

Critical Review:
Are phonological awareness intervention programs effective in dedicated classrooms for children with speech and/or language disorders?

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This critical review examines the effectiveness of phonological awareness intervention programs in classrooms dedicated to children with speech and/or language disorders. Studies evaluated include two single subject 'n-of-1' studies and two nonrandomized clinical trials (case-control) studies. Overall, available research findings support the use of phonological awareness intervention programs in classrooms designed for children with speech and/or language disorders as an effective tool to improve phonological awareness skills. Clinical implications and recommendations for future research are also discussed.

Introduction

Phonological awareness refers to “the knowledge that spoken words are composed of individual sounds and the ability to manipulate those sounds” (Roth, Troia, Worthington, & Handy, 2006). For a child who has developed this awareness, he or she is able to divide words into smaller units (i.e., by syllable), identify sounds in words, or produce rhymes for a given word.

Some children do not develop phonological awareness skills or are delayed in doing so. In particular, children with speech and/or language delays often also display phonological awareness deficits (Laing & Espeland, 2004). This finding is particularly salient, given that early phonological awareness skills have been strongly linked to early reading skills (van Kleeck, Gillam, & McFadden, 1998). As a result, for children who struggle to acquire phonological awareness skills, learning to read can also be difficult. A significant amount of research has indicated that early intervention can improve both phonological awareness skills and subsequent reading ability in typically developing children (Laing & Espeland, 2004). Given the ample amount of existing research indicating the lifelong importance of literacy, as well as the benefits of early intervention (Roth, Troia, Worthington, & Dow, 2002), the notion of beginning treatment for phonological awareness for children who lack these skills as soon as possible is consequently intuitive.

As a service delivery model for children with speech and language deficits, classroom-based intervention has been explored. An investigation by Throneburg, Calvert, Sturm, Paramboulas, and Paul (2000) suggests that a classroom-based model for intervention for children with speech and/or language delays has its advantages, such as promoting the generalization of skills learned in therapy to the child’s natural classroom environment.

As such, the existence of research indicating the general success of early phonological awareness intervention programs, as well as the success of classroom-based service delivery models for speech and language impairments, provide reasonable grounding for investigating whether early phonological awareness intervention programs *within* the classroom are effective. Given the particular relevance of phonological awareness training for children with identified speech and/or language disorders, a classroom-based intervention approach, tailored to the needs of this population, may be a new avenue to target at-risk students.

Objectives

The primary objective of this paper was to critically review the existing literature regarding the effectiveness of phonological awareness intervention programs in dedicated classrooms for children with speech and/or language disorders. The secondary objective of this paper was to propose clinical implications and evidence-based recommendations for professional practice and to suggest areas for future research.

Methods

Search Strategy

Computerized databases, including ERIC, PubMed, ProQuest Education Journals, and SCOPUS, were searched using the following search strategy: (“phonological awareness”) AND (classroom) AND (impairment OR intervention). The search was limited to English journal articles. No limitations were set on date of publication.

Selection Criteria

Studies selected for inclusion in this review were required to examine phonological awareness intervention programs situated within preschool or

kindergarten classrooms specifically dedicated to children with speech and/or language disorders. All subjects held a pre-existing diagnosis of a speech and/or language disorder. Studies focusing upon kindergarten or preschool-aged children who were considered to be at risk for (but not identified with) speech and/or language impairments due to low income or low socioeconomic status were excluded.

Data Collection

Results of the literature search yielded four articles that met the selection criteria. The articles included two single subject 'n-of-1' studies (Roth et al., 2002; Roth et al., 2006), which were considered to be Level 1 research evidence. Additionally, two nonrandomized clinical trials, case-control studies (Laing & Espeland, 2005; van Kleeck et al., 1998), which were considered to be Level 2b research evidence, were also included.

Results

Results are organized from least to most compelling evidence.

Roth et al. (2002) presented a comprehensive intervention program (Promoting Awareness of Sounds in Speech, or PASS) targeted at improving the phonological awareness skills of preschool children identified with speech and/or language disorders. Of the program's three modules, only the rhyming module was examined in this particular study. The study included 8 children, ranging from 4 to 6 years, who were identified with only a speech or language disorder, and who were enrolled at a preschool for children with communication disorders. The implemented phonological awareness intervention program, which lasted between 6 and 8 weeks, was used to supplement the child's classroom instruction of the alphabetic principle. Further phonological awareness activities beyond those provided by the PASS program were not permitted. Because of the short duration of the program, maturational effects of the children were not considered.

Baseline, intervention and post-treatment measures of the rhyming task were collected and analyzed by means of percentage of correct responses. All children participating in the study demonstrated improvement in their rhyming abilities, following the implementation of the PASS rhyming module and in conjunction with the classroom-based instruction of the alphabetic principle.

The small subject pool makes the value of this study's findings somewhat limited. Only descriptive statistics were reported, meaning that the data analysis was not as strong as it might have been if further statistics were discussed. Because of the preschool's enrollment

periods, children involved in the study were unable to participate in the entire intervention program. Additionally, this study did not examine the effects of the PASS rhyming module in isolation, without the influence of the classroom-based instruction in the alphabetic principle. As a result, the reported improvement in rhyming skills cannot be solely attributed to the implemented intervention, due to the presence of an additional variable (the alphabetic principle). The effects of teaching the alphabetic principle and the effects of the rhyming module should be separately considered in future studies. However, given that each participant did demonstrate improved rhyming ability, but not their abilities in untrained skills (i.e., sound segmenting and blending), the findings of the study suggest that using phonological awareness intervention programs in classrooms for children with speech and/or language concerns can be effective for trained phonological awareness activities. Interestingly, this study demonstrated improvements in rhyming (i.e., a treatment-specific effect), but the gains did not transfer to sound segmenting and blending (i.e., other tasks also recognized as phonological awareness activities). Consequently, this study may be indicative of the need for further research exploring the exact factors that contribute to and are currently considered as phonological awareness skills.

Similarly, Roth et al. (2006) examined the second module of the PASS program, in which training of blending skills was implemented. Eleven students enrolled at a preschool for children with speech and/or language delays, and who were between 4 and 6 years of age, participated in the blending module of this study over a period of 6 to 8 weeks. Like the rhyming module, the blending module was implemented with classroom instruction of the alphabetic principle.

Baseline, intervention and post-treatment measures were taken to determine each participant's gain. *t*-tests were used to determine the statistical significance of each child's progress. It was determined that for blending, the trained skill, the average gain across participants was statistically significant ($t = -5.47$, $p < 0.05$). Given that all participants in the blending module had previously received PASS training through the rhyming module, statistically significant improvement was also noted for rhyming ability, as would be expected ($t = -2.60$, $p < 0.05$). However, gains made for segmenting, the third and final part of the PASS program, were not determined to be statistically significant ($t = -1.20$, $p > 0.05$). This finding is also important, given that this skill had not yet been trained for this group of participants. It also strengthens the case for future studies exploring factors that contribute to and are known as phonological awareness skills.

Again, a small sample size means that the findings of this study must be interpreted with caution. Specific *p* values were not provided, despite the authors making note of their statistical significance. Like the Roth et al. (2002) study, this study did not examine the effectiveness of the blending activities in isolation, since all participants had previously received the rhyming module training and classroom instruction of the alphabetic principle. Furthermore, the effects of rhyming ability on blending skills were also not examined. Finally, and similar to the 2002 study, the structure of the preschool's academic year resulted in participant exposure to only part of the PASS blending intervention, meaning that the total improvement potential for each participant was not determined.

Even though this study also contains some methodological concerns, the findings are still suggestive of the effectiveness of using phonological awareness intervention programs to target at-risk students in classrooms dedicated to children with speech and/or language difficulties.

Laing and Espeland (2005) examined the effects of a classroom-based, low-intensity phonological awareness intervention program on children identified with speech and/or language impairments. In this study, a phonological awareness intervention program, focusing on rhyme identification and production, sound categorization, letter identification and sound-letter correspondence, was provided to a class of preschool children with identified speech and/or language impairments. Data were collected for six students, whose cognitive abilities were within the average range and could be compared to the control group. The control group was comprised of five typically developing students from a mainstream classroom, who did not receive the phonological awareness intervention.

In the fall and winter semesters, both groups of children participated in a rhyme production task. The results of this task were used as a comparative measure before, during, and after the implementation of the phonological awareness intervention tasks. In the spring semester, all children in the class were exposed to two fifteen-minute weekly sessions of phonological awareness activities. The spring semester, in which the phonological awareness intervention was administered, was eight weeks in duration.

Mean achievement scores for the rhyme production task were compared using the non-parametric Wilcoxon signed-ranks test, which was an appropriately selected statistical test due to the small sample size used in the study. Between fall and winter testing, there was no

significant difference in rhyme production ability for either group ($z = -0.730$, $p = 0.47$). However, between winter and spring, a statistically significant difference was found for rhyme production ($z = -2.20$, $p = 0.028$) and identification ($z = -2.72$, $p = 0.007$), as well as sound categorization abilities ($z = -2.20$, $p = 0.028$) in the impaired group. This finding is particularly important, since the phonological awareness tasks and intervention activities were administered throughout the spring semester. Because the rhyme production abilities of typically developing children were not found to have significantly improved, the improved abilities of the impaired group can be more confidently attributed to the implementation of the phonological awareness intervention. As a result, the findings of this study suggest that phonological awareness training within a classroom setting can be effective for children with identified speech and/or language impairments, closing an achievement gap between impaired and typically developing students.

While the findings of this study are encouraging, the findings would be stronger if the study was replicated with a larger subject pool. The heterogeneous nature of the subjects selected for this study, given the range in type and severity of speech, language or both speech and language impairments, make the findings difficult to generalize. Each child's attendance and the number of intervention sessions received were also not reported, meaning that the amount of intervention required for impact remains unknown. Nevertheless, these findings are suggestive of phonological awareness intervention programs being effective in classrooms dedicated for children with speech and/or language disorders.

van Kleeck et al. (1998) compared the performance of sixteen kindergarten-aged children with identified speech and/or language disorders prior to and following classroom-based phonological awareness training over the course of nine months. These children were divided into two age-based groups. Both groups' performances were compared to a group of eight children who had been students in the same classroom in a previous year, but who did not receive the phonological awareness training. Graduate speech-language pathology students provided the classroom-based phonological awareness training, which included both rhyming and phoneme awareness activities. Classroom teachers were specifically instructed not to provide any additional teaching of phonological awareness skills. Pre- and post-test measures of rhyming and phoneme awareness capabilities were recorded.

Two-way mixed ANOVAs were appropriately used to analyze pre- and post-treatment phonological awareness measures. Results indicated that all children receiving

the training improved their skills in rhyming and phoneme awareness in relation to their pretest scores. In addition, scores for the control group were higher for rhyming than for phonemic awareness in comparison to the trained groups. However, given that the post-intervention phoneme awareness skill level for the trained groups was greater than that of the control group, the resulting increase in abilities can be more confidently attributed to the training received, and not to classroom curriculum. Because the trained groups' scores on rhyming tasks did not surpass those of the control group, improvement in rhyming skills cannot be attributed in the same manner.

The authors comment that this study includes a significant number of strengths that make the suggested program worthwhile. The prescribed program occurred in relatively short periods, and was described in adequate detail such that the procedures can be easily replicated. Anecdotal reports suggest that the inclusion of both classroom teachers and speech-language pathologists fostered a beneficially collaborative approach to intervention, and that the program was entertaining for the children involved. However, even the best-designed studies should be examined with a critical eye. Some of the aforementioned strengths were only ambiguously discussed; costs, number of clinicians and graduate students required, and required training for classroom teachers were not clarified. The authors comment that the small sample size of children involved in this study created a significant limitation. Additionally, the authors point out that the effects of rhyming on phoneme awareness, and vice versa, were not examined; this study would have benefitted from the addition of counterbalancing measures to determine the exact contribution of each task.

Several other limitations exist for this study that were not mentioned by the authors. Firstly, the control group was comprised of a group of older students. "Historical" data from these students had been previously collected for alternate purposes not described in the paper. Additionally, all children in this study presented with a variety of speech, language or speech and language disorders. The number of disorders, as well as the types and severity of each manifestation, varied immensely between subjects. The unifying descriptor across all subjects was that each disorder could be broadly labeled as a speech and/or language disorder. Consequently, the heterogeneity of subjects makes generalizing the outcomes of the study difficult for future clinical practice.

Children in this study participated in rhyming intervention activities in the fall, and phoneme awareness intervention in the spring. Even though the

intervention activities were undertaken at different times of year, the results were grouped together for analysis. The effects of time, maturation and growth were only discussed in reference to the children's ages pre- and post-study. The authors referenced the children participating in intervention activities in small groups of three or four students, but the method of assigning students to groups as well as the number of students per group were not specified. Student attendance and the number of intervention sessions received were also not discussed. Finally, the number of graduate student clinicians was unspecified and it remains unclear whether the clinicians visiting each classroom remained consistent throughout the study. Fidelity measures, if completed, were not mentioned in the review.

Despite the number of concerns surrounding the methodology, study findings are suggestive of the effectiveness of classroom-based phonological awareness intervention for children with speech and/or language disorders.

Discussion

Young children with speech and/or language disorders often present with delayed or absent phonological awareness skills. Taken together, the results of the four reviewed studies are suggestive of the positive effects of phonological awareness intervention in classrooms dedicated to children with speech and/or language delays. In various manifestations, the studies included in this review reveal the potential for significant positive change when targeting phonological awareness skills in a classroom setting.

Several limitations from this review warrant further discussion. Given the heterogeneous nature of speech and language disorders, and despite the fact that all reviewed studies used a multiple baseline approach to combat this concern, skills, strengths and weaknesses may greatly vary between children. Consequently, required intervention for children with speech and/or language impairments is also likely to be varied. The creation of a unified phonological awareness intervention program may be difficult, given the diversity of abilities. Furthermore, phonological awareness refers to a host of skills (i.e., rhyming, segmenting, letter-sound correspondence, etc.), which have been superordinately grouped as strongly correlated with early literacy. Since there is some indication that training some skills may not transfer to all phonological awareness skills, support for broadly termed phonological awareness intervention programs must be carefully examined.

Likewise, given the variety in phonological awareness activities, and in conjunction with the heterogeneous

nature of speech and language delays, the combined results of the reviewed studies should be interpreted with caution. Replicating these results across *all* students with speech and/or language delays and for *all* phonological awareness intervention activities may be difficult, if not impossible.

Similarly, this review focused on classroom-based intervention as the treatment setting. Even though all studies considered in this review involved classrooms specifically designed for children with speech and/or language delays, the classroom conditions under which intervention was implemented were unspecified and are assumed to have varied. Of particular importance, teacher training, treatment intensity and duration, student attendance, and personnel implementing intervention are thought to have varied immensely between studies. As a result, when considering the cumulative results of this review, it becomes clear that further research into the conditions required to produce positive change for phonological awareness ability is still needed. Furthermore, it has yet to have been determined if phonological awareness intervention programs implemented in classrooms dedicated to students with speech and/or language impairments are more or less effective than individual intervention for the same population.

Perhaps most importantly, however, is the concerningly limited knowledge base of this intervention design. Existing literature examining this particular topic includes only four studies, one of which is an extension of a previous study. Furthermore, the largest of the four studies meeting the criteria for inclusion employed a subject pool of only sixteen children. Such small sample sizes, combined with such a limited number of studies completed on the topic, are a strong indication of the need for further research, particularly since the results of this review are suggestive of a clinically useful method of targeting at-risk students.

Conclusion and Clinical Implications

This critical review suggests that phonological awareness intervention programs in classrooms dedicated to children with speech and/or language disorders may be a suitable avenue for targeting at-risk students. To date, only a limited body of research is available. Taken together, the available studies are still suggestive of this potential intervention design as clinically relevant to promote positive change. Given that the results of this review are demonstrative of an opportunity for successful intervention, speech-language pathologists must be willing to collaborate with classroom teachers and to engage in knowledge transfer between professionals. As this intervention

design remains largely unexplored, these studies may be foundational for further research.

Future Research Recommendations

Further research is still required to explore the potential benefits of classroom-based phonological awareness intervention for children with speech and/or language disorders. Such research may include large-scale studies, and a further exploration of the exact influence of student attendance, teacher training, classroom conditions and treatment duration and intensity. Additionally, research may be required to further specify the benefits of this type of intervention for the various types and severities of speech and/or language disorders. It may be necessary to examine the exact factors that contribute to and are currently considered as phonological awareness skills, as well as to specify the types of phonological awareness skills that are known to improve within classroom-based interventions.

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