PASS Research

The evidence basis for **PASS** comes from 6 studies which are each described below. The primary purpose of the first two studies was to determine the efficacy of PASS for preschool children with speech and language impairments. Study 3 was designed as an exploratory investigation to examine the long-term benefits of PASS on children's literacy development. The aim of the fourth and fifth studies was to ascertain the effectiveness of PASS as a Tier 2 instructional program within a response-to-intervention (RTI) educational model for at-risk 3- and 4-year-old children. The sixth study was a pilot investigation to determine the effectiveness of PASS for preschool children who are English-language learners (ELLs). For all studies, PASS instruction was implemented in conjunction with systematic training in the alphabetic principle.

Study 1

Background

Roth, Troia, Worthington, and Dow (2002) used a single-case experimental design to evaluate effects of the PASS rhyming unit with 8 preschool children who had speech and/or language impairments. A probe task was developed for each phonological awareness target behavior— rhyming, sound segmentation, and sound blending. The items on these probes were at the production level, the most difficult level of mastery (for example, the blending items required children to combine C-V-C sounds into words). Each probe consisted of one demonstration item, one practice item, and 10 test items. The stimuli for each probe were, to the extent possible, balanced for consonant and vowel diversity. None of the probe items were used for explicit training activities during the intervention phase to permit an evaluation of stimulus generalization. The steps were:

- Establish stable (in level and trend) pre-treatment baseline performance for each child using multiple probes of rhyming, blending, and segmentation. Stability was evident if the level (i.e., magnitude) of the plotted data points for rhyming fell within a 15% range of the mean level of the data series and if the trend of the data series was characterized by a zero celeration or decelerating slope (see Tawney & Gast, 1984).

- Implement rhyming treatment phase and monitor progress.

- Determine post-treatment performance gains using multiple probes of rhyming, blending, and segmentation.

Results

All children showed significant improvement in their rhyming ability (even at the production level) with the group average exceeding the training criterion of 80% over two sessions. The average pretreatment baseline score ranged from 0-53%. The average post-treatment score

ranged from 77–100% (without overlap with pre-treatment scores). Functional independence of the three phonological awareness target behaviors and, thus, experimental control and treatment efficacy were demonstrated if: (a) the level and trend of post-treatment probe data were substantially superior to baseline performance; (b) those areas for which training did not occur showed little or no improvement; and (c) the effects of intervention were replicated across phonological awareness behaviors. The results indicated that the PASS rhyming module, implemented in conjunction with alphabetic principle instruction, was an efficacious approach to phonological awareness instruction for the preschool children in our sample. The results indicated that there were no notable gains in blending and segmentation, demonstrating that rhyming gains were due to treatment and not general maturation or other factors.

Study 2

Background

Roth, Troia, Worthington, and Handy (2006) used the same single-case experimental design to evaluate effects of the blending unit with 11 preschool children with speech and/or language impairments (all had previously participated in the PASS rhyming unit). Replicating the methodology used for the rhyming study, the series of steps followed were:

- Establish stable (in level and trend) pretreatment baseline performance for each child using multiple probes of rhyming, blending, and segmentation.

- Implement blending treatment phase and monitor progress.

- Determine post-treatment performance gains using multiple probes of rhyming, blending, and segmentation.

Results

The findings indicated that PASS blending training was an efficacious approach to phonological awareness instruction for the preschoolers with disabilities in the sample. Moreover, the blending treatment effects were localized, which is consistent with findings for the rhyming unit of PASS. All children showed significant improvement in their receptive blending ability (blending recognition), with the group average exceeding the training criterion of 80% accuracy over two sessions. Further, the children learned this task quickly, needing no more than two lessons to attain mastery. As expected, blending production was a more difficult task than rhyming because it required synthesizing three individual sounds to generate a word (e.g., /n/-/o/-/z/ [nose]). The group averaged a 49% gain in overall correct responses from pretest to post-test, which represented a large treatment effect. Specifically, the average pretreatment baseline score was 3% correct in comparison to the average post-treatment score of 52% correct (ES = 2.87). However, it appeared that overall correctness did not accurately portray the extent of children's learning. For example, "bat" and "bid" are scored as incorrect responses to the stimulus item "c-a-t." However, the first response indicates that the child preserved two of three target phonemes in the

word, while "bid" includes none of the target phonemes. Therefore, we measured the number of phonemes preserved in each probe item (10 CVC words = 30 phonemes). Using this procedure, the results indicated that the proportion of phonemes preserved at pretest averaged 32%, while at post-test the average number of phonemes preserved was 89%, demonstrating that "number of phonemes preserved" is likely a more sensitive index of children's mastery of sound blending.

Study 3

Background

Roth, Golden, and Fritsch (2004) conducted a study that focused on the later literacy status of children with speech-language deficits who had previously received explicit PASS training in their therapeutic preschool program at the University of Maryland, College Park. This investigation utilized parent report information via surveys mailed out 2 to 6 years after the children "aged out" of the preschool program.

- Eighteen children comprised the research group (RG) and received PASS rhyming, blending, or segmentation instruction three days per week in individual sessions at the preschool over a period of 6–8 weeks. At the time of the parental survey, these children were enrolled in grades ranging from 1st through 4th.

- Thirty-five children comprised the non-research group (NRG); this group received individual therapy of equal intensity and duration at the preschool in areas of speech and language other than phonological awareness. At the time of the parental survey, these children were enrolled in 2nd through 6th grades.

- Questionnaires regarding literacy (reading and writing) status were mailed to the parents of the RG group and the NRG group. To facilitate maximum response rate, follow-up letters were mailed one month subsequent to the initial mailing. Follow-up phone calls were initiated 2 months later to the remaining nonrespondents. The total response rate of completed surveys was 55% from the RG families and 46% from the NRG families.

Results

Parent surveys indicated that, since graduation from the preschool program, 37.5% of the RG and 25% of NRG were performing at grade level with respect to their reading and writing abilities. More specifically:

- Reading comprehension was cited as the primary area of difficulty for all of the RG and 75% of the NRG; decoding (word level reading) was reported as the major area of difficulty for the remaining 25% of the NRG.

- Writing difficulties were reported for 25% of the RG and 75% of the NRG; the area of primary writing difficulty for the RG was identified as composition while the area of primary writing difficulty for the NRG included composition and spelling.

These preliminary results suggest that explicit and intense instruction in phonological awareness (implemented in conjunction with alphabetic principle instruction) delivered in the **preschool years** can have positive effects on the later literacy learning skills of children with primary speech-language impairments.

Study 4

Background

Roth, Worthington, and Troia (2009) and Roth and Rogers (2009) determined the effectiveness of the PASS rhyming unit as a Tier 2 instructional program with 3- and 4-year-olds at high risk for educational failure. The children attended inner-city public charter schools. The composition of the student population was multiethnic and multiracial with SES ranging from poverty to lower middle class.

- A quasi-experimental group design was used which compared the rhyming performance of two groups of children: experimental group and control group.

- The children in the experimental group (n = 21) were selected for Tier 2 instruction because their phonological awareness performance fell below the cut-off scores for their school on two measures: the **Individual Growth Developmental Indicators** (IGDIs; Carta, Greenwood, Walker, Kaminski, McConnell, & McEvoy, 2002) Rhyming subtest, which is a 2-minute timed test of children's receptive rhyming ability, and the **Phonological Awareness Literacy Scales** (PALS Pre-K; Invernizzi, Sullivan, Meier, & Swank, 2004), which is untimed and contains 10 items that measure receptive rhyming ability. Average raw scores on each test were calculated for each school/grade. To be eligible for Tier 2 instruction, a child's performance had to fall at least 20% below their school/grade's average on both of these measures after a six-week period of high-quality Tier 1 classroom instruction.

- Pretest probes were administered prior to and following training to establish a stable baseline of performance; the probe consisted of 15 items (5 each for rhyming, blending, and segmentation).

- The children in the control group received general rhyming instruction as part of their classroom curriculum. The children in the experimental group received additional rhyming instruction (Tier 2) using the PASS rhyming unit via pull-out services conducted by speech-language pathologists. These services were delivered in small groups (2–4 children) twice weekly in half-hour sessions.

Results

A comparison of the control group and the experimental group revealed:

- On the PALS Pre-K Rhyming subtest (total possible correct = 10), the mean pretest score of the control group was 4.27 versus 2.9 for the experimental group (the spring benchmark for this subtest is 4 correct). At post-test, the control group obtained a mean of 7.92 versus 7.33 for the experimental group, with an effect size (ES) of 1.79, with both groups exceeding the benchmark. This finding indicates that PASS training was effective in significantly improving the rhyming skills of the most at-risk children. It is also notable that their post-test scores were nearly identical to the control group, suggesting that PASS instruction accelerated their rate of learning.

- On the IGDIs Rhyming subtest, the mean pretest score of the control group was 2.74 versus 0.5 for the experimental group (the spring benchmark for this subtest is 5 correct). At post-test, the control group obtained a mean score of 9.29 (ES = 1.18) versus 10.25 for the experimental group (ES = 2.48), with both groups exceeding the benchmark. A comparison of the groups' post-test means and effect sizes indicates that PASS was extremely effective in improving the experimental group's rhyming abilities to the level of their peers, with an average gain of about 2½ standard deviations between the beginning and ending of PASS instruction.

- The mean probe scores of the experimental group on the rhyming probe was 1.88 at pretest and 3.95 (of 5) at post-test, with an ample effect size (ES) of 1.08.

Study 5

Background

Roth, Worthington, and Troia (2009) and Roth and Rogers (2009) determined the effectiveness of all three PASS modules as a Tier 2 instructional program with 3- and 4-year-old children at high risk for educational failure. The children attended inner-city public charter schools. The composition of the student population was multi-ethnic and multi-racial with SES ranging from poverty to lower middle class.

- A quasi-experimental group design was used which compared the phonological awareness performance of two groups of children: experimental group (n =15) and control group (n =38).

- The children in the experimental group received rhyming, blending, or segmentation instruction and were selected for Tier 2 instruction because their phonological awareness performance fell below the cut-off scores for their school/grade on two measures (i.e., IGDIs Rhyming subtest and PALS Pre-K Rhyme Awareness subtest). To be eligible for Tier 2 instruction, a child's performance had to be at least 20% below their school/grade's average on both of these measures after a six-week period of a high-quality Tier 1 classroom instruction.

- The children in the control group received general phonological awareness instruction as part of their classroom curriculum. The children in the experimental group received

additional rhyming, blending, or segmentation instruction (Tier 2) using PASS units via pull-out services conducted by speech-language pathologists. These services were delivered in small groups (2–4 children) twice weekly in half-hour sessions.

- Pretest probes were administered prior to and following training to establish a stable baseline of performance. The probe consisted of 15 items (5 each for rhyming, blending, and segmentation).

Results

A comparison of the control group and the experimental group revealed:

- On the PALS Pre-K Rhyming subtest (total possible correct = 10), the mean pretest score of the control group was 3.79 versus 1.33 for the experimental group (the Spring benchmark for this subtest is 4 correct). At post-test, the control group obtained a mean of 7.47 versus 7.07 for the experimental group, with an ES of 1.68, with both groups exceeding the benchmark. This finding indicates that PASS training was effective in significantly improving the phonological awareness skills of the most at-risk children. It is also notable that their post-test scores were nearly identical to the control group, suggesting that PASS instruction accelerated their learning growth rate.

- On the IGDIs Rhyming subtest, the mean pretest score of the control group was 1.94 versus 0.71 for the experimental group (the Spring benchmark for this subtest is 5 correct). At post-test, the control group obtained a mean score of 8.27 (ES = 1.15) versus 9.86 for the experimental group (ES = 2.07), with both groups exceeding the benchmark. A comparison between the groups' post-test means and effect sizes indicates that PASS was extremely effective in improving the experimental groups' rhyming abilities to the level of their peers, with an average gain of about 2 standard deviations between the beginning and ending of PASS instruction.

- The mean probe score of the experimental group was 1.33 (of 15) at pretest and 7.07 at post-test, with an ample effect size (ES) of 2.55.

Study 6

Background

Roth, Worthington, and Troia (2009) and Roth and Rogers (2009) conducted a preliminary investigation to determine the effectiveness of PASS for preschool ELL children. Over 94% of the ELL children in this project were from Hispanic backgrounds who spoke Spanish as their primary and native home language (according to parental report).

- A quasi-experimental group design was used which compared the rhyming performance of two groups of children: experimental group (n =10) and control group (n = 64). The experimental group consisted of ELL children and the control group was comprised of

non-ELL children, all of whom met the criteria for Tier 2 PASS instruction. To be eligible for Tier 2 instruction, a child's performance had to be at least 20% below their school/grade's average on both of these measures after a 6-week period of a high-quality Tier 1 classroom instruction.

- Both groups were selected for PASS Rhyming instruction because their phonological awareness performance fell below the cut-off scores for their school/grade on two measures (i.e., IGDIs Rhyming subtest and PALS Pre-K Rhyme Awareness subtest).

- Tier 2 PASS instruction was implemented by speech-language pathologists in small groups (2–4 children) twice weekly in half-hour sessions.

- Pretest probes were administered prior to and following training to establish a stable baseline of performance. The probe consisted of 15 items (5 each for rhyming, blending, and segmentation).

Result

A comparison of the control group and the experimental group revealed:

- On the PALS Pre-K Rhyming subtest (total possible correct = 10), the mean pretest score of the control group (non-ELL children) was 3.5 versus 2.10 for the experimental group (ELL children; the Spring benchmark for this subtest is 4 correct). At post-test, the control group obtained a mean of 6.92 versus 5.2 for the experimental group, with an ES of 1.38, with both groups exceeding the benchmark. This finding indicates that PASS training was effective in significantly improving the rhyming skills of the most at-risk children.

- On the IGDIs Rhyming subtest, the mean pretest score of the control group was 1.94 versus 0.71 for the experimental group (the Spring benchmark for this subtest is 5 correct). At post-test, the control group obtained a mean score of 8.27 (ES = 1.15) versus 9.86 for the experimental group (ES = 2.07), with both groups exceeding the benchmark. A comparison between the groups' post-test means and effect sizes indicates that PASS was extremely effective in improving the ELL children's rhyming abilities to the level of their native English-speaking peers, with an average gain of about 2 standard deviations between the beginning and ending of PASS instruction.

- The mean probe scores of the experimental group (ELL children) on the rhyming probe were 2.1 at pretest and 5.2 at post-test, with an ample effect size (ES) of 1.08. The control group (non-ELL children) obtained mean pretest scores of 3.5 versus 6.92 at post-test.