WIAT-III into separable scores, or modeling with just a single index from the BRIEF-SR). Berninger and Winn (2006) outlined EFs of the SVW model to include: supervisory attention (inhibition, selection of relevant information, attentional shifting, attention [staying on task], cognitive engagement and presence, and metalinguistic and metacognitive awareness), goal setting, planning, reviewing, revising, and strategies for self-regulating and monitoring. The BRIEF-SR GEC captures many of these same domains within its eight subscales (e.g., inhibit, shift, emotional control, monitor, WM, plan/organize, organization of materials, and task completion) (Guy et al., 2004b). Interestingly, the WM measures from the WISC-V similarly account for many of these EFs. For example, moving between Digit Span tasks requires cognitive flexibility or shifting, along with WM and focused attention (Wechsler, 2014b). Picture Span requires WM and response inhibition, and LNS requires focused attention and WM (Wechsler, 2014b). Thus, it seems reasonable that the BRIEF-SR GEC would load on a factor with both the WMI and LNS.

However, the provision of a brief planning period loaded on the second factor, which was more closely aligned with text generation and writing fluency. Though this might be expected, especially because the planning period was specific to the response prepared for the WIAT-III Essay Composition task, it is possible that specific planning
Poch and Lembke

Table 4
Factor Loadings Across EFA Models

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<td>Spelling</td>
<td>.660</td>
<td>.138</td>
<td>.710</td>
<td>.701</td>
<td>.333</td>
</tr>
<tr>
<td>LNS</td>
<td>.517</td>
<td>.275</td>
<td>.616</td>
<td>.558</td>
<td>.193</td>
</tr>
<tr>
<td>BRIEF GEC / MI</td>
<td>-.421</td>
<td>.143</td>
<td>-.370</td>
<td>.243</td>
<td>-.106</td>
</tr>
<tr>
<td>EC</td>
<td>.732</td>
<td>.252</td>
<td>.728</td>
<td>.839</td>
<td>.319</td>
</tr>
<tr>
<td>DASH</td>
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<td>.715</td>
<td>.368</td>
<td>.208</td>
<td>.609</td>
</tr>
<tr>
<td>Planning</td>
<td>.568</td>
<td>.150</td>
<td>.548</td>
<td>.295</td>
<td>.252</td>
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<tr>
<td>GS</td>
<td>.173</td>
<td>.211</td>
<td>.249</td>
<td>.975</td>
<td>.297</td>
</tr>
</tbody>
</table>

Note: BRIEF GEC / MI = Global Executive Composite (2-factor EFA) or the Metacognition Index (3-factor EFA) of the Behavior Rating Inventory of Executive Function – Self-Report (BRIEF-SR); BRIEF_WM = Working Memory scale of the BRIEF-SR; BRIEF_PO = Planning/Organization scale of the BRIEF-SR; Spelling = Spelling subtest of the Wechsler Individual Achievement Test – III (WIAT-III); SC = Sentence Composition subtests of the WIAT-III; WMI = Working Memory Index of the Wechsler Intelligence Scale for Children – V (WISC-V); LNS = Letter Number Sequencing subtest of the WISC-V; Word Count = Word Count score of the Essay Composition subtest of the WIAT-III; DASH = Detailed Assessment of Speed of Handwriting; Theme Develop. = Theme Development and Text Organization of the Essay Composition subtest of the WIAT-III; Planning = Planning Measure; GS = Graphic Speed subtest of the DASH.

abilities aid in the generation of text on a central topic and support fluency with written expression. Indeed, researchers who have provided planning time for middle and high school students have often found positive gains in student text (Spivey & King, 1989; Vanderberg & Swanson, 2007).

Alternatively, it is possible that this text generation (fluency) factor represents higher-order writing and cognitive skills, as it is specific to being able to craft connected text with fluency. Swanson and Berninger (1996) noted that WM is related to higher-order writing skills, which they identified as planning, organizing, and text generation. Considering this factor as the higher-order factor would also be consistent with the early model of the SVW, in which the higher-order variable was ideation, even though Berninger and colleagues (e.g., Berninger & Swanson, 1994; Berninger et al., 1991; Berninger et al., 1992) viewed idea generation as a component of text generation, or transforming ideas into language representations.
The present study seems to corroborate Berninger and colleagues’ interpretation, that generating ideas – and subsequently planning – is specific to text generation.

**Struggling Writers**

Descriptive results for a small group of struggling ninth-grade writers \((n = 8)\) (based on performance at or below the 25th percentile on the WIAT-III Writing Composite Score) revealed statistically significant differences on most measures, though differences on the WIAT-III measures would have been expected. These students were not different from their peers on the Graphic Speed subtest, which measures visual-spatial abilities, or in reporting difficulties with self-regulatory executive functions (as measured by the BRIEF-SR).

Ironically, the existing literature purports that struggling writers and writers with disabilities typically struggle with self-regulatory EFs (e.g., Benton, Kraft, Glover, & Plake, 1984; Effney et al., 2013; Graham & Harris, 2012). It may be that struggling writers can provide a similarly accurate representation of their self-regulatory executive functions, but that they do not effectively utilize such skills. Moreover, different results may occur with a larger population of writers identified with specific learning disabilities in writing. This finding warrants further investigation.

**Limitations**

Several limitations apply to this study and may be classified into three primary categories: (a) sample size/composition and effects of sample size/composition, (b) measurement, and (c) reliability. First, the sample size used for this study \((N = 69)\) was small for using statistical techniques like SEM and EFA. This was further complicated by the small number of students who received special education services \((n = 2 \text{ or } 2.9\%)\) and the subsample of struggling writers \((n = 8 \text{ or } 12\%)\). Further, all the students were from the same classroom; while this arrangement controls for teacher effects, the effects that may be produced by other teachers is unknown. Nonetheless, the sample was diverse racially, ethnically, and in terms of socio-economic status. However, such diversity cannot represent all high school students nationally, nor high school students across this midwestern district. Thus, it is possible that with a larger sample, more factors might be identified or that the factor structure would be differently arranged.

The next category of limitations is specific to measurement. Composite scores were utilized for select measures as this is consistent with the scoring and interpretation of the standardized assessments administered. However, use of these composite scores may skew the identification of a unitary construct (i.e., factor) and may also have contributed to the non-positive definite matrix observed in the hypothesized measurement model, though breaking apart these variables did not lead to a measurement model with a positive definite matrix. Moreover, a limited number of standardized assessments are available for evaluating self-regulatory EFs as they relate specifically to adolescent writing. The BRIEF-SR was selected because it is a standardized assessment; however, it does not solely measure self-regulation of writing.

Additionally, the present study only relied on expository writing tasks. It is possible that the inclusion of other genres of writing, especially narrative writing, would load differently across the factors, or change the cognitive constraints of writing. As McCutchen (1996) has noted, students’ transcription processes with narrative text – a familiar text structure – are likely to be fluent by junior high.

Moreover, it is possible that the inclusion of a planning period in advance of the Essay subtest of the WIAT-III invalidated the standardized administration and scoring of the writing prompt. Although Vanderberg and Swanson (2007) used a similar planning period in advance of both a different standardized writing assessment and a researcher-developed writing probe, this must be considered for any possible impact it might have had on the quantity and quality of student writing that was produced.

The final area of limitations surrounds reliability. Early during data collection, a transposition error in the first trial of item 8 on the LNS subtest was identified. It was decided to re-administer the item to the impacted 18 students. Though it is possible that this error jeopardized the reliability of the data for the impacted students, students’ scores essentially remained the same.
Implications for Practice

One educational implication from our findings is that intervention and instructional supports for high school students similar to those who participated in this study might address transcription-level writing skills, given that they loaded with memory and self-regulatory variables on the same factor. Some transcription-level supports are available for younger writers (e.g., Datchuk, Kubina, & Mason, 2015; Graham & Harris, n.d.), and while the extent to which these same supports will be effective with older learners is unclear, it is possible that similar supports will scaffold writing while lessening the constraints of memory and EFs. Specifically, supporting adolescents in crafting and combining sentences may be particularly useful, as struggling writers in this sample mainly lagged in this area when examining mean scores across the measures. Saddler (2012) suggested that writing good sentences is difficult, yet essential to the production of longer text as sentences are “vehicles of communication” (p. 6). Indeed, a lack of knowledge of effective sentence structures and sentence combining techniques can impede idea translation and text generation, draining cognitive resources.

Implications for Future Research

Overall, much work remains to be done to expand researchers’ and teachers’ understandings about the writing skills that influence writing development throughout high school (Graham, 2006; Kim et al., 2015). This includes research that replicates the present study. While researchers typically prefer working with parsimonious models, the most powerful way to theoretically ensure that researchers are truly capturing the most comprehensive view of writing is by working with complex models. This can be accomplished by incorporating additional parameters and measures in an effort to identify a model that is not only more representative of the data, but also enhances construct, convergent, and discriminant validity (Trokchim, 2006). However, because adding additional measures to the assessment battery can be costly; require numerous resources, including personnel; and place demands on research participants, including a significant loss of instructional time (which are substantive grounds for districts and for parents/guardians to deny participation/consent), researchers might consider alternative sources of data for modeling purposes (e.g., historical data or data available from large national data sets).

Research with elementary-aged writers has explored the role of alternative variables in relationship to writing. For example, Abbott and Berninger (1993) explored oral language measures, whereas Abbott et al. (2010) modeled reading and writing variables. Modeling both oral language and reading variables with secondary students is also warranted.

Another area of particular interest for adolescents is the role of personal self-efficacy beliefs and motivation for writing. Many adolescents, especially struggling writers, have experienced years of failure in writing, with feedback often emphasizing what students have done incorrectly, rather than offering a means by which to improve their writing. It is possible that such variables account for additional variance.

The population from which students are sampled is also a viable direction for future research. As this study only considered students in one teacher’s English classes, future research might consider modeling with refined student populations, such as a sample of equal numbers of students identified as learners with specific learning disabilities in written expression and their non-disabled peers, or even a sample of high school students across grades 9–12. With similarly sized sub-groups of students, multi-group analysis can be conducted to explore whether the structural paths of an identified and good fitting model are invariant or not across the groups. Use of longitudinal SEM would also provide rich data about student writing over time.

As researchers continue to model the dimensionality of writing, they must carefully consider the extent to which such models fully represent writing and how the models can be used to name and understand the challenges that adolescents encounter in writing. Only then, can suggestions for intervention and instruction be made (Graham, 2006).

This study suggests possible relationships and is a snapshot of writing from a single writing genre. However, given the complexity of writing, researchers may need to continue to explore more multi-component intervention and instructional materials to support adolescents’ often intractable
and entrenched writing needs. Indeed, recent research in modeling continues to posit that writing is multidimensional (e.g., Kim et al., 2014, 2015; Puranik et al., 2008; Wagner et al., 2011).

**Conclusion**

Modeling of writing has provided, and will continue to provide, a way for understanding the complexity and interconnected nature of writing. This exploratory study provides preliminary insight on the “pieces” of adolescent writing as they relate to the SVW. Though the results suggest a possible multidimensionality of the component skills, continued work in this area offers promise for better understanding adolescents’ struggles in writing and later designing effective intervention and instructional writing routines.

**References**


Identifying Global Research Priorities for Learning Disabilities

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Abstract

Estimates of the global prevalence of learning disabilities (LD) range from 5-17%. A host of negative outcomes have been associated with LD, particularly for people of low socioeconomic status within developed nations and for people in developing nations. The goal of this study was to identify global research priorities that address the persistent and pervasive challenges faced by people with LD. The Child Health and Nutrition Research Initiative (CHNRI) global research priority-setting methodology was employed to generate research questions and to evaluate them according to a set of four criteria: acceptability and impact, equity, feasibility, and usefulness. Thirty-eight research questions were generated, coded into six categories. The two most critical research categories were (a) developing stronger understandings of LD across the lifespan and (b) developing more effective ways to train teachers.

Keywords: Learning Disabilities, Research, International

Learning disabilities (LD) have generally been defined as a neurological disorder that interferes with the ability to store, process, or produce information. As such, LD can significantly impact a person’s ability to learn to read, write, spell, compute math, reason, or interact socially.

Global estimates of the prevalence of LD are difficult to find, and national-level estimates vary significantly. For example, a number of countries, including Germany, Australia, and the United States, report prevalence ranges from 5-17% (Child Trends Databank, 2014; Moll, Kunze, Neuhoff, Bruder, & Schulte-Körne, 2014; Prior, Sanson, Smart, & Oberklaid, 1995; Shaywitz, Morris, & Shaywitz, 2008; National Center for Education Statistics [NCES], 2016; Westwood & Graham, 2000). Other countries, such as Russia and Nigeria, report lower rates between 5-8% (Grigorenko, 2010; Onukwufo, 2016). Varying definitions of LD, the heterogeneity of the condition, and the approaches used to identify students as having a learning disability within the school system all contribute to the lack of precision in reporting prevalence rates.

Despite these obstacles, understanding the global scope and impact of LD is important because people with LD face challenges in a number of areas, including academic, quality of life, economic, health, social, and emotional. Of these, academic challenges are the most extensively documented. In the United States, for example, the National Assessment of Educational Progress (NAEP) indicates that students with LD have academic achievement scores that are significantly below those of their nondisabled counterparts in reading, math, and writing (NCES, 2016). Moreover, these achievement discrepancies tend to increase as students progress through school (NCES, 2016). While it is challenging to locate national-level data on the performance of students with LD in nations other than the United States, lower academic achievement in the affected area of learning (e.g., reading, math, writing) has been reported in students with LD in several countries (see e.g., Dirks, Spyer, van Lieshout, & deSonneville, 2008; Heikkilä, Torppa, Aro, Närhi, & Ahonen, 2016; Sideridis, Stamovlasis, & Antoniou, 2016).
To date, much of the LD research has focused on academic achievement differences. However, recent years have witnessed an increase in the number of studies examining social and emotional issues, with consistent findings across cultures showing that students with LD tend to struggle in these areas. Specifically, studies have demonstrated strong correlations between LD and social and emotional challenges such as anxiety and depression (see, e.g., Backenson et al., 2015; Emam & Kazem, 2015; Mammarella et al., 2016).

This trend suggests a need to better understand the social and emotional needs of students with LD as a means to better support their ability to navigate the social demands of school, as well as to develop stronger self-regulation skills and abilities.

The presence of an LD can also have significant implications for life outside of and beyond school. For example, Sakiz, Sart, Böran, Korkmaz, and Babür (2015) found that students with LD in Turkey self-reported lower quality of life across dimensions such as physical and emotional well-being, relationships with family and friends, and school. Similar results have been noted in Hungary, Italy, India, and Israel (Balazs, Miklosi, Toro, & Nagy-Varga, 2016; Ginieri-Coccossis et al., 2013; Karande, Bhosrekar, Kulkarni, & Thaker, 2009; Margalit, Mioduser, Al-Yagon, & Neuberger, 1997). In addition, learning disabilities have also been connected to public health concerns; for example, international studies have shown poor use of public health initiatives in the population of people with LD (Jacobson, Janicki, & Ackerman, 1989; Jones & Kerr 1997; Sullivan, Hussain, Slack-Smith, & Bittles, 2003; Wood & Douglas, 2007).

**Learning Disabilities and Socioeconomic Status**

As is the case with many other disability conditions, the prevalence of LD varies based on socioeconomic status (SES). In the United States, for example, approximately 6% of children living at or above the poverty line are diagnosed with a LD compared to 12% of children below the poverty line (Child Trends Databank, 2014). This variation in prevalence of disabilities associated with SES is also seen globally; there is, in general, there is a higher disability prevalence in lower-income countries than in higher-income countries (World Health Organization and World Bank, 2011).

However, in the case of LD, these disparities are not always clear because methods and systems to detect, evaluate, and intervene for LD vary significantly across nations. For example, a comparison of LD policy and practice in India to Australia highlights specific ways in which students with LD in lower-income countries may be disadvantaged (Thomas & Whitten, 2012). Specifically, the authors report a lack of infrastructure and systematic support to serve students with LD within the Indian system compared to the Australian system. They also note that a lack of funding and policy guidance contributes to the constraints on equity and access within the Indian system (Thomas & Whitten, 2012). By contrast, students with LD in Australia were much more likely than their counterparts in India to receive assessment, modified or differentiated learning programs, and ongoing assistance. Furthermore, they were less likely to be stigmatized and segregated from others and were more likely to be taught by teachers who had some professional understanding of LD. Teachers in Australian schools also had significantly more classroom support and many more resources at their disposal than their Indian counterparts (Thomas & Whitten, 2012).

Policy reviews and studies from other nations report similar disparities in services based on economic status. In Turkey, for example, students with LD face challenges in school because of a lack of well-trained teachers, effective teaching methods, well-designed curricula, and inadequate educational materials (Sakiz et al., 2015). Additionally, teachers’ perceptions and attitudes may negatively affect and be affected by the low academic performance of students with LD, further reducing the opportunity to reach their academic potential (Levi, Einav, Raskind, Ziv, & Margalit, 2013; Ozabaci & Ergun-Basak, 2013). Yildiz, Yildirim, Ates, and Rasinski (2012) report that Turkish students with LD experience problems interacting with teachers, family, and peers, and also encounter significant challenges with diagnostic procedures and access to services. Clearly, the presence of learning disabilities is a global issue that affects a significant percentage of the world’s population and disproportionately impacts people in lower-income countries as well
as people from low socioeconomic backgrounds within wealthier nations. When left undetected and untreated, LD can lead to lower education achievements, poor health outcomes, and higher rates of poverty (Horowitz, Rawe, & Whittaker, 2017; World Health Organization & World Bank, 2011).

Identifying Global Priorities in Learning Disabilities Research

Although a substantial amount of research has identified evidence-based practices for people with LD, much of what we currently understand comes from research that has primarily been conducted in wealthy countries, and especially from English-speaking countries – a pattern of inequity that is repeated across many areas of social sciences research (Global Forum for Health Research, 2004).

As a result, the current research base on LD may not contribute directly to improving the situation in developing nations, suggesting a need to expand the research base in several ways, including (a) developing stronger understandings of the issues related to LD as manifested within developing nations, (b) increasing applied research to determine the extent to which the existing knowledge base has relevance for developing nations, and (c) solving the problems of practice that contribute to existing disparities in access to services for poor people with LD in developed nations.

Expanding the research base to address these areas is a significant undertaking that requires determining a set of priorities to guide the work. In an effort to chart a course for this effort, the International Academy for Research on Learning Disabilities (IARLD) undertook a global research priority-setting activity. The IARLD is an international professional organization dedicated to conducting and sharing research about individuals who have LD. The IARLD consists of an elected group of scientists, educators, and clinicians in the field of LD throughout the world. Currently, 29 countries are represented among the IARLD membership. Of the represented nations, 20 are considered developed and 9 are considered developing, according to the World Economic Situation Prospects prepared by the Development Policy and Analysis Division of the United Nations (United Nations Department of Economic and Social Affairs, 2014).

Establishing global research priorities to improve our current understanding of LD, particularly in developing nations, can create an agenda that balances basic science, educational, clinical, and public health research to meet the needs of people with LD.

Methods

Following the lead of Tomlinson, Yasamy, Emerson, Officer, Richler, and Saxena (2014), who published a set of global research priorities for developmental disabilities, we adopted the priority-setting methodology manualized by the Council on Health Research for Development (COHRED; Okello & Chongtrakul, 2000) and by the Child Health and Nutrition Research Initiative (CHNRI; Rudan et al., 2008).

COHRED is a global, non-profit organization dedicated to delivering sustainable solutions to the health and development challenges of people living in low-income countries. CHNRI is a network of global partners dedicated to reducing child mortality and eradicating extreme poverty and hunger. These two organizations outlined a protocol to advance and promote the concept of essential national health research (ENHR) as a strategy to promote health and development on the basis of equity and social justice (Okello & Chongtrakul, 2000).

According to the priority-setting methodology, several groups of participants are required to successfully conduct a research priority-setting process, including the core group, the research question-identification participants, and the expert raters who apply the scoring criteria (Rudan et al., 2008).

Participants

Core group. The core group is responsible for overseeing and executing the priority setting process. In the current study, four researchers formed the core group, including the authors of this manuscript. Three are members of the IARLD, with two serving on its executive board. The fourth core group participant is a postdoctoral fellow completing her fellowship with the lead author of this manuscript. The core group met in person at IARLD conferences, and collaborated via technology on the processes followed, to include analysis and interpretation of data.
Research question-identification participants. Because the membership of the IARLD consists of leading international researchers, policy makers, and practitioners, we surveyed the IARLD membership to generate research questions they believed were a priority in the field of LD. Several methods were used to secure responses from members, including electronic surveys with followups, and in-person requests for submitting research questions during the annual IARLD conferences.

Current IARLD membership includes 231 members from 29 countries, with 177 at universities, 19 practitioners in school/district or state offices, and 33 “other” (including hospitals, clinics and other organizations). A total of 73 members (32%) from 19 countries submitted their priority research questions. Of those responding, 73% were from universities, 8% practitioners in school/district or state offices, and 19% other organizations.

Expert raters. Once the initial research questions are generated, the priority setting process relies on a group of experts to rate the research questions according to a predetermined set of criteria.

To recruit raters for the current study, we held a roundtable discussion at the 2016 IARLD conference to discuss the project and project goals. Representatives from seven countries attended the session and agreed to serve as expert raters. To increase the representativeness of our rater group, we emailed IARLD members from countries not represented in the rater sample; the criteria for soliciting raters included whether they were known to the core group as having expertise in research on LD and/or needs related to LD in nations beyond those of others already confirmed as raters. A total of 18 people (15 female) from 15 countries agreed to serve as raters. All raters held academic positions (e.g., researchers, professors).

Procedures

The process followed in this study consisted of the following steps:

1. Create a core group to oversee the process. The core group was inspired to complete the project after reading the global research-priority work for developmental disabilities conducted by Tomlinson et al. (2014). The group closely followed the process manualized by Rudan et al. (2008).

2. Generate a list of initial research questions. Because the membership of IARLD consists of leading international researchers, policy makers, and practitioners, we surveyed the IARLD membership group, asking each participant to generate no more than five research questions they believed were a priority in the field of LD. This activity generated an initial list of 146 questions.

3. Review and finalize the list of research questions. The core group reviewed the initial set of questions as follows: (a) items that were not research questions were eliminated; (b) questions that were duplicated were eliminated; and (c) questions that were similar were reviewed to determine whether they could be revised, considered to be the same question, or if both questions should be kept. This process yielded a total of 38 unique questions. A complete list of the research questions is included in Figure 1.

<table>
<thead>
<tr>
<th>Category 1: Definition of Learning Disabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What are the critical and defining characteristics of LD?</td>
</tr>
<tr>
<td>2. Are the critical and defining characteristics of LD common across orthographies, languages and cultures?</td>
</tr>
<tr>
<td>3. Does the localization of cognitive processes in the brain help our understanding of LD?</td>
</tr>
<tr>
<td>4. What are the contributions of visual memory and visual discrimination to word recognition in different orthographies?</td>
</tr>
<tr>
<td>5. Should psychoemotional variables be considered as core identifying features of learning disabilities?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Category 2: Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. What are the components of a reliable assessment method and criteria for identifying learning disabilities?</td>
</tr>
<tr>
<td>7. Can the assessments used within an LD identification protocol be standardized across cultures and languages?</td>
</tr>
<tr>
<td>8. What is the most effective way to identify early children who need intensive reading instruction, and does this vary by orthography?</td>
</tr>
</tbody>
</table>
9. How can we reliably identify and differentiate between specific learning disabilities and language difference with limited exposure to L1 and L2?
10. How can we reliably identify and differentiate specific learning disabilities and other, overlapping conditions such as ADHD, ASD?
11. What clinical identification practices and cognitive processing assessments reliably predict bio-neurologically identifiable LD?
12. Are underachieving persons who meet low academic achievement criteria for LD but do not meet bio-neurological identification criteria meaningfully distinct from those who do?
13. Are there reliable subtypes of LD and are these based on common underlying cognitive processes or on academic achievement?
14. What are the key risk and protective factors for learning disabilities in the first four years of life (0-4years)?
15. Is response to intervention (RTI) an effective method of identifying students as LD?
16. What are evidence-based assessment procedures for the analysis of the specific educational needs of students with learning disabilities?

**Category 3: Teacher Education and Professional Development**

17. What training or professional development approaches are most effective to provide teachers with the general knowledge to help prevent reading difficulties by providing strong foundational reading instruction?
18. What training or professional development approaches are most effective to ensure special educators (and teachers providing instruction to students with LD) have the specialized knowledge to provide evidence based instruction and intensive, data-guided, rigorous intervention to effectively meet the needs of students with identified LDs in their classrooms?
19. What methods are most effective in improving teachers' ability to read and interpret data to be used in data-based decision-making?
20. What training or professional development approaches are effective in developing teachers' understanding of the LD construct and understanding that students with LD need individual supports (reasonable accommodation; using tablets in classrooms etc.)?
21. What are the best and most efficient methods for training in-service teachers to work with students with learning disabilities in general education settings in developing countries and in countries that do not provide such specialized training?
22. How can we better evaluate and capture the impact of PD?

**Category 4: Interventions/Remediation**

23. Are there unique individualized intervention approaches for students with LD that are not appropriate or useful for other students who experience learning difficulties?
24. How can assistive technologies support the learning of individuals with learning disabilities and facilitate intervention on a wide scale, at school, and in the workplace?
25. Can effective interventions for students with disabilities be delivered within large-group settings?
26. What are evidence-based and school-based prevention strategies for learning disabilities (dyslexia/dyscalculia)?
27. Does intervention alter the underlying neurological condition and core psychological processing deficits of persons with LD?
28. What variables moderate treatment outcomes for students with LD?
29. What are evidence-based interventions for students who are LD and whose first language is not the societal language of their adopted country?
30. What combination(s) of rigorous intervention (reading, social/emotional support) are most helpful and feasible?
31. Can best practices established in developed countries be effectively adapted for developing countries?
32. What forms of curriculum-based progress monitoring measures are reliable across languages?
Figure 1 continued

Category 5: Understanding LD Across the Lifespan (and LD Outside of School)

33. How do learning disabilities develop or change over the life course and across contexts (e.g., school, work, home)?
34. What are the challenges parents face in supporting their children with learning disorders at home?
35. In what ways can families/caregivers and others outside the school (e.g., after school caregivers) best support children with learning disabilities?
36. What are effective strategies to support the successful transition of students with LD across school levels, and across various contexts?

Category 6: Inclusion/Advocacy

37. What are effective strategies to support students with LD to develop self-advocacy skills?
38. Can students with an LD be served equally well through full inclusion in general education or special education, or a combination?

Table 1
Criteria Used to Rate the Research Questions and Their Definitions

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicability and Impact</td>
<td>How likely is it that the results will be immediately applicable for guiding policies and programs and have impact on policy and practice?</td>
</tr>
<tr>
<td>Equity</td>
<td>How likely is it that the proposed research will benefit those who are most vulnerable to poor child development?</td>
</tr>
<tr>
<td>Feasibility</td>
<td>How likely is it that the cost of the proposed research will be a feasible investment?</td>
</tr>
<tr>
<td>Usefulness</td>
<td>Given the quality of existing evidence, how likely is it that the proposed research will fill a critical gap in knowledge?</td>
</tr>
</tbody>
</table>

Our expert raters did not sufficiently meet our goals for representation across geographical focus (only 1 rater was from a developing nation) or stakeholder groups (88% were from universities, 12% from other organizations). The effects of the limited representation are discussed ahead.

6. Select the criteria against which research questions can be judged. Because the overall goal of this priority-setting activity was to identify research priorities to advance the global understanding of LD, and, in particular, to address the disparities between developed and developing nations, the core group followed the guidance of Rudan et al. (2008), and selected the following four criteria: applicability and impact; equity; feasibility; and usefulness. The definitions of these terms are included in Table 1. The process of generating and consolidating research questions resulted in 38 research questions arranged into six categories as presented in Figure 1.
7. Have the expert rater group independently rate each of the 38 questions according to the four criteria using a three-point scale of Very Likely (2 points), Somewhat Likely (1 point), and Unlikely (0 points). Questions were presented in random order through an electronic survey administered via Qualtrics, and the raters were given four weeks to complete their ratings.

8. Compute scores through Qualtrics. To facilitate review of the scores and research priorities, questions were categorized into six categories to facilitate interpretation of the priorities.

Data Analysis

Data were downloaded from Qualtrics and uploaded to SPSS v 23.0 for analysis. Each research question’s score for each criterion as well as a total score were computed. Analysis included rank ordering items by criteria and by total score. Correlations among criteria were also computed. Finally, mean category scores were computed by adding the total scores for the items within a category and dividing by the number of questions within that category.

Results

An overall research-priority score was calculated as the total of each criterion score. Table 2 presents the criterion and total scores for each item, along with the mean and standard deviations for each category. As illustrated in Table 2, the top-rated questions varied somewhat across criteria. The questions with the highest overall scores were the following: Question 20 – related to training and professional development to improve general education teachers’ understanding of LD; Question 24 – related to scaling the use of assistive technology to support the needs of people with LD; Question 18 – related to training and professional development for special education teachers; Question 8 – related to early identification of students at risk for LD that impact reading; and Question 6 – related to determining consistent and reliable assessment methods and criteria to identify students with LD.

<table>
<thead>
<tr>
<th>Question Number</th>
<th>Applicability and Impact</th>
<th>Equity</th>
<th>Feasibility</th>
<th>Usefulness</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category 1: Definition of Learning Disabilities</td>
<td></td>
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<td>20.6 (2.7)</td>
<td>22.4 (3.13)</td>
<td>78 (10.29)</td>
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<td>17 (2.48)</td>
<td>21 (2.79)</td>
<td>21.9 (2.98)</td>
<td>84.81 (9.04)</td>
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Table 2 continued

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<td>21  25*  19  19  25  88</td>
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<tr>
<td>22  16  12  14  19  61</td>
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<tr>
<td>(M (SD))  21.67 (4.17)  17.33 (3.93)  20.5 (3.98)  23.83 (3.54)  83.33 (14.09)</td>
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</table>

<table>
<thead>
<tr>
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<td>28  21  16  18  24  79</td>
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<td>30  25*  16  18  25  84</td>
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<tr>
<td>32  19  18  17  19  73</td>
</tr>
<tr>
<td>(M (SD))  19.3 (4.59)  16.6 (4.90)  16.9 (3.92)  21.5 (3.86)  74.3 (15.85)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Category 5: Understanding LD Across the Lifespan</th>
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</thead>
<tbody>
<tr>
<td>33  21  18  20  30*  89</td>
</tr>
<tr>
<td>34  19  20  19  27*  85</td>
</tr>
<tr>
<td>35  20  17  18  28*  83</td>
</tr>
<tr>
<td>36  23  18  22  24  87</td>
</tr>
<tr>
<td>(M (SD))  20.75 (1.70)  18.25 (1.25)  19.75 (1.70)  27.25 (2.5)  86 (2.58)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Category 6: Inclusion and Advocacy</th>
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</thead>
<tbody>
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<td>37  17  19  20  20  76</td>
</tr>
<tr>
<td>38  18  16  15  17  66</td>
</tr>
<tr>
<td>(M (SD))  17.5 (.70)  17.5 (2.12)  17.5 (3.53)  18.5 (2.12)  71 (7.07)</td>
</tr>
</tbody>
</table>

Note. * Are the top five questions for each criterion. In cases where scores are tied, more than five questions are designated.

The correlations among criterion scores and totals are included in Table 3. All correlations were significant \(p < .01\), in the moderate to high range. The correlation between the equity and usefulness criteria was the lowest, with several questions rated lower for equity receiving higher ratings for usefulness. For example, Question 27, Does intervention alter the underlying neurological condition and core psychological processing deficits of persons with LD?, received a low score of 8 for equity and a 20 for usefulness. Question 19, What methods are most effective in improving teachers’ ability to read and interpret data to be used in data-based decision-making?, received a low score of 15 for equity and a 25 for usefulness. Question 33, How do learning disabilities develop or change over the life course and across contexts?, received a low score of 18 for equity and a 30 for usefulness.

In addition to examining the individual items, we computed mean scores for each criterion and total for every category (see Table 2). The rank order of categories (highest to lowest) by the mean total score for each criterion varied, with no category consistently ranked highest or lowest across criteria. The category ranking for the overall total from high to low was as follows: (a) Understanding learning disabilities across the lifespan, (b) Teacher education and professional development, (c) Identification, (d) Definitions of LD, (e) Intervention, and (f) Inclusion and advocacy.
Table 3
Correlations Among Criterion and Total Scores

<table>
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<tr>
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<th>Applicability</th>
<th>Equity</th>
<th>Feasibility</th>
<th>Usefulness</th>
<th>Total</th>
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<td>.623</td>
<td>.717</td>
<td>.681</td>
<td>.898</td>
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</tr>
<tr>
<td>Equity</td>
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<td>.546</td>
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<td>.807</td>
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<tr>
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<td></td>
<td></td>
<td>.578</td>
<td>.854</td>
<td></td>
</tr>
<tr>
<td>Usefulness</td>
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<td></td>
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<td>.831</td>
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</table>

*Note. All correlations based on N = 38 and are significant, p < .01.*

**Discussion**

Learning disabilities affect a substantial percentage of the population in significant ways, and differentially impact people from SES within developed nations and those from developing nations. Although a sizable research base has examined a variety of issues related to LD, a majority of studies have been conducted in wealthy, English-speaking countries, suggesting that their results may have limited relevance to advancing our understanding of LD for those living in poverty and for people with LD in developing countries.

We applied the CHNRI priority-setting methodology (Rudan et al., 2008) to identify global research priorities in the field of LD. The results of this process indicated that the critical priorities for future research relate to the need for a stronger understanding of the manifestation of LD across the lifespan, as well as a need for identifying and scaling effective teacher education and professional development programs. Additional research areas were also articulated, such as the need for more consistent, reliable, and valid approaches to identification, greater consensus on definitions of LD, and effective interventions and methods for including students with LD in the general classroom.

Through the use of an established process, we involved a number of experts with limited geographical, stakeholder, and gender balance representation. The limitations of this approach largely relate to the potential for sampling bias. Although 73 experts from 19 countries generated questions that were subsequently rated by 17 research experts representing 15 countries, it is highly likely that a different sample of question generators and expert raters would have yielded different results.

The research questions and their subsequent ratings reflect biases in the sampling of experts included within this study. Although the IARLD is comprised of experts whose research and practice include an international focus, our sample did not contain a significant number of practitioners, nor did it reflect a comprehensive set of developing nations; finally, it excluded people who do not speak English. The sample also did not include a large number of policy makers or parents, who may have unique views on the research needs to address important issues and challenges.

Although these limitations impact the generalizability of the results, this priority-setting activity makes an important contribution to identifying global research priorities and towards beginning a conversation about a global research agenda for LD. The number of participants as well as adherence to a standard protocol to protect against potential bias reduce the probability that a similar group of experts would produce materially different results. To an extent, this is reflected in the initial list of 146 questions and the overlap that allowed this list to be distilled to a final set of 38 questions. However, it is recommended that continued refinement of a global research agenda actively seek participation from underrepresented nations and stakeholder groups.

Interesting, the area of LD research identified as being of the highest priority was to develop a stronger understanding of LD across the lifespan. Questions in this category related to both the need for early identification and intervention and developing stronger understandings of how LD continue to impact people in the workplace and in areas beyond school. Additionally, across the 38 questions, most related to solving problems of practice, particularly within the school setting.
LD are somewhat unique as a disability, in that their primary impact is conceptualized within the context of school. Given reported prevalence estimates suggesting that as many as one in five students within a classroom may be impacted by LD and that students with LD tend to spend the majority of their school day within an inclusive setting, it is imperative that teachers are equipped with an understanding and practical knowledge of LD as well as the interventions that are most successful in meeting the needs of students with LD (International Dyslexia Association, 2017).

**Conclusion**

A search for research on LD in academic databases returns initial lists of tens of thousands of hits. But despite this extensive knowledge base, persistent and pervasive problems of practice persist, as evidenced by the continued academic, social, health and quality-of-life challenges faced by people with LD as well as the disparity of the impact of LD on individuals from low socioeconomic status or from developing nations.

Although research funding agencies apply objective criteria to evaluating the research they fund, those criteria are often limited to answerability and novelty approach rather than assessing the potential to contribute to the reduction of the persisting disease burden (Rudan et al., 2008). The global research priority-setting methodology employed in this study is systematic, transdisciplinary, and incorporates principles ranging from public health, social, public opinion, ethical, and economic disciplines (Rudan et al., 2008). The identified research priorities resulting from this activity highlight the need to address the continued disparities that people with LD encounter.

**References**


Preconference Activities – July 1, 2018
Conference – July 2 and 3, 2018
Ghent, Belgium

Conference Committee:
Professor Dr. Annemie Desoete (Ghent University and Artevelde University College),
Professor Dr. Pol Ghesquiere (University of Leuven),
Dr. Petra Warreyn (Ghent University), Elke Baten (Ghent University),
Nele Schuddinck (Artevelde University College),
Ruth Vanderswalmen (Artevelde University College), and
Christel Van Vreckem (Artevelde University College)

Cruickshank Memorial Lecture:
Linda Siegel, “Solving the Problem of Learning Disabilities”

Deadline for Submitting a Proposal: January 8, 2018
See www.iarld.com for guidelines

Early Registration Deadline: March 31, 2018
Register at www.iarld.com

Guided Tour: Discover Ghent and taste some local Belgian products
Registration deadline: July 1, 2018

If you have any questions, please contact:
Annemie Desoete, Conference Chair;
IARLDGhent@arteveldehs.be
Manuscript Submission Guidelines

English is used for submissions to the journal, correspondence and publication. All submissions must be formatted consistent with the 6th edition of the *Publication Manual of the American Psychological Association* (APA). Manuscripts must include a 100- to 150-word abstract summarizing the contents.

A critical concern in the learning disabilities field is the definition of the population. Therefore, authors are expected to operationally define the study participants in accordance with professional standards (see CLD Research Committee: Rosenberg et al., 1993. Minimum standards for the description of participants in learning disabilities research. *Learning Disability Quarterly*, 26(4), 210-213). In addition, parameters of the setting in which the research took place are to be clearly delineated. Such descriptions facilitate replication and application of results. Manuscripts that fail to specify participant and setting variables will be rejected or returned to the authors for clarification. Authors of research manuscripts are encouraged to include brief (e.g. one to two sentences) explanations of why specific procedures and analysis methods were employed. Peer reviewers will evaluate the appropriateness of this and all aspects of the reported study.

Manuscripts are not to exceed 35 double-spaced pages, consistently employing a 12-point font (including references, tables, figures and appendices). Please limit tables and figures to those essential to conveyance of your content. Please present figures and tables in portrait format and use grey scale rather than colored images.

The manuscript submission and review process will be conducted electronically. To submit your manuscript digitally, you must use one of the following formats: Microsoft Word (.doc or .docx), RTF or PDF. Manuscripts must be saved as “letter” (“U.S. letter”) page length/paper size. Submissions in Word or RTF format will be converted into a PDF before being sent for blind peer review. If you submit a PDF file, it is your responsibility to ensure it can be read and printed by others. To avoid delays, please embed all fonts and use Adobe PDF Distiller instead of PDF Writer to ensure that others can view the article exactly as intended. No email attachment should exceed 15 MB.

Each manuscript must be accompanied by a cover letter that communicates (a) that the manuscript is an original work, (b) that the manuscript is not under consideration by any other journal, and (c) any other disclosures as required by the APA (e.g., ethical treatment of participants, financial relationship disclosures). A cover page that provides the name, affiliation, mailing address, phone number, fax and email address of each author must also accompany each manuscript. All communications will be with the lead author. No author identifying information should be included directly in manuscripts submitted for review (e.g., explicit reference to previous publications, acknowledgments, author biographies). Please send the required cover letter, separate cover page with author identifying information, and manuscript as three separate attachments to a single email to: ijrld@bc.edu (please do not send tables, figures, appendices or other supporting materials in separate files). Manuscripts may not be submitted by fax or in paper form.

For further information, please refer to:
The IARLD (International Academy for Research in Learning Disabilities) is an international professional organization dedicated to conducting and sharing research about individuals who have learning disabilities.

The IARLD is an elected group of premier scientists, educators and clinicians in the field of learning disabilities throughout the world. The Academy was formed in 1976 by Dr. William Cruickshank (United States of America) and Dr. Jacob Valk (The Netherlands), meeting in Canada with the intention of providing a forum for the exchange of information and the advancement of knowledge regarding learning disabilities.

Since its inception, the Academy has realized its mission of being a professional, international, interdisciplinary consortium of scientists. The Academy currently has a membership of nearly 200 distinguished scholars, representing 26 different countries and thirty disciplines.

IARLD members represent:
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- distinguished practitioner/clinicians,
- young researchers, and
- promising doctoral students.

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