

TEACHING YOGA SKILLS TO YOUNG CHILDREN WITH DEVELOPMENTAL
DELAYS WITH PARENTS AS INTERVENTION AGENTS IN THE HOME

By

DEBORAH J. GRUBER

A dissertation submitted to the Graduate Faculty in Psychology in partial fulfillment of
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Claire Poulson

Date

Chair of Examining Committee

Maureen O'Connor

Date

Executive Officer

Bruce Brown

Nancy Hemmes
Supervisory Committee

THE CITY UNIVERSITY OF NEW YORK

Abstract

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Adviser: Professor Claire Poulson

Children with disabilities often lack the skills required to participate in physical fitness activities. The purpose of the present study was to assess the effects of an intervention package to teach children with developmental delays individual exercise skills. These skills were taught with yoga as the method of exercise. The study was conducted in the home environment, with parents teaching the yoga skills. The video-modeling baseline procedure consisted of presenting a videotape showing a certified yoga instructor providing verbal instructions and physical demonstrations of each step in a 24-step response chain that made up two yoga poses. The experimenter trained the parents to use graduated guidance and reinforcement procedures. The graduated guidance intervention was implemented by the parents of the participants. The intervention was introduced in a multiple-baseline-experimental design across three participants. The graduated-guidance procedure was provided to the participant, enabling the participant to execute the correct physical alignment for each step in the response chain. Baseline data indicated that with video-modeling alone (baseline), correct matching of the yoga response chain occurred with no greater than 17% accuracy. Systematically with the introduction of treatment, all participants matched the response chain with 71% accuracy or better. Data also demonstrate that one participant generalized these skills with 96% accuracy and another participant generalized these skills to 88% accuracy with a different video model in

which the treatment package was not implemented. Correct implementation of the graduated guidance procedure occurred for all three parents with the introduction of parent training. The present study replicated earlier findings but with parents, rather than teachers, as intervention agents.

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Teaching Yoga Skills to Young Children with Developmental Delays with Parents as Intervention Agents in the Home

Physical education is part of the educational curriculum in almost every school in the country (Young, 1997). Physical fitness improves muscle strength, flexibility, and cardiovascular health (Young, 1997), stimulates the growth hormone (Cappa, Bizzari, Martinez, Porzio, Giannone, Turchetta, & Calzori, 2000) and improves motor skills (Sharpe, 1998). Physical fitness is essential to the health of all children.

For preschool age children, greater emphasis is being placed on the importance of structured physical education as part of the total curriculum (Murata, and Maeda, 2002). Activities for young children should target basic fine and gross motor movements, ball play, and riding a tricycle (Murata, and Maeda, 2002). Many individuals with disabilities often lack the skills required to participate in physical fitness activities (Fine & Fine, 1996). This lack of skills should not restrict them from participating in age-appropriate physical activities (Murata, and Maeda, 2002).

A physical activity that has been gaining popularity among children is the practice of yoga. Yoga for children is being introduced in the context of private studios, and public schools (Mardesich, 2006). There are also several yoga videotapes for children on the market, so children can practice yoga in the home environment. There have been several studies published demonstrating the effects of yoga training on skills associated with physical activity. Yoga has been demonstrated to improve performance on muscular fitness tests (Gharote, 1976), respiration rate (Telles, Narendran, Raghuraj, Nagarathna, and Nagendra, 1997), and static motor skills (Telles, Hanumanthaiah, and Nagendra, 1993).

Behavior analysts provide training of physical activity skills. For example, Libby, Weiss, Bancroft, and Ahearn (2008) examined the effects of three prompting procedures commonly used to teach children with developmental delays long chains of motor responses. Additionally, Vintere, Hemmes, Brown, and Poulson (2004) examined the effects of two training procedures on the acquisition of gross motor chains for preschool dance students. Luyben, Funk, Morgan, Clark, and Delulio (1986) used a most-to-least prompting procedure to teach adults with intellectual disabilities soccer skills. Schleien, Wehman, and Kiernan (1981) taught multi-handicapped adults to play a game of darts. Lagomarcino, Reid, Ivancic, and Faw (1984) taught leisure dance skills to adults with profound mental retardation.

Graduated guidance is an instructional procedure very often used in behavior analytic practice. Graduated guidance is the combined use of physical guidance, fading, and reinforcement resulting in a systematic gradual reduction of the intensity of physical guidance (Sulzer-Azaroff, 1991). Graduated guidance has been shown to be an effective procedure to teach skills associated with physical activity. For example, Gruber, Lee and Poulson (2005) assessed the effects of an intervention package to teach children with developmental delays yoga skills. The video-modeling baseline procedure consisted of presenting a videotape showing a certified yoga instructor providing verbal instructions and physical demonstrations of each step in a 24-step response chain that made up two yoga poses. The graduated guidance intervention was implemented by preschool teachers. It was introduced in a multiple-baseline-experimental design across three participants. Systematically with the introduction of treatment, all participants matched the response chain with 70% accuracy or better. Data also demonstrated that one

participant generalized these skills in the presence of a live model; a stimulus that was not present during training.

Behavior analysts have been successful in providing parents with the skills needed to train their children in the home environment. Studies that have been conducted with parents as trainers have examined the effects of treatment packages to address problem behavior, spontaneous speech, self-help skills, and play. For example, Herbert and Baer (1972) conducted a study in which two mothers were trained to give attention to their children following appropriate behavior. Following parent training, both mothers increased attending to appropriate child behavior and an increase in appropriate child behavior was also demonstrated. In another study, Sanders and Glynn (1981) examined the effects of a treatment package consisting of training parents in behavior management procedures to reduce their children's problem behavior in the home. Results indicated that the training produced accurate implementation by parents and a decrease in problem behavior across children. Krantz, MacDuff, & McClannahan (1993) conducted a study in which parents were trained to assist their children in schedule-following involving family activities. Across all three children, results demonstrated an increase in engagement, decrease in disruptive behavior, and an increase in social initiations in the home. Charlop and Trasowech (1991) conducted a study examining the effects of teaching parents to use a time-delay procedure to increase spontaneous language in their children. Results demonstrated an increase in spontaneous language across all children and an increase in correct implementation of procedures across parents. Denny, Marchand, Martella, Martella, Reilly, Reilly, & Cleanthous (2000) demonstrated the effectiveness of using

parents to teach eating and ball play to their child with Cri du Chat Syndrome. Graduated guidance procedures were used to teach these skills.

Although past behavior analytic research has addressed skill acquisition in the areas of physical activities, less attention has been given to parents teaching physical activity in the home environment. Studies conducted in the home environment using parents to teach skills have focused primarily on language and social behavior. In the home environment, typical children engage in a variety of physical activities. The purpose of the present study was to assess the effects of using graduated guidance and video-modeling procedures to teach yoga skills to children with developmental delays. In the present study parents taught yoga skills to their children using graduated guidance and video-modeling procedures.

Method

Participants and Setting

Two boys and one girl with developmental delays participated in the study. At the start of the study, Ryan was 3 years 6 months old, Marc was 4 years 6 months old, and Rose was 3 years 7 months old. All participants were selected on the basis of their skills and needs. For all participants, behavioral observations were consistent with deficits in the areas of gross-motor, fine-motor, and balance skills. For Ryan, goals written on his Individual Educational Plan (IEP) included following 2-step directions and imitating sequenced gross-motor movements. Marc's IEP included increasing gross-motor skills such as jumping, balancing, and ball play, following 2-step directions, and increasing fine-motor, and visual-motor skills. Rose's goals included gross-motor imitation, fine-motor imitation, and following directions. For all three participants, the experimenter observed imitating actions from a video display. Additionally, progress was noted on the above-mentioned IEP goals for all participants, and they were therefore selected to participate in the study. Furthermore, preferences for physical activities such as bike riding, chase games, and playing on playground equipment was observed for all participants. A preference for physical and social praise was also observed. For the parents, all were inexperienced in delivering graduated guidance procedures. The study took place in a quiet room in the child's home. Sessions were conducted three times a week.

Training Materials and Yoga Preparation

The materials required for training included a television, VCR or DVD player, the instructional video, yoga mats, and data collection forms of the task analysis. Additionally, all child-participants were required to be in loose-fitting clothing and be in their bare feet.

Video Modeling

The videotape or DVD consisted of a certified yoga instructor providing verbal instructions and physical demonstrations of each step in a response chain that made up two yoga poses.

Modeling Stimuli

Two hatha yoga poses (Iyengar, 1966) were task-analyzed into a 24-step response chain. The two yoga poses that made up the response chain are Half Moon Pose and Cobra Pose. The steps of the chain are presented in Table 1. Content validity was established through observation and the practice of yoga by the experimenter, and the approval of a certified yoga instructor; the same instructor used as the model on the video. The experimenter had studied yoga with the certified yoga instructor for several years. The yoga instructor is certified in several areas of yoga including Bikram Yoga, Vinyasa Yoga, and Pre and Post Natal Yoga. She presently owns a yoga studio where she teaches classes to both adults and children.

General Procedures

For both baseline and intervention, the livingroom/family room was set up with the television, VCR or DVD player, video and yoga mat prior to the beginning of each session. The parent was present during all sessions. Only mothers chose to participate. All sessions were video-taped. A session was defined as one execution of the 24-step response chain. Each session began with the parent pressing “play” to start the instructional video. The instruction, “Time for yoga,” was given by the instructor on the video. The parent stood behind the child with a distance no greater than arm’s length. The experimenter assessed performance of both parent and child by watching the video-

taped session later. For the child, the experimenter recorded the steps of the task analysis that were performed independently or otherwise, which is the yoga response chain that was modeled on the video. The experimenter also recorded the parents' use of the graduated guidance procedure for each step of the task analysis.

Parent Training Procedures

During baseline, parents were instructed to stand in the livingroom/family room with their child, and to not intervene physically or verbally. Once a stable baseline was established for the child, parent training began with one parent. No sessions with the child were conducted during parent training. Parent training began by having the parent view the model on the videotape. The experimenter then demonstrated the use of the graduated guidance and reinforcement procedures by implementing the procedures on the parent, followed by the parent implementing the procedures on the experimenter. Criterion for mastering the implementation of the procedures was 100% accuracy for 2 sessions. Once parent training was completed for one parent, the graduated guidance treatment package was implemented with one participant. Baseline data for the other parents continued until training with the next began.

Graduated Guidance Procedure

A parent provided graduated guidance throughout the 24-step response chain, in accordance with the directions from the instructor on the video. Graduated guidance enabled the child to execute the correct physical alignment for each step in the chain. The prompt levels established using graduated guidance are presented in Table 2. The criterion to move to a less intrusive prompt level was at least 88% at the prescribed prompt level for 4 consecutive sessions. In other words, if 3 or fewer errors were made

out of the 24 steps during 4 consecutive sessions, a less intrusive prompt level was prescribed. An error was defined as an incorrect execution of a response in the chain. Failure to perform a step at the prescribed prompt level was corrected through a full physical prompt by the parent without verbal feedback. The parent was instructed to deliver reinforcement following the child's completion of the 24-step response chain if the child made 7 errors or fewer. The reinforcement procedure consisted of the delivery of social praise and a preferred edible or activity at the end of the response chain.

Generalization Procedure

Unprompted and non-reinforced generalization probe sessions were conducted across baseline and the experimental condition. As in baseline, each parent was instructed to stand in the livingroom/family room with her child, and to not intervene physically or verbally. Generalization probes were conducted in the same setting, however, a different video model demonstrating the same poses replaced the model used during the graduated guidance procedures. The generalization video model was the experimenter.

Pre-test and Post-test Procedure

One pre-test session and one post-test session were conducted during baseline and the experimental condition. These sessions were conducted using a live model demonstrating the same poses as the video model. As with the generalization probes, these sessions were unprompted and non-reinforced. Furthermore, the live model was the experimenter; the same model used during the generalization probes.

Observation and Data Collection

All yoga sessions were videotaped. The experimenter and another trained

observer obtained the data from the tapes. Data on participants were collected on a task-analysis data sheet, showing the 24 steps of the chain. Prescribed prompt levels were printed at the top, and data were collected on the participant's performance of each step. Data indicated whether each step was performed correctly, or whether it was prompted or otherwise incorrect.

Treatment Integrity

Data were collected on parents with each participant. Using the task analysis data sheet with the prompt level printed at the top, data were collected on the parent's use of graduated guidance during each step in the task analysis. Data were recorded on whether each step was prompted correctly by the parent and on the parent's accuracy of reinforcement delivery.

Data were also collected on the performance of the live model used during the pre-test and post-test sessions. Data indicated whether the live model performed each step correctly (matching the performance of the video model) or incorrectly (not matching the performance of the video model).

Experimental Design

A multiple-baseline-experimental design across subjects was used. Once a stable baseline was established, training began with one participant. Baseline data for the other participants continued until intervention was introduced for one participant at a time.

Consumer Satisfaction

A consumer satisfaction survey was completed by parents at the end of the study. The survey included questions concerning their satisfaction with yoga as a new skill for their child and the child's enjoyment of the activity.

Interobserver Agreement

Interobserver agreement data were obtained by a second observer, for approximately one quarter of all sessions including baseline, treatment, generalization, and the pre-test and post-test. The experimenter served as the primary observer. A second observer was another doctoral student in Psychology. Interobserver agreement was calculated by dividing the number of agreements by the number of agreements plus the number of disagreements and multiplying by 100. An agreement was defined as an identical score on each step of the task analysis by both the experimenter and the second observer. For example, both observers were required to have data that indicated that the response was correct with prompting, correct without prompting, or incorrect. If a score did not match, this indicated a disagreement. All sessions were videotaped; observers scored sessions independently at different times and were allowed to view any segment of the tape up to five times to score responses.

Interobserver Agreement

Tables 3 and 4 show interobserver agreement data for each participant. Tables 5 and 6 show interobserver agreement data for each parent, thus showing treatment integrity. All four tables show the number of observations conducted (#), percentage of interobserver agreement (%), and range of scores (R). Additionally, interobserver agreement data were collected on the delivery of reinforcement and the performance of the pre-test and post-test live model.

Participants. Interobserver agreement data were collected for approximately one quarter of all sessions including baseline, treatment and generalization with each participant.

Table 3 shows interobserver agreement data for each participant across baseline and graduated guidance conditions. Mean agreement during the video-modeling baseline was 100% for Ryan, with no range of scores; 100% for Marc, with no range of scores; and 95% for Rose, with a range of 88-100%. Mean agreement across graduated guidance conditions was 90% for Ryan, with a range of 84-96%; 96% for Marc, with a range of 84-100%; and 93% for Rose, with a range of 88-96%.

Table 4 shows interobserver agreement data for each participant during generalization probes. During baseline, mean agreement across the generalization probes was 100% for Ryan with no range of scores; 100% for Marc with no range of scores, and 98% for Rose, with a range of 96-100%. During the graduated guidance condition, mean agreement across the generalization probes was 90% for Ryan with a range of 79-92; 100% for Marc with no range of scores, and 96% for Rose, with no range of scores.

Parents. Interobserver agreement data were collected for approximately one quarter of all sessions including baseline, treatment and generalization on parents with each participant.

Table 5 shows interobserver agreement data on treatment integrity for parents with each participant across baseline and graduated guidance procedures. Mean agreement during the video-modeling baseline was 100% for Ryan's parent, with no range of scores; 100% for Marc's parent, with no range of scores; and 100% for Rose's parent, with no range of scores. Mean agreement across graduated guidance conditions was 89% for Ryan's parent, with a range of 83-100%; 95% for Marc's parent, with a range of 84-100%; and 98% for Rose's parent, with a range of 92-100%.

Table 6 shows interobserver agreement data on treatment integrity for parents with each participant during generalization probes. During baseline, mean agreement across the generalization probes was 100% for Ryan's parent, with no range of scores; 100% for Marc's parent, with no range of scores; and 100% for Rose's parent, with no range of scores. During the graduated guidance condition, mean agreement across the generalization probes was 98% for Ryan's parent, with a range of 92-100%; 100% for Marc's parent, with no range of scores, and 100% for Rose's parent, with no range of scores.

Reinforcement. Interobserver agreement data were collected on the delivery of reinforcement and the withholding of reinforcement by parents with each participant during baseline, generalization probes, and across the graduated guidance condition. As described above, the parent was instructed to deliver reinforcement following the child's completion of the 24-step response chain if the child made 7 errors or fewer. The reinforcement procedure consisted of the delivery of social praise and a preferred edible or activity at the end of the response chain. Mean agreement across baseline, generalization probes, and all levels of graduated guidance procedures was 100% with no range of scores for all parents.

Pre-test and Post-test Model. Interobserver agreement data were collected on the performance of the pre-test and post-test model with each participant. Interobserver agreement data were collected on the extent to which the pre-test and post-test live model used the same verbal instructions and physical demonstrations of each step in the response chain that was performed by the yoga instructor on the video. Mean agreement

was 100% with no range of scores for the pre-test and post-test model with all participants.

Results

Figure 1 shows the functional relation between the graduated guidance procedure and the percentage of 24 steps matching the modeled yoga response chain. There was a systematic increase over baseline in percentage of steps matching the yoga response chain across all three participants with the introduction of the graduated guidance condition. Details of their performance are described below.

As shown in Figure 1, matching of the yoga response chain during baseline occurred with 0% accuracy for Ryan, and 0% accuracy for Marc and only as high as 17% for Rose. For all participants, the graduated guidance procedure was introduced at the full physical prompt level (see Table 2). For Ryan and Rose, the fifth session was introduced at the full physical prompt level with a 2-second delay. For Marc, the sixth session was introduced at the full physical prompt level with a 2-second delay. With the introduction of the graduated guidance procedure, there was an increase in correct responding to the video yoga model over baseline performance. Ryan's performance continued to increase at a steady rate such that he achieved of 92% accuracy within 24 sessions of treatment. Rose's performance continued to increase at a steady rate such that she achieved 80% accuracy within 33 sessions of treatment. While Marc continued to demonstrate independent responding throughout intervention, his acquisition was slower. He achieved 71% accuracy within 55 sessions of treatment.

Ryan and Rose remained at the full physical 2-second delay prompt level until they mastered the response chain. For Marc, day number 85 (this session is the 48th session in treatment due to vacations and illnesses) was introduced at the error correction only level (see Table 2). The criterion to move to a less intrusive prompt level was 88%

at the prescribed prompt level or better of the response chain for 4 consecutive sessions. In other words, if 3 or fewer errors were made out of the 24 steps for 4 consecutive sessions, a less intrusive prompt level was prescribed. While Ryan's and Rose's independent responding continued at a steady rate, other steps were often incorrect, and therefore, four consecutive sessions at the prescribed prompt level or better did not occur. While Marc performed some steps independently, other steps were often prompted at the prescribed level. He achieved four consecutive sessions at the prescribed prompt level with 88% accuracy, and therefore moved to the error correction only level. At the error correction only level, any prompted response is considered incorrect. Marc performed 2 sessions at this level with 71% accuracy.

The open circles in Figure 1 show the percentage of responses matching the yoga response chain during generalization probes. As described in the procedure section above, generalization probes consisted of a different video model, performing the same responses on the video used during treatment, in the absence of reinforcement. For two of the participants, (Ryan and Rose) there was an increase in percentage of probe responses matching the model when treatment was introduced, but there was little or no such change over baseline responding for Marc. Details of their performance are described below.

For Ryan, two generalization probes were conducted during the baseline condition. Ryan's matching of the yoga response chain during generalization probes in the baseline condition occurred with 0% accuracy. Five generalization probes were conducted during the graduated guidance condition. Ryan's matching of the yoga response chain during the five generalization probes in the graduated guidance condition

occurred with 33% accuracy, 38% accuracy, 79% accuracy, 92% accuracy, and 96% accuracy respectively.

For Marc, three generalization probes were conducted during the baseline condition. Marc's matching of the yoga response chain during generalization probes in the baseline condition occurred with 0% accuracy. Five generalization probes were conducted during the graduated guidance condition. For all five generalization probes conducted during the graduated guidance condition, Marc's matching of the yoga response chain occurred with 4% accuracy.

For Rose, seven generalization probes were conducted during the baseline condition. For five of the seven sessions, Rose's matching of the yoga response chain during generalization probes in the baseline condition occurred with 0% accuracy. The fourth probe occurred with 18% accuracy. The sixth probe occurred with 12% accuracy. Five generalization probes were conducted during the graduated guidance condition. Rose's matching of the yoga response chain during the three generalization probes in the graduated guidance condition occurred with 29% accuracy, 46% accuracy, 50% accuracy, 42% accuracy, and 88% accuracy respectively.

The closed triangles in Figure 1 show the percentage of steps matching the yoga response chain during the pre-test and post-test sessions. As described in the procedure section above, the pre-test session and the post-test session consisted of a live person of a person modeling the same responses on the video, in the absence of reinforcement. For two of the participants, (Ryan and Rose) there was an increase in percentage of matching the response chain from pre-test to post-sessions when treatment was introduced, but

there was little or no such change over baseline responding for Marc. Details of their performance are described below.

Ryan performed the response chain with 0% accuracy during the pre-test, and with 79% accuracy during the post-test. Marc performed the response chain with 0% accuracy during the pre-test, and with 4% accuracy during the post-test. Rose performed the response chain with 4% accuracy during the pre-test, and with 63% accuracy during the post-test.

Error Analysis

Tables 7-9 show the individual differences in responding across all participants displayed in an error analysis. Each error analysis for all participants during full physical 2-second delay prompt level sessions (FP2) shows the number of steps modeled that were followed by errors (X), with prompted responses (/), and with independent matching responses shown by shaded boxes. As presented in Table 2, at the FP2 prompt level, the parent fully supported the child throughout the entire response, waiting 2 seconds after the model completed the action. In other words, if the child did not begin to perform the next step in the chain and remained in the position from the previous step for 2 seconds, then the parent prompted the next response. If the child completed the step in the response chain independently, the parent did not intervene. If the child attempted the next step in the response chain but executed it incorrectly, the parent immediately provided a correction through a full physical prompt. Therefore, the child was fully supported throughout the entire response during both error-correction and full physical prompting. Furthermore, each error analysis shows responding during generalization probes that occurred during the FP2 level of the graduated guidance intervention. During

generalization probes, parents were instructed to not intervene. Therefore, if a step in the response chain was executed incorrectly, no physical prompting was provided.

The error analysis for Ryan is presented in Table 7. Sessions 19-66 indicate the sessions conducted at the FP2 level. For all FP2 sessions, 25% of all responses were errors, 8% of all responses were prompted, and 67% of all responses were independent. Ryan had a greater number of errors than he did prompted responses. These errors occurred primarily between steps 3-12 as shown on Table 1. Observations indicated that Ryan attempted to imitate the response modeled on the video, but did so incorrectly, therefore needing a physical prompt to execute the response with the proper alignment. The columns labeled G on the error analysis indicate the 4 generalization probes that occurred during the FP2 level. For these generalization probes, 25% of all responses were errors, and 75% of all responses were independent. Responses were not prompted and errors were not corrected during generalization probes. Ryan's responding during the generalization probes closely paralleled his responding during training sessions.

The error analysis for Marc is presented in Table 8. Sessions 32-84 indicate the sessions conducted at the FP2 level. For all FP2 sessions, 17% of all responses were errors, 50% of all responses were prompted, and 33% of all responses were independent. In contrast to Ryan's error analysis, Marc had a greater number of prompted responses than he did errors. Prompted responses occurred throughout the chain, with no clear pattern of errors. These data indicate that Marc often did not attempt to imitate the next response in the chain modeled on the video, but he maintained the position from the previous response, therefore needing a physical prompt after the 2-second delay to execute the next response in the chain. The columns labeled G indicate the 4

generalization probes that occurred during the FP2 level. For these generalization probes, 96% of all responses were errors, and 4% of all responses were independent. The only response that Marc performed independently was step 1. Step 1 was to stand on the mat with feet together and arms down by his sides. Responses were not prompted and errors were not corrected during generalization probes. Observations indicated that that Marc maintained this position throughout the generalization probe, as he was not prompted into the next position in the response chain.

The error analysis for Rose is presented in Table 9. Sessions 43-90 indicate the sessions conducted at the FP2 level. For all FP2 sessions, 21% of all responses were errors, 29% of all responses were prompted, and 50% of all responses were independent. Unlike either Ryan or Marc, Rose had only a slightly greater number of prompted responses than she did errors. Errors occurred primarily between steps 4-9 as shown on Table 1 and prompted responses occurred primarily between 14-24, also shown on Table 1. Observations indicated that Rose attempted to imitate the responses modeled on the video when the responses were from a standing position, but she did so incorrectly, therefore needing a physical prompt to execute the response with the proper alignment. Furthermore, observations indicated that Rose often did not attempt to imitate the next response in the chain modeled on the video when the responses were from a prone position, but she maintained the position from the previous response, therefore needing a physical prompt after the 2-second delay to execute the next response in the chain. The columns labeled G indicate the 4 generalization probes that occurred during the FP2 level. For these generalization probes, 46% of all responses were errors, and 54% of all responses were independent. Responses were not prompted and errors were not corrected

during generalization probes. Rose's responding during the generalization probes closely paralleled her responding during training sessions.

Treatment Integrity on Parents

Treatment integrity data were obtained to evaluate the extent to which the parents followed the procedures they were supposed to use during the study.

Graduated guidance. Table 10 concerns the use of graduated guidance procedures. Table 10 shows treatment integrity for parents with each participant across all levels of graduated guidance procedures, shown by number of sessions (No.), percentage correct (%), and range of scores (R). Ryan experienced full physical guidance during 4 sessions. Percentage of correct prompting was 92, with a range of scores from 79-100. Ryan experienced full physical guidance at a 2-second delay during 20 sessions. Percentage of correct prompting was 96, with a range of scores from 83-100. Marc experienced full physical guidance during 5 sessions. Percentage of correct prompting was 97, with a range of scores from 92-100. Marc experienced full physical guidance at a 2-second delay during 42 sessions. Percentage of correct prompting was 96, with a range of scores from 67-100. Marc experienced error-correction only during 8 sessions. Percentage of correct prompting was 92, with a range of scores from 83-100. Rose experienced full physical guidance during 4 sessions. Percentage of correct prompting was 98, with a range of scores from 96-100. Rose experienced full physical guidance with a 2-second delay during 29 sessions. Percentage of correct prompting was 92, with a range of scores from 63-100.

Baseline and Generalization Probes. Table 11 shows treatment integrity for parents with each participant across baseline and generalization probes, shown by number

of sessions (No.), percentage correct (%), and range of scores (R). During baseline and generalization probes, each parent was instructed to stand in the experimental room with her child, and to not intervene physically or verbally. Ryan experienced six baseline sessions. For Ryan's parent, percentage of correct appropriate behavior was 100, with no range of scores. Ryan experienced two generalization probes during the baseline condition. For Ryan's parent, percentage of correct appropriate behavior was 100, with no range of scores. Ryan experienced five generalization probes during the graduated guidance condition. For Ryan's parent percentage of correct appropriate behavior was 98, with a range of scores from 92-100. Marc experienced 11 baseline sessions. For Marc's parent, percentage of correct appropriate behavior was 94, with a range of scores from 71-100. Marc experienced three generalization probes conducted during baseline. For Marc's parent, percentage of correct appropriate behavior was 100, with no range of scores. Marc experienced five generalization probes during the graduated guidance condition. For Marc's parent, percentage of correct appropriate behavior was 100, with no range of scores. Rose experienced 20 baseline sessions. For Rose's parent, percentage of correct appropriate behavior was 97, with a range of scores from 96-100. Rose experienced seven generalization probes during baseline. For Rose's parent, percentage of correct appropriate behavior was 100, with no range of scores. Rose experienced five generalization probes during the graduated guidance condition. For Rose's parent, percentage of correct appropriate behavior was 99, with a range of scores from 96-100.

Reinforcement. The parent was instructed to deliver reinforcement following the child's completion of the 24-step response chain if the child made 7 errors or fewer. The reinforcement procedures consisted of the delivery of social praise and a preferred edible

or activity at the end of the response chain.

Reinforcement treatment integrity for parents with each participant during graduated guidance was collected by recording the number of response chains that met criterion for reinforcement following which the parent delivered praise and preferred activities. Reinforcement treatment integrity is not shown in a table. For Ryan, 19 sessions across the graduated guidance condition were eligible for reinforcement. Ryan's parent produced praise and a preferred activity for all 19 sessions. For Marc, 46 sessions across the graduated guidance condition were eligible for reinforcement. Marc's parent produced praise and a preferred activity for all 46 sessions. For Rose, 28 sessions across the graduated guidance condition were eligible for reinforcement. Rose's parent produced praise and a preferred activity for all 28 sessions.

Reinforcement treatment integrity for parents with each participant during graduated guidance was also collected by recording the number of response chains that did not meet criterion for reinforcement following which the parent did not deliver praise and preferred activities. For Ryan, 5 sessions across the graduated guidance condition were not eligible for reinforcement. Ryan's parent withheld praise and a preferred activity for 3 of the 5 sessions. For Marc, 7 sessions across the graduated guidance condition were not eligible for reinforcement. Marc's parent withheld praise and a preferred activity for 7 of the 9 sessions. For Rose, 5 sessions across the graduated guidance condition were not eligible for reinforcement. Rose's parent withheld praise and a preferred activity for zero of the 5 sessions.

During baseline and generalization probes, each parent was instructed to stand in the experimental room with her child, and to not intervene physically or verbally. For the

parents with all participants, all parents appropriately withheld reinforcement during baseline and generalization probes.

During pre-test and post-test procedures, each parent was again instructed to stand in the experimental room with her child, and to not intervene physically or verbally. One pre-test and one post-test were conducted for all participants. All parents appropriately withheld reinforcement during the pre-test and post-test procedures.

Treatment Integrity on the Pre-test and Post-test Live Model

Treatment integrity data were obtained to evaluate the extent to which the pre-test and post-test live model used the same verbal instructions and physical demonstrations of each step in the response chain that was performed by the yoga instructor on the video. These data are not shown on a table. The live model performed the response chain a total of 6 sessions. For all 6 sessions, the model used the same verbal instructions and physical demonstrations of each step in the response chain that was performed by the yoga instructor on the video.

Consumer Satisfaction

Table 12 shows the questions and results of the consumer satisfaction survey that was completed by the parents at the end of the study. Parents were asked to rate their degree of satisfaction with the procedures and outcomes of the study on a 7-point Likert-type scale. A “7” indicated that the parent was “completely satisfied” and a “1” that the parent was “completely dissatisfied. All three parents responded to all five questions. Mean ratings were calculated by multiplying each value of the ratings (1-7) by the number of scores for that rating (1-3). Next, the mean ratings were summed and the resulting number was divided by the number of returned questionnaires (in this case,

always three). The responses from the satisfaction surveys resulted in a summary rating of 6.93.

Discussion

The purpose of the present study was to assess the effects of using graduated guidance and video-modeling procedures to teach yoga skills to children with developmental delays. In the present study parents taught yoga skills to their children. Because there was a systematic increase in matching the steps in the yoga response chains across all three participants with the introduction of the graduated guidance condition, one may conclude that the graduated guidance intervention procedure was effective in causing that increase. During the first few sessions of treatment, full physical guidance was implemented, and when the 2-second delay was introduced (FP2 on Figure 1), all the participants showed an immediate increase in correct responding.

During generalization probes there was an increase over baseline in matching the yoga response chain for Ryan and for Rose. Additionally for Ryan and Rose, there was an increase in matching the yoga response chain from the live model pre-test to the live model post-test. This suggests that stimulus control shifted from graduated guidance to the video-model and to the live model during the graduated guidance intervention. For Marc, during generalization probes and the pre-test and post-test session, there was little or no change in baseline responding when treatment was introduced.

One goal of the present study was to train the parents in the use of graduated guidance procedures. Correct implementation of the graduated guidance procedure occurred for all three parents with the introduction of parent training.

A consumer satisfaction survey concerning the enjoyment of yoga and yoga as a new skill was completed by the parents. Parents responded favorably to the consumer satisfaction measures upon completion of the study.

Past research has favored the use of most-to-least prompting procedures over the use of least-to-most prompting procedures. Libby et al., (2008) examined the effects of three prompting procedures commonly used to teach children with developmental delays long chains of motor responses. Results from the Libby et al. (2008) study indicated that the most-to-least procedure was associated with fewer errors than the least-to-most procedure. Additionally, the rate of acquisition using a most-to-least procedure with a time delay was nearly as rapid as the least-to-most procedure, and it produced fewer errors. Furthermore, for all prompting procedures, forward chaining was used to teach all chains. Gruber, et al.(2005) assessed the effects of a graduated guidance intervention package in a school to teach children with developmental delays yoga skills. In the Gruber et al. (2005) study, one participant increased his yoga responding when the intervention included introducing one step of the chain at a time, in a forward chaining presentation. In this study, however, while a most-to-least procedure with a time delay was used, the yoga response chain was taught using a simultaneous task presentation. Of all three participants, Marc's acquisition was slowest. The data from the error analysis show that Marc often did not attempt to imitate the next response in the chain modeled on the video, but maintained the position from the previous response, therefore needing a physical prompt after the 2-second delay to execute the next response in the chain. Furthermore, during generalization probes the only response that Marc performed independently was step 1. Responses were not prompted and errors were not corrected during generalization probes. Observations indicated that that Marc maintained this position throughout the generalization probe, as he was not prompted into the next position in the response chain. This suggests that Marc's slower acquisition rate and

failure to generalize may be due to his dependency on adult prompts, making it less likely for stimulus control to shift from graduated guidance to the video-model during the graduated guidance intervention. In the future, researchers should examine the most effective procedure to teach long chains of motor responses. For example, researchers might compare acquisition rate during forward chaining, backward chaining, and simultaneous task presentation with and without a time delay.

The success of the Gruber et al. (2005) study, demonstrates the effectiveness of using graduated guidance procedures to teach physical activity skills in a school. Graduated guidance has been proven to be an effective procedure to teach other skills such as the use of a photographic activity schedule (MacDuff, Krantz & McClannahan, 1993). Photographic activity schedules enable the learner to engage in activities independently from teachers or other adults. Furthermore, research has demonstrated the success of activity schedules in the home environment (Krantz, et al., 1993). Research examining the use of activity schedules to increase independence with skills associated with yoga poses should be addressed in the future.

In addition to the home environment, gym classes in school settings and classes held in children's yoga studios are environments where typical children practice yoga. Future research might focus on examining the extent to which the graduated guidance procedures will increase independent yoga skills in the context of these environments.

Table 1

The Two Yoga Poses that make up the 24-Step Response Chain

1. Stand on mat with feet together, arms down by sides
2. Arms over head with elbows locked
3. Interlock fingers, release index finger
4. Without bending arms or legs, bend body to the right
5. Hold until the teacher on the video says, “All done, change”
6. Come back the center, keeping fingers interlocked and arms straight
7. Without bending arms or legs, bend body to the left
8. Hold until the teacher on the video says, “All done, change”
9. Come back the center, keeping fingers interlocked and arms straight
10. Bend forward, begin with fingers still interlocked (fingers can unlock and legs can bend)
11. Touch the floor with hands
12. Hold until the teacher on the video says, “All done, change”
13. Come back up with arms out in front of body
14. Stand up straight with arms over head, feet together
15. Bring arms down by sides
16. Lie down on stomach
17. Chin on mat, facing the video
18. Place palms on mat, underneath shoulders, fingers facing forward
19. Keep elbows bent, raise torso off the floor, just to the belly button
20. Hold until the teacher on the video says, “All done, change”
21. Lower torso
22. Turn face to the right side, left ear on mat
23. Place arms by sides
24. Hold until teacher says, “Yoga is all done for today”

Table 2

Prompt Levels and Error Correction for the Graduated Guidance Procedures

Prompt Level	Definition of Prompt	Definition of Error Correction
Full Physical	Full physical guidance is provided to the child throughout the entire response simultaneously with the video model.	No error correction is used at full physical guidance.
Full Physical 2-second delay	Full physical guidance is provided to the child throughout the entire response waiting 2 seconds after the video model completes the response.	Full physical guidance is provided to the child throughout the entire response immediately following an incorrect attempt at executing the response.
Error- Correction Only	No physical guidance is provided to the child.	Full physical guidance is provided to the child throughout the entire response immediately following an incorrect attempt at executing the response.

Table 3

Interobserver Agreement for Each Participant Across Baseline and Graduated Guidance Conditions, Shown by Number of Observations (No.), Percentage Agreement (%), and Range of Scores (R)

Participant:	Baseline			Graduated Guidance		
	No.	%	R	No.	%	R
Ryan	2	100	-	5	90	84-96
Marc	3	100	-	10	96	84-100
Rose	5	95	88-100	6	93	88 -96

Table 4

Interobserver Agreement for Each Participant During Generalization Probes, Shown by
Number of Observations (No.), Percentage Agreement (%), and Range of Scores (R)

Participant:	Generalization Probes			Generalization Probes		
	during Baseline			during Graduated		
				Guidance		
	No.	%	R	No.	%	R
Ryan	1	100	-	4	90	79-92
Marc	3	100	-	2	100	-
Rose	2	98	96-100	1	96	-

Table 5

Interobserver Agreement for Parents with Each Participant Across Baseline and Graduated Guidance Conditions, Shown by Number of Observations (No.), Percentage Agreement (%), and Range of Scores (R)

Parent with:	Baseline			Graduated Guidance		
	No.	%	R	No.	%	R
Ryan	2	100	-	5	89	83-100
Marc	3	100	-	10	95	84-100
Rose	5	100	-	6	98	92 -100

Table 6

Interobserver Agreement for Parents with Each Participant During Generalization Probes,
Shown by Number of Observations (No.), Percentage Agreement (%), and Range of
Scores (R)

Parent with:	Generalization Probes			Generalization Probes		
	during Baseline			during Graduated Guidance		
	No.	%	R	No.	%	R
Ryan	1	100	-	4	98	92-100
Marc	3	100	-	2	100	-
Rose	2	100	-	1	100	-

Table 8

Error analysis for Marc for all FP2 sessions and Generalization Probes during FP2, shown by number of steps modeled with errors (X), with prompted responses (/), with independent matching responses (■).

Steps of the Yoga response Chain	24	■	/	X	■	■	/	/	■	/	■	X	■	■	■	■	■	■	■	■	X	/	■	■	■	■	
	23	■	/	/	■	■	/	/	■	/	■	X	■	■	/	■	/	/	/	■	■	X	/	/	■	■	■
	22	/	/	/	/	/	/	/	/	/	/	X	/	/	/	/	/	/	/	/	/	X	/	/	/	/	/
	21	X	■	X	/	X	X	/	/	/	/	X	■	■	/	/	/	/	/	/	/	X	/	/	/	■	■
	20	■	X	/	■	■	■	/	■	■	■	X	/	/	/	/	■	■	■	■	■	X	■	■	■	■	■
	19	X	X	X	/	/	■	/	■	■	■	X	/	/	/	/	/	/	/	/	/	X	/	/	■	■	■
	18	X	X	X	/	■	/	■	■	■	■	X	/	■	■	/	■	■	■	■	■	X	■	■	■	■	■
	17	X	X	X	/	/	■	/	■	■	■	X	■	/	/	/	/	/	/	/	/	X	/	/	■	■	■
	16	/	/	/	■	/	/	/	/	/	/	X	/	/	/	/	/	/	/	/	/	X	/	/	/	/	/
	15	■	/	■	/	/	/	/	/	■	■	X	■	/	/	■	/	/	/	■	■	X	/	/	/	/	/
	14	■	/	/	/	/	/	/	/	/	/	X	/	/	/	■	/	/	/	/	/	X	/	/	/	/	/
	13	X	X	X	X	X	/	/	/	/	/	X	/	/	/	■	■	■	/	/	■	X	/	/	■	■	■
	12	X	X	X	X	X	■	■	■	■	■	X	■	■	/	■	■	■	X	■	■	X	■	■	■	X	■
	11	X	X	X	X	X	X	/	X	/	■	X	/	■	/	■	■	■	■	■	■	X	■	■	■	■	■
	10	X	X	/	/	■	X	■	■	/	/	X	/	X	/	■	/	■	■	/	■	X	/	/	/	/	/
	9	X	X	X	/	X	X	X	X	X	X	X	X	X	■	X	X	■	X	/	■	X	X	X	■	■	■
	8	X	X	X	X	X	X	X	X	X	X	X	X	X	/	X	X	/	X	/	■	X	X	■	■	■	■
	7	X	X	/	/	/	/	/	/	X	/	/	X	X	/	/	X	/	X	/	■	X	X	/	/	■	■
	6	X	X	■	/	/	/	X	X	X	X	X	X	X	/	■	X	X	X	X	/	X	X	X	■	■	■
	5	X	X	X	/	/	/	X	X	X	X	X	X	/	X	X	/	/	X	X	X	X	X	X	■	■	■
	4	X	X	X	X	/	/	X	X	/	X	X	X	X	X	/	/	X	X	X	X	X	X	X	■	■	■
	3	■	X	/	■	X	■	/	/	X	■	X	/	/	/	■	/	/	/	/	/	X	/	/	X	/	/
	2	/	X	/	/	/	/	/	/	X	/	X	/	/	/	/	/	/	/	/	/	X	/	/	/	/	/
	1	/	■	■	/	/	X	/	/	■	/	■	/	/	/	/	/	/	/	/	/	■	/	/	/	/	/
		32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	

Sessions

Table 9

Error Analysis for Rose for all FP2 Sessions and Generalization Probes during FP2, shown by Number of Steps Modeled with Errors (X), with Prompted Responses (/), with Independent Matching Responses (■).

Steps of the Yoga response Chain

24	X	/	/	■	■	/	X	■	■	■	■	■	■	■	■	X	X	/	/	X	■	■	■	■	■	/
23	X	/	/	■	■	/	X	/	/	/	/	/	/	/	/	X	/	/	/	X	/	/	■	/	/	/
22	X	/	/	/	/	/	X	/	■	/	/	/	//	■	■	X	/	/	/	X	/	/	/	/	/	/
21	X	/	/	■	/	/	X	■	■	/	/	/	■	■	■	X	■	/	X	■	■	■	/	■	/	■
20	/	■	/	/	■	/	X	/	■	■	■	■	■	■	■	■	■	■	■	■	■	■	/	■	X	■
19	/	■	/	/	■	/	X	/	/	/	/	■	■	■	■	■	■	■	■	■	■	■	/	■	X	■
18	■	/	■	■	■	/	X	■	■	■	■	/	/	■	■	■	/	■	■	■	■	/	/	/	■	■
17	/	■	/	■	/	■	■	/	X	■	■	X	■	■	■	■	X	X	■	■	■	■	/	■	X	■
16	/	/	■	■	■	■	■	/	/	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	/
15	■	X	X	/	■	■	■	/	■	■	■	/	■	■	■	X	X	X	X	X	X	X	/	/	/	/
14	/	/	/	/	■	■	■	/	/	/	/	/	/	/	/	X	/	/	/	X	/	/	/	■	/	■
13	■	/	/	/	/	/	■	/	/	■	■	■	■	■	■	■	/	/	■	■	■	■	/	■	■	■
12	/	/	■	/	X	/	■	■	■	■	X	■	■	■	■	■	■	/	/	■	■	■	X	■	/	■
11	/	■	/	/	/	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
10	■	■	■	■	/	■	■	■	■	■	■	■	■	■	■	■	/	■	X	■	■	■	■	■	■	■
9	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	■	X	X	/	/
8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	/	X	■	X	X	X	/	/
7	/	X	/	X	X	X	X	X	X	X	X	X	X	X	X	X	X	/	/	X	/	X	X	X	/	/
6	/	■	X	/	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	■	/	X	X	/
5	X	/	X	/	■	X	X	X	X	X	X	X	X	X	X	X	X	■	/	X	■	X	X	X	/	■
4	X	/	X	/	X	X	X	/	X	X	■	X	X	■	■	■	X	■	X	X	■	■	X	■	/	■
3	/	/	/	/	/	/	X	/	/	X	■	X	/	■	■	■	/	■	■	■	■	■	/	/	/	■
2	■	■	■	/	■	■	■	X	/	■	■	■	■	■	■	■	/	■	■	■	■	■	■	■	/	■
1	■	/	■	/	X	■	X	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	4	44	45	49	50	51	52	55	56	57	58	59	60	62	63	64	65	70	71	72	73	75	76	78		

Sessions

Table 9

Continued Table 9 Error Analysis for Rose for all FP2 Sessions and Generalization Probes during FP2, shown by Number of Steps Modeled with Errors (X), with Prompted Responses (/), with Independent Matching Responses (■).

							G		
24	■	■	■	■	/	■		■	■
23	/	■	■	■	/	X		■	■
22	/	■	■	/	/	/		/	■
21	/	■	■	■	X	■		■	X
20	X	■	/	/	X	/		■	X
19	X	■	/	■	X	/		■	X
18	X	■	■	■	■	/		■	X
17	X	■	■	■	X	/		■	■
16	■	■	/	■	■	■		■	■
15	X	/	/	/	■	■		■	■
14	X	■	/	■	■	/	X	/	X
13	X	■	■	■	■	/		■	■
12	X	■	■	■	■	■		■	■
11	■	■	■	■	■	■		■	■
10	■	■	X	■	■	■		■	■
9	■	■	X	■	■	■	X	■	■
8	X	X	■	■	■	■	X	■	■
7	X	X	■	■	■	■		■	■
6	X	X	■	■	■	■		■	■
5	X	X	■	■	■	■		■	■
4	X	X	/	■	■	■		■	■
3	/	■	/	■	/	X		/	■
2	■	■	/	■	■	■		/	■
1	■	■	/	■	■	■		/	■
	79	80	81	82	83	87	88	89	90

Sessions

Table 10

Graduated Guidance Treatment Integrity for Parents with each Participant across all Levels of Graduated Guidance Procedures, shown by Number of Sessions (No.), Percentage Correct (%), and Range of Scores (R)

Parent with:	Graduated Guidance: Full Physical			Graduated Guidance: Full Physical 2 Second Delay			Graduated Guidance: Error-Correction Only		
	No.	%	R	No.	%	R	No.	%	R
Ryan	4	92	79-100	20	96	83-100			
Marc	5	97	92-100	42	96	67-100	8	92	83-100
Rose	4	98	96-100	29	92	63-100			

Table 11

Treatment Integrity for Parents with each Participant across Baseline and Generalization Probes, shown by Number of Sessions (No.), Percentage Correct (%), and Range of Scores (R)

Parent with:	Baseline			Generalization			Generalization during		
	No.	%	R	during Baseline			Graduated Guidance		
	No.	%	R	No.	%	R	No.	%	R
Ryan	6	100	-	2	100	-	5	98	92-100
Marc	11	94	71-100	3	100	-	5	100	-
Rose	20	97	96-100	7	100	-	5	99	96-100

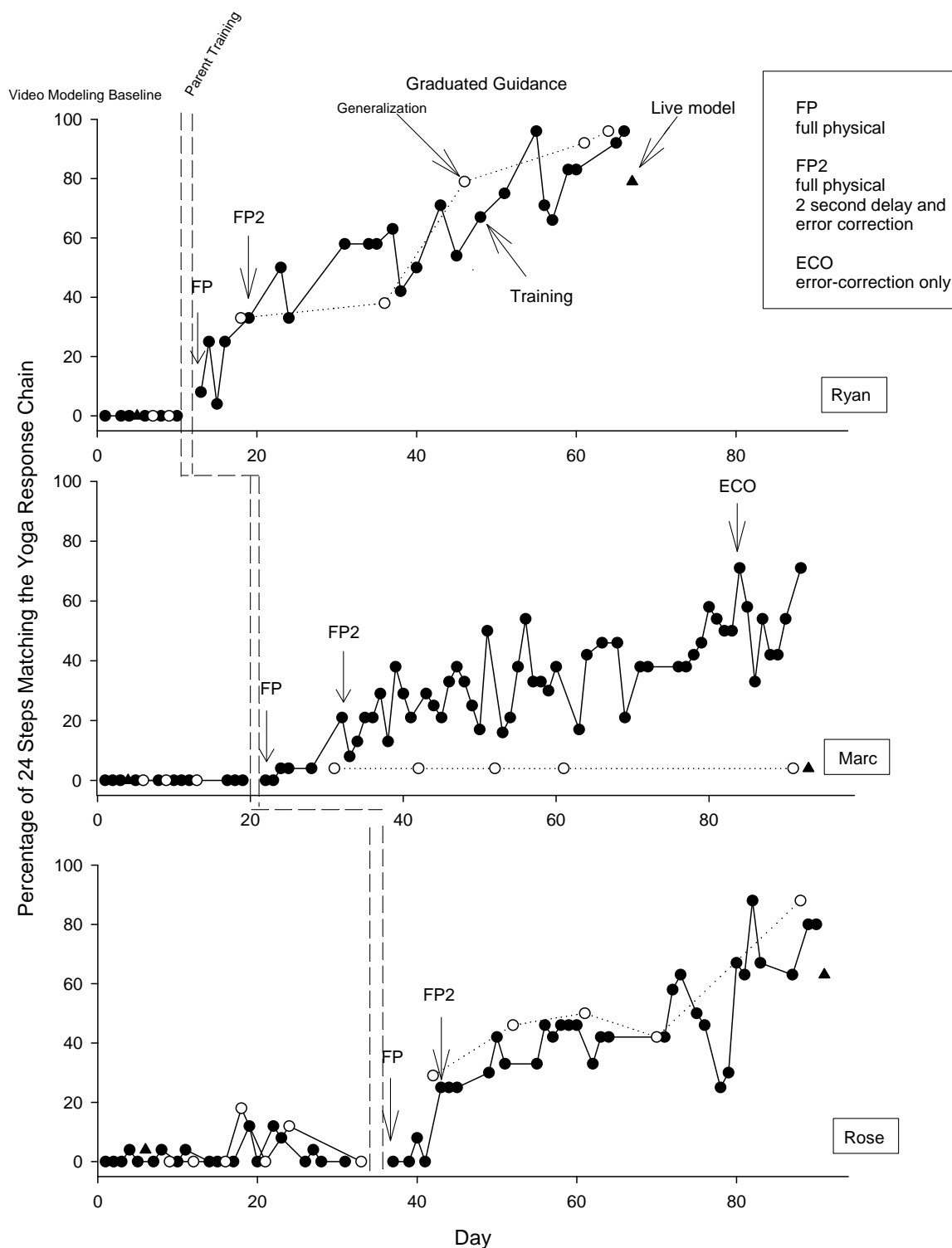


Figure 1. Percentage of matching the yoga response chain measured for three participants during the video-modeling baseline, graduated guidance procedures, generalization probes, and pre-test and post-test sessions. Solid black circles represent responding during training, open circles represent responding during the generalization probes, and solid black triangles represent responding during the pre-test and post-test sessions.

Appendix

THE USE OF PEERS AND PEER MODELING IN TREATMENT PACKAGES
ON THE ACQUISITION OF SKILLS ASSOCIATED WITH PHYSICAL ACTIVITY
IN INDIVIDUALS WITH DEVELOPMENTAL DISABILITIES

Abstract

Although the use of peers in a treatment package for people with disabilities has been demonstrated to increase skills in the areas of academics, social behavior, and receptive and expressive language development, the acquisition of motor skills has been given far less attention. This paper contains an overview of the literature from 1973 to 2005 concerning peer modeling procedures and other kinds of procedures in which peers play a role in a treatment package for people with disabilities. This paper also addresses the use of modeling in the area of physical activity in applied research. Following this overview is a discussion concerning the need for more research to assess the effects of the use of peer models to teach children with developmental delays skills associated with physical activity because these children are receiving instruction in the context of physical education classes that include typical peers. Finally, directions for future research are presented concerning the kinds of behavior analytic techniques that will be most effective when using peer models to facilitate learning in children with developmental delays.

The Use of Peers and Peer Modeling and Peers in Treatment Packages on the
Acquisition of Skills Associated with Physical Activity in Individuals with
Developmental Disabilities

The development of behavior in typical children is affected by peer modeling (Egel, Richman, & Koegel, 1981; Carr & Darcy, 1990). Several studies have examined the extent to which peer modeling can be used to teach typically developing children. For example, Grusec and Abramovitch (1982) conducted a study using typical preschool children as subjects. They found that when imitating someone else's playing produced social reinforcement, playing increased. As another example, Hartup and Coates (1967) examined the effects of peer modeling on the acquisition of sharing by typical preschool children. The findings indicated that preschoolers exposed to a peer model shared, and they also shared more than those subjects who were not exposed to models. Similarly, in a study conducted by Canale (1977), similar results were demonstrated with children who were five and six years of age.

In addition to play and sharing above, the extinction of avoidance behavior through the use of peer modeling has also been demonstrated. Bandura, Grusec, and Menlove (1967) examined the extent to which the use of a peer model who approached a feared stimulus (a dog) without aversive consequences would extinguish the avoidance response in children who feared dogs. Results indicated that those subjects who observed the model decreased avoidance behavior, and differed significantly from subjects who were not exposed to a model.

Although peer modeling with typical children has been shown to increase play and sharing, there is less information on the effects of peer modeling procedures for

children with disabilities (Egel et al., 1981; Carr & Darcy, 1990). These procedures are of particular importance as more and more children with disabilities are being educated in environments that include typical peers (Egel et al., 1981; Jones & Schwartz, 2004). More specifically, children with disabilities are receiving educational instruction in the context of structured physical activity, beside their typical peers (Sharpe, 1998). Physical Education has been an established field of study in colleges and universities for over 20 years (Sharpe, 1998). Furthermore, physical education is part of the educational curriculum in almost every school in the country (Young, 1997).

The present paper will focus on people with developmental delays. The purpose of the present paper is three-fold. First, this paper will review 1) peer modeling procedures and 2) other kinds of procedures in which peers play a role in a treatment package for people with disabilities. This paper will also review the use of modeling in the area of physical activity in applied research. Second, this paper will argue that more research is needed to assess the effects of the use of peer models to teach children with developmental delays skills associated with physical activity. Lastly, this paper will argue an additional point that future research should examine the kinds of behavior analytic techniques that will be most effective when using peer models to facilitate learning in children with developmental delays.

To examine research that uses peers in a treatment package for people with disabilities and research that uses modeling in the area of physical activity, articles published between 1973 and 2005 in the following behavioral journals were reviewed: *Journal of Applied Behavior Analysis*, *Behavior Modification*, *Journal of Autism and*

Developmental Disorders, Journal of Special Education, Topics in Early Childhood Special Education, and Journal of Sport Psychology.

The Use of Peers in a Treatment Package in Applied Research

Participation of peers in a treatment package in applied behavior analytic research has appeared in the Journal of Applied Behavior Analysis from as early as 1973. That earlier research examined the effects of peer-mediated procedures that included peer tutoring, peers as behavior managers, and the use of peers to facilitate social interactions. These types of strategies appear with more frequency than that of the use of peers as models, in which the model actually demonstrates the response that is to be performed by the observer. During the 1980's, research examining the effects of peer modeling on the acquisition of various skills began to appear with more frequency in behavior analytic journals. In the present section of this paper, the author will briefly and selectively review those published articles that include people with developmental delays as peer tutors and tutees, peers as behavior managers, peers to facilitate social interactions, and peer modeling.

Peer Tutoring

Research has demonstrated the effects of peer tutoring on the acquisition of skills, such as academic skills and vocational skills. Additionally, research has demonstrated the effects of the implementation of an instructional package to increase the use of peer tutoring. It has been suggested that the use of peers to implement procedures is greatly beneficial in large classroom settings. Procedures that require high rates of teacher attention are difficult to implement in larger classrooms, therefore, the use of peers to implement these procedures becomes a viable solution (Strain, Cooke, & Apolloni,

1976). Additionally, instruction becomes problematic for teachers who have students with varying levels of ability (Parsons & Heward, 1979). Parsons and Heward (1979), therefore, conducted a study using children with varying learning disabilities. Higher functioning children served as tutors, and lower functioning students served as tutees. One additional student served as a generalization tutee. The study examined the effects of a training package on peer-tutoring behavior and the effects of the peer tutoring procedures on the acquisition of sight words. Results indicated a systematic increase in all responses targeted in the peer-tutoring training package. Additionally, sight word acquisition increased across all tutees. Fueyo and Bushell (1998) were concerned that there is seldom enough time to teach and seldom enough opportunities to practice mathematical skills. They examined the effects of peer tutoring procedures on the acquisition of number line skills by low-performing first-graders. With the systematic implementation of procedures by trained tutors, participants increased their use of number line skills.

Peers as Behavior Managers

Peer attention is a common and naturally occurring consequence that has an effect on disruptive classroom behavior (Northup, Jones, Broussard, DiGiovanni, Herring, Fusilier, & Hanchey, 1997). Solomon and Wahler (1973) found that social attention by peers maintained disruptive behavior in five children in an elementary classroom. In a group-design, Sanders and Glynn (1977) introduced a peer-training procedure in which peers delivered reinforcement for target subject behavior and ignored inappropriate behavior. A second training procedure included reinforcement for the behavior of the peers. There was a significant increase in the target behavior of the subjects after the

implementation of the first training procedure, and additional increases following the second procedure.

The use of peers as monitors to decrease classmates' disruptive behavior has been shown to be an effective intervention. Smith and Fowler (1984) demonstrated that peer-delivered tokens successfully decreased the disruptive behavior of their target classmates. Fowler and Paine (1985) demonstrated that the use of a point system that was initiated by an adult, maintained its effectiveness in reducing inappropriate behavior in the target subject when it was implemented by a peer. Furthermore, the subject's inappropriate behavior decreased when the subject served as the peer monitor for another individual. Additionally, Stern, Fowler, and Kohler (1988) compared two interventions to decrease off-task behavior. Participants were given two roles: they delivered points to the other child for appropriated behavior, or received points for their own appropriate behavior. Results demonstrated that both interventions served to decrease the levels of the off-task behavior measured.

Inadvertent Reinforcement by Peers

Some studies have examined non-programmed peer-mediated reinforcement. Functional assessment methods have been used to demonstrate the maintenance of inappropriate behavior caused by peer attention. The results of a functional assessment conducted by Northup et al. (1997) demonstrated that the disruptive behavior of an 8-year-old boy with attention-deficit-hyperactivity disorder (ADHD) was maintained by peer attention when the drug methylphenidate was not administered to the participant. Peer attention did not maintain disruptive behavior when the drug was present. Jones, Drew, and Weber (2000), used a functional assessment to reveal that the disruptive

behavior of a child with ADHD was maintained by peer attention. In another study, Flood, Wilder, Flood, and Masuda (2002) also demonstrated that peer attention maintained off-task behavior in three children with ADHD. An intervention that included the use of peer-mediated reinforcement systematically reduced off-task behavior by all participants.

The Use of Peers as Confederates to Facilitate Social Interactions

Research has demonstrated the strong influence children can have on each other's behavior, particularly in the areas of social and communicative development (Strain & Schwartz, 2001). The development of friendships and meaningful relationships are essential to the development of children with and without disabilities (Strain & Schwartz, 2001). Numerous studies have demonstrated the effectiveness of including peers in a treatment package to teach social interactions to children with developmental delays. For example, Strain, Shores, and Timm (1977) assessed the effects of peer confederate social initiations on the behavior of socially delayed preschool children. With the introduction of a training procedure to teach the confederates to approach the subjects, a systematic increase was demonstrated in the pro-social behavior of the subjects. In another study, Shafer, Egel, and Neef (1984) examined the effects of a peer-training procedure on the social interactions between children with autism and their non-autistic peers. The procedure produced a substantial systematic increase in the responses measured between the trainers and target peers. Additionally, these increases were maintained during probe conditions. Goldstein and Wickstrom (1986) designed a study to increase communicative interaction of three language-delayed children and their typical peers. Intervention consisted of prompting the typical peers to engage in communicative interactions with the

target peers during a free-play period. Results demonstrated a systematic increase in communicative interaction for all target peers. Furthermore, these interactions were maintained with the removal of teacher prompts.

Very often, peer-mediated strategies to increase social interactions between typical and handicapped peers require the peer to be trained to either ask questions or make requests of their handicapped peer (Goldstein, Kaczmarek, Pennington, & Shafer, 1992). Therefore, Goldstein et al. (1992), designed a study in which peers were trained to attend to and comment on the behavior of their autistic peers. Four of the five participants with autism demonstrated marked increases in social interactions with the implementation of treatment, thus providing another peer-mediated procedure to increase socially appropriate behavior.

The development of friendships and meaningful relationships are essential to the development of children with and without disabilities (Strain & Schwartz, 2001). Haring and Green (1992) designed an intervention that engaged the typical peers in weekly discussions concerning the social interactions of the target peers and how to engage the target peers in more meaningful interactions. Data were collected by the typical peer on the frequency, number of opportunities, and appropriateness of the interactions of the target peers. Results demonstrated that the systematic implementation of the social network strategy increased all aspects of social interactions measured.

In the studies mentioned above, the interventions consisted of training a peer to initiate some sort of interaction with his or her handicapped peer. If, in fact, the handicapped peer were taught to initiate an interaction by an adult, responding might extinguish if the typical peer does not respond (Odom & Strain, 1986). Odom and Strain

(1986), therefore, designed a study that compared two procedures to increase reciprocal interactions of children with autism: a peer-initiated intervention and an intervention in which the teacher taught the child with autism to initiate, and trained the typical peers to reciprocate. While the peer-initiated intervention increased the social responding of the children with autism, the teacher-prompting procedure increased both initiations and responding, resulting in longer chains of social interactions. This intervention, however, is problematic because of the continuing need for adult prompting. Another type of antecedent intervention would be needed to remove the teacher prompts (Odom & Strain, 1986). The use of scripts would be a viable solution. Krantz and McClannahan (1993) conducted a study in which a script was systematically faded to teach children with autism to initiate communicative interactions with their peers. Results indicated that initiations increased systematically with the introduction of the scripts, and non-scripted initiations occurred when the script was faded. This demonstrated a successful procedure to promote social interaction for children with developmental delays, without the need for adult prompts.

Peer Modeling

Although the development of behavior in typical children is affected by peer modeling processes (Egel et al., 1981; Carr & Darcy, 1990), children with developmental delays often do not imitate the actions of their typical peers (Carr & Darcy, 1990). These children do not imitate peers without the implementation of structured intervention procedures (Peck, Apolloni, Cooke, & Raver, 1978). Several studies have demonstrated the positive outcomes of intervention procedures that use peers as models for children with developmental delays. Behavior that has been acquired through the use of peer-

modeling procedures includes but is not limited to receptive and expressive language (Egel et al., 1981; Jones & Schwartz, 2004), response chains (Werts, Caldwell, & Wolery, 1996), social skills (Pierce & Schreibman, 1995; Pierce & Schreibman, 1997) and play skills (Peck et al., 1978; Carr & Darcy, 1990; Arntzen, Halstadro, & Halstadro, 2003).

Egel et al. (1981) conducted a study to assess the effects of peer modeling on the acquisition of receptive and expressive language skills of four children with autism. The participants were selected for this study because instructional methods such as systematic prompt-fading had been ineffective in increasing correct responding. Baseline, therefore, consisted of a systematic prompt-fading procedure alone, and intervention consisted of prompt-fading, plus a typical peer modeling the correct response. With the introduction of the modeling condition, all four participants demonstrated a systematic increase in correct responding. Furthermore, with the removal of the models two days after treatment, all subjects continued to respond correctly.

Jones & Schwartz (2004) were interested in examining the extent to which the type of model affected the peer-modeling intervention. They argued that siblings might serve to be effective models because of longer social histories and more frequent modeling opportunities than school peers or adults. Therefore, Jones & Schwartz (2004) conducted a study to assess the effects of three different types of models on the acquisition of expressive language skills in three preschoolers with autism. Number of correct responses was measured by comparing interventions consisting of a peer model, a sibling model, and an adult model. There was an increase in correct responding across all stimulus sets for each participant with the introduction of the modeling intervention.

Furthermore, there was no clear difference amongst the three procedures. Very often, however, higher numbers of correct responses were obtained with child models over adult models. The authors state that further research is needed to determine the extent to which a model's effectiveness is modified by the environmental context.

While it appears that the acquisition of language skills has been the predominant dependent variable when assessing the effectiveness of peer modeling interventions (Carr & Darcy, 1990), other skills have been examined in behavior analytic literature. For example, Werts et al. (1996), conducted a study assessing the effects of a peer-modeling intervention on the acquisition of response chains. Three children, all approximately eight years of age, were the subjects of the study. All three children were included in a regular education classroom for part of the school day. Typical peers from their classrooms served as models for the subjects. Response chains taught were using number and letter tiles, using a tape recorder, using a computer program, using a calculator, and sharpening a pencil. Intervention consisted of a peer modeling procedure, in which the model was placed next to the subject, performed the steps of the response chain and recited each step as it was demonstrated. With the systematic implementation of the peer modeling procedure, all three subjects acquired multi-step response chains. Furthermore, all three subjects accurately performed at least two additional response chains similar to those trained, using different materials, as measured in a post test.

Including children with autism in environments with their typical peers provides opportunities to increase appropriate social interactions (Pierce & Schreibman, 1997). Intervention packages that incorporate task interspersal, choice-making, and reinforcement have been demonstrated to be effective in increasing appropriate social

interactions in children with autism (Pierce & Schreibman, 1995; Pierce & Schreibman, 1997; www.mcesa.k12.mi.us/Homepage.htm). Furthermore, these interventions have been demonstrated to be effective in increasing social interactions when the intervention was implemented by typical peers (Pierce & Schreibman, 1995; Pierce & Schreibman, 1997). Pierce & Schreibman (1995) conducted a study in which peers were trained to implement a treatment package by modeling responses and giving feedback to two children with autism. After intervention, the children with autism increased their appropriate social interactions, and increased their conversational and play initiations. Pierce and Schreibman (1997) replicated the 1995 study, and included an assessment of generalization across untrained peers, in which the behavior of one participant showed a marked increase from baseline to follow-up. More specifically, this participant did not engage in any social interactions with the untrained peer during baseline, and demonstrated 100% engagement after treatment.

The development of play skills is greatly influenced by peer modeling (Carr & Darcy 1990). Researchers have examined the effects of peer-modeling on the acquisition of play skills including pretend play (Peck et al., 1978) and gross motor activities (Carr & Darcy, 1990; Arntzen et al., 2003).

Peck et al. (1978) observed that in two experiments, interventions consisting of adult prompts and reinforcement, resulted in an increase in play skills of mentally retarded preschoolers as modeled by their typical peers. Three mentally retarded preschoolers served as subjects in the first experiment, and two served as subjects in the second experiment. Additionally, subjects in second experiment demonstrated generalization of skills under non-training conditions.

Carr and Darcy (1990) found that the use of a peer model was effective in teaching children with autism skills associated with gross motor activity, in which participation required extensive movement within the designated environment. In the above-mentioned peer-modeling studies, interventions consisted of the peer in close proximity to the subject, with very little movement around the environment. Carr and Darcy (1990) argued that these types of interventions are difficult to use when attempting to teach long chains of gross motor responses. Therefore, Carr and Darcy (1990) examined the effects of a peer-modeling procedure on the acquisition of gross motor chains, in the context of a Follow-the-Leader activity. Intervention consisted of a forward chaining procedure, in which the peer provided modeling, prompting, and reinforcement. All four participants acquired a 10-step response chain. Additionally, all participants performed the steps of a novel 10-step response chain in the context of a non-training probe condition.

In the Carr and Darcy (1990) study, the role of the participants was that of follower, and the typical peer had the role of leader. Arntzen et al. (2003) taught a 5-year-old boy with developmental delays to participate in three gross motor games, as both the leader and a participant.

Summary

The studies reported above demonstrate the effectiveness of peer-mediated procedures to increase skill acquisition in children with developmental delays. The majority of the studies reviewed focus on the acquisition of language and academic skills. It appears that there is less research activity concerning the use of peer modeling within the area of physical activity.

The Use of Modeling in Applied Research in the Area of Physical Activity

In the previous section of this paper, the author found little research activity concerning the use of peer modeling for individuals with developmental delays within the area of physical activity. Nevertheless, there has been some research of this nature with typical learners. Research has demonstrated the effects of modeling as part of a treatment package on the acquisition of skills associated with physical fitness, dance, and sports. In the present section of this paper, the author will briefly review those research articles that include modeling as part of a treatment package to increase skills associated with football (Komacki & Barnet, 1977; Allison & Ayllon, 1980), gymnastics and tennis (Allison & Ayllon, 1980), swimming (Koop & Martin, 1983), soccer (Rush & Allyon, 1984), track (Shapiro & Shapiro, 1985), dance (Fitterling & Ayllon, 1983; Vintere, Hemmes, Brown, & Poulson, 2004) and yoga (Gruber, Lee & Poulson, 2005). The sources of these articles include Journal of Applied Behavior Analysis, Behavior Modification, Journal of Sport of Sport Psychology, and research presented at the Association for Behavior Analysis Convention, 2005. Of these studies, Rush and Allyon (1884) are the only experimenters who used a peer to implement the treatment package in their study. Among those journals reviewed, this author found no other behavior analytic studies using a peer model in the context of sports or other types of physical fitness. Additionally, Gruber et al. (2005) are the only experimenters that used modeling in the context of a physical fitness activity for children with developmental disabilities.

Sports

Because operant procedures have demonstrated to be effective in increasing gross motor skills, these procedures have been applied to skills associated with athletic

performance (Allison & Allyn, 1980; Rush & Allyn, 1984). Studies associated with sport performance that include modeling as part of a treatment package behavioral coaching affects the acquisition of sport-related skills. Komacki and Barnett (1977) conducted a study to assess the effects of a behavioral coaching procedure on the acquisition of three football plays. Participants were five 9-10 year old boys on a youth football team. As part of the treatment package, the coach modeled the appropriate movements of each play. Results indicated that there was a systematic increase in appropriate play execution with the implementation of the treatment package.

Traditionally, the delivery of instructions, feedback, prompting, and modeling by coaches has not been routinely examined (Shapiro & Shapiro, 1985). Allison and Allyn (1980) conducted a study comparing the effects of behavioral coaching on skill acquisition to that of traditional coaching methods. Coaching techniques were examined in the context of football, gymnastics, and tennis. For all three sports, the treatment package consisted of initial instructions, saying “freeze” if the skill was executed incorrectly, describing the incorrect position while the athlete was frozen in the position, and modeling the correct response while the athlete was still frozen. After modeling, the athlete would then come out of the incorrect position and attempt to imitate the correct response. Additionally, reinforcement was delivered for any correct response. A combination of multiple baseline and reversal designs were used to compare behavioral coaching to standard coaching. For all three sports, results indicated a systematic increase with the implementation of the behavioral coaching package on the execution of the target skills. The components of the behavioral coaching treatment package used in the Allison and Allyn (1980) study have also been implemented to increase sport

performance in the areas of track and soccer. Shapiro and Shapiro (1985) found that with the implementation of the behavioral coaching package, there was a systematic increase in the performance of the target track skills.

Because research has demonstrated the effectiveness of peer modeling, Rush and Allyn (1984) questioned whether a peer would be an appropriate individual to implement the behavioral coaching treatment package used in the Allison and Allyn (1980) study. Rush and Allyn (1984) examined the effects of the Allison and Allyn (1980) treatment package on the acquisition of basic soccer skills. The peer coach was trained in the behavioral coaching procedure. With the implementation of the treatment package, there was a systematic increase in the soccer skills measured for all participants. Rush and Allyn (1984) stated that the use of a peer coach to teach basic soccer skills affords the head coach more time to devote to other coaching responsibilities.

Koop and Martin (1983) were interested in examining the effects of a treatment package to decrease errors in swimming strokes. The behavioral coaching package differed slightly from the previously mentioned studies, however, modeling the correct response was still part of the package. The treatment package consisted of descriptions of the correct stroke, modeling of the correct stroke, and reinforcement for correct imitation of the model. Additionally, stimulus generalization to another setting and response generalization to other strokes were also assessed. Participants were five swimmers; the youngest swimmer was seven years old and the oldest swimmer was twelve years old. Results indicated a systematic decrease in errors for all participants during training. Stimulus generalization to regular practice occurred in three swimmers. Response generalization across strokes was not demonstrated.

Dance and Yoga

The effectiveness of operant procedures that include modeling is not limited to sport performance (Fitterling & Allyn, 1983). As previously stated, the traditional or standard methods of coaching have not been routinely examined (Shapiro & Shapiro, 1985). The same is true for standard ballet instruction (Fitterling & Allyn, 1983). Therefore, Fitterling and Allyn (1983) conducted a study comparing the effects of behavioral coaching on the acquisition of specific ballet skills to that of standard ballet instruction. Four female ballet students ages seven and eight, participated in the study. Consistent with Allison and Allyn (1980), Shapiro and Shapiro (1985), and Rush and Allyn (1984), the treatment package included initial instructions, saying “freeze” if the skill was performed incorrectly, describing the incorrect position while the dancer was frozen in the position, and modeling the correct response while the dancer was still frozen. After modeling, the dancer would then come out of the incorrect position and attempt to imitate the correct response. A combination of multiple baseline and reversal designs were used to compare behavioral coaching to standard ballet instruction. Results indicated a systematic increase with the implementation of the behavioral coaching package on the performance of ballet skills.

Other behavior analytic interventions that include modeling have been examined in the area of dance and yoga. With regard to dance, Vintere et al. (2004) examined the effects of two training procedures on the acquisition of gross-motor chains for preschool dance students. One training procedure consisted of modeling and praise with self-instruction, and the other procedure consisted of modeling and praise without self-instruction. While the self-instruction procedure enhanced initial response acquisition

when compared to modeling and reinforcement alone, both procedures, which included modeling, were effective in teaching the gross-motor chains. With regard to yoga, Gruber et al. (2005) assessed the effects of an intervention package to teach children with developmental delays yoga skills. The video-modeling baseline procedure consisted of presenting a videotape showing a certified yoga instructor providing verbal instructions and physical demonstrations of each step in a 24-step response chain that made up two yoga poses. The graduated guidance intervention was implemented by yoga trainers, which was introduced in a multiple-baseline-experimental design across three participants. Systematically with the introduction of treatment, all participants matched the response chain with 70% accuracy or better. Data also demonstrate that one participant generalized these skills in the presence of a live model, a stimulus that was not present during training.

Summary

The studies reported above demonstrate the effectiveness of using modeling in a treatment package to increase skill acquisition in the areas of sports, dance, and yoga. Of these articles, only Rush and Allyon (1984) used a peer to implement the treatment package in their study. Additionally, only Gruber et al. (2005) used modeling in the context of a physical fitness activity for children with developmental disabilities.

Discussion

This review examined the use of peers in a treatment package for people with disabilities and the use of modeling in the area of physical activity in applied research. The majority of the published articles reviewed examined the effects of peer-mediated procedures (eg., peer tutors and tutees, peers as behavior managers, and peer modeling) to increase acquisition of skills in the areas of academics, social behavior, and receptive and expressive language development. The acquisition of motor skills has been given far less attention. Furthermore, only one article reviewed used a peer to implement a treatment package in the context of an organized sport. That study, however, used typical learners as subjects. In another study, while modeling was used in the context of a physical fitness activity (yoga) for children with developmental disabilities, the behavior was modeled by an adult on a videotape, and thus, it was not modeled by a peer.

As stated in the introduction, Physical Education has been an established field of study in colleges and universities for over 20 years (Sharpe, 1998). Furthermore, physical education is part of the educational curriculum in almost every school in the country (Young, 1997). Nevertheless, for individuals with disabilities, a greater emphasis is placed on functional academic instruction (Fine & Fine, 1996). Many individuals with disabilities are faced, however, with a large amount of leisure or down time (Fine et al. 1996). Without the skills required to participate in physical fitness activities, integrating these individuals into environments with their typical peers can be quite challenging, and yet, increasing emphasis is being placed on inclusive education. (Fine and Fine, 1996). Research is needed, then, to determine the extent to which behavior-analytic procedures involving peers will effect skill acquisition associated with

physical activity by individuals with developmental disabilities. The findings from future studies should guide the development of treatment procedures.

In the articles reviewed that pertain to motor skills, the implementation of treatment packages that included modeling resulted in the acquisition of the skills measured. Carr and Darcy, (1990) found that the use of a peer model was an effective strategy to teach children with autism skills associated with gross motor activity, in which participation required extensive movement within the designated environment. Intervention consisted of a forward chaining procedure, in which the peer provided modeling, prompting, and reinforcement. Allison and Allyn (1980) found that the use of behavioral coaching was more effective in increasing skill acquisition when compared to traditional coaching methods, in the context of football, gymnastics, and tennis. The treatment package consisted of initial instructions, saying “freeze” if the skill was executed incorrectly, describing the incorrect position, and modeling the correct response. Similar results were demonstrated in studies that replicated the treatment packages in the context of track (Shapiro & Shapiro 1985), soccer (Rush & Allyn 1984), dance (Fitterling & Allyn,1983). Gruber et al. (2005) found that an intervention package consisting of modeling, prompting, and reinforcement was an effective strategy to teach children with developmental delays yoga skills. While the above-mentioned studies used modeling as part of the treatment package, other techniques were also included. It is unclear as to what combination of procedures is the most effective for teaching long chains of motor responses. Future research might also include component analyses to determine which components of a treatment package are effective in teaching skills associated with physical activity.

Numerous studies have already demonstrated the effectiveness of including peers in a treatment package to teach social interactions to children with developmental delays. Because physical education is part of the curriculum in most school settings, structured physical activity can serve as a context to teach not only motor skills, but also social interaction skills (Sharpe, 1998). The use of scripts has been demonstrated to be an effective procedure to teach children with developmental delays to initiate communicative interactions with their peers (Krantz & McClannahan 1993). Research examining the use of scripts to initiate statement pertaining to a structured physical activity (eg., “Will you be my partner”), should be addressed in the future. Furthermore, social interactions can function as antecedent stimuli to the presentation of a gross motor response chain modeled by a peer.

Research has demonstrated that 1) peer-mediated procedures such as peer tutoring, peers as behavior managers, and peer modeling are effective in increasing skill acquisition in children with developmental delays, and 2) the use of treatment packages that include modeling by other than peers are effective in increasing skill acquisition in the areas of sports, dance, and yoga. Future research might address procedures using modeling by peers, instead of others, to teach skills associated with physical activity.

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