

*USE OF PEER-MEDIATED INTERVENTION IN CHILDREN
WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER*

ALICIA N. GRAUVOGEL-MACALEESE

UNIVERSITY OF NEVADA, RENO

AND

MICHELE D. WALLACE

CALIFORNIA STATE UNIVERSITY, LOS ANGELES

The present experiment extended and replicated the use of functional analysis and a peer-mediated intervention to decrease disruptive behavior displayed by children diagnosed with attention deficit hyperactivity disorder in an afterschool program. After determining that the participants displayed off-task behavior maintained by peer attention via a functional analysis, peer-implemented differential reinforcement of other behavior with extinction was effective in reducing participants' off-task behaviors. The use of peers as behavior-change agents is discussed, as are avenues for future research.

Key words: attention deficit hyperactivity disorder, differential reinforcement, functional analysis, peer mediation

Approximately two million children in the United States are estimated to have attention deficit hyperactivity disorder (ADHD, National Institute of Mental Health, 2006). Furthermore, it is estimated that 80% of children diagnosed with ADHD exhibit a variety of behavior problems (Cantwell & Baker, 1991). Research has demonstrated that the most efficacious strategy to decrease or eliminate behavior problems is to develop an intervention based on the identified function of the behavior (Carr & Durand, 1985). In addition to using functional analyses to guide intervention, research has demonstrated that peer attention can be a functional reinforcer for some children with ADHD, and the use of peer-mediated interventions can decrease behavior

problems for these children (e.g., Flood, Wilder, Flood, & Masuda, 2002). However, most applications of behavioral assessments and peer-mediated interventions of behavior problems exhibited by children with ADHD have been conducted exclusively in analogue educational settings using single interventions (e.g., extinction alone).

The purposes of the current study were (a) to replicate and extend functional analysis procedures using peers in an afterschool program and (b) to replicate and extend peer-mediated interventions for problem behavior maintained by peer attention using multiple-component contingencies (e.g., both differential reinforcement and extinction).

METHOD

Participants and Setting

Three participants with ADHD, Scott (8-year-old boy), Zane (6-year-old boy), and Drew (10-year-old boy), and their respective peers, Howey (9-year-old boy), Brian (7-year-old boy), and Jeffery (10-year-old boy), participated in the study. Zane was the only participant who was taking medication for his ADHD at the time of the study. Participants chose peers as

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Address correspondence to Michele D. Wallace, Charter College of Education, Division of Special Education and Counseling, California State University, Los Angeles KH C1064, Los Angeles, California 90032 (e-mail: mwallac@calstatela.edu).

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children with whom they would like to work during homework time, and we ensured that the staff deemed the selected peers as good role models. All sessions were 5 min in duration and were conducted in the homework setting of the afterschool program.

Data Collection, Interobserver Agreement, and Procedural Integrity

Off-task behavior was defined as talking about subjects unrelated to homework (all participants), leaving or falling out of his seat (all participants), wandering around the room (Scott and Drew), leaving the homework area (Zane), hiding behind objects (Zane), and crawling under the tables (Drew).

Trained observers scored a response on a data sheet broken into 10-s intervals if the participant engaged in off-task behavior during any portion of the 10-s interval. The observers used a stopwatch to identify the 10-s intervals. Data are presented as percentage of intervals, which was calculated by dividing the intervals in which off-task behavior was scored by the total number of intervals (30) and converting the ratio to a percentage.

Interobserver agreement was evaluated by having a second observer independently record data during 29%, 57%, and 33% of sessions for Scott, Zane, and Drew, respectively. Agreement was calculated by dividing the number of agreements by the number of agreements (both observers recorded the target behavior in the same interval) and disagreements and converting the ratio to a percentage. Mean agreement was 95% for both Scott and Zane (range, 80% to 100%) and 89% for Drew (range, 73% to 100%) across all conditions.

Procedural integrity data were collected for the peers' responses during the functional analysis and treatment sessions. The observer scored whether the peer responded correctly or incorrectly during the interval as specified by the condition. The observer scored a correct response when the peer provided attention contingent on off-task behavior during the

peer-attention condition, provided attention noncontingently during the control condition, and ignored off-task behavior and provided attention for on-task behavior during treatment sessions, whether it occurred independently or was prompted via the vibrating pager (Anglesea, Hoch, & Taylor, 2008). The observer scored an incorrect response if the peer delivered attention when he should not have or if he ignored the prompt to deliver attention. The procedural integrity measures were converted to a percentage correct after dividing the number of intervals in which the peer responded correctly by the total number of intervals. Procedural integrity was recorded for 100% of all sessions and follow-up, resulting in a mean of 99%, 97%, and 94% for Scott, Zane, and Drew, respectively.

Peer and Staff Training

Before functional analysis and treatment sessions, the investigator used role play and modeling to teach the peers how to respond during the various conditions (as described above for correct responses). The training phase continued until peers reached an 80% accuracy criterion. In addition, the peers wore a concealed vibrating pager during all sessions, which was used to prompt the peer if he did not respond correctly.

Staff were trained prior to the start of the functional analysis by using role playing and modeling. During the functional analysis, if the staff did not implement the correct contingency, the investigator verbally prompted the correct response (e.g., to provide attention or to remove homework).

Functional Analysis

Antecedents and consequences correlated with the attention, play, and demand conditions (Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994) were presented in a multi-element design with the addition of a peer-attention condition. Worksheets included the participant's homework and were assigned to a

condition based on the results of a preference assessment (e.g., the worksheet the participant identified as the least preferred was assigned to the demand condition, and the others were assigned to the staff-attention and peer-attention conditions). During the play condition, word finds and crossword puzzle worksheets were used.

The peer was present during all functional analysis conditions but interacted only during the peer-attention and control conditions. During the peer-attention condition, if the target behavior occurred, the peer provided brief (approximately 10 s) attention (e.g., laughing at the joke, going under the table with the target participant, walking over to the bleachers). During the staff-attention condition, staff provided attention contingent on the target behavior. In the demand condition, the participant was allowed to escape work for 30 s contingent on the target behavior (neither the peer nor the staff member interacted with him during this break). After 30 s, the staff member instructed the participant to get back to work. In the control condition, the peer delivered noncontingent attention (approximately once every 30 s and included the peer talking about the worksheet activity) and ignored any off-task behaviors.

Treatment Evaluation

A multiple baseline design across participants, with a reversal for one participant (Scott), was used to evaluate the treatment intervention. Baseline sessions were identical to the peer-attention conditions of the functional analysis for all three participants and included the three peer-attention sessions.

During the treatment phase, the peer provided statements of praise and help if the participant was on task. If the participant engaged in off-task behavior, the peer discontinued praise and help until the participant was on task again (i.e., extinction). During baseline and treatment, the worksheet consisted of the homework assigned by the teacher.

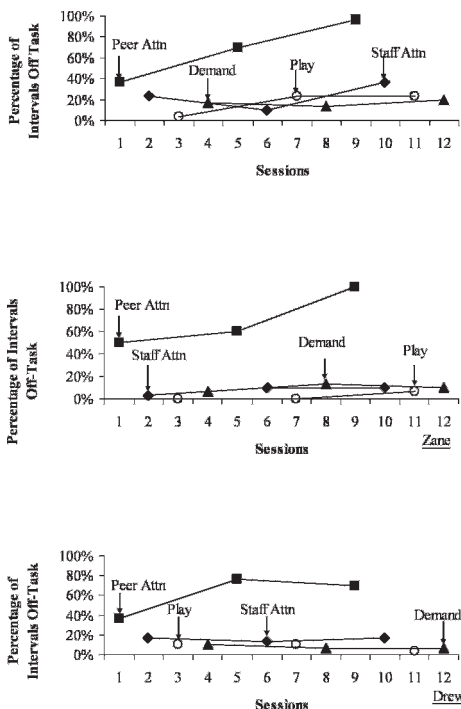


Figure 1. Percentage of 10-s intervals of off-task behavior for Scott, Zane, and Drew during the functional analysis.

RESULTS AND DISCUSSION

Results of the functional analyses are depicted in Figure 1. For all participants, the functional analyses indicated that off-task behavior was sensitive to attention from peers ($M_s = 67\%$, 70% , and 61% for Scott, Zane, and Drew, respectively).

Results of the treatment analysis are depicted in Figure 2. During baseline, all participants engaged in high levels of off-task behavior ($M_s = 67\%$ and 89% for Scott, 76% for Zane, and 63% for Drew). When peers implemented differential reinforcement, off-task behavior immediately decreased for all three participants and remained low ($M_s = 16\%$ and 12% for Scott, 13% for Zane, and 9% for Drew). Follow-up sessions were conducted for Drew a month after the last treatment session, and off-task behavior remained low ($M = 1\%$). It should be noted that the pager was not used to

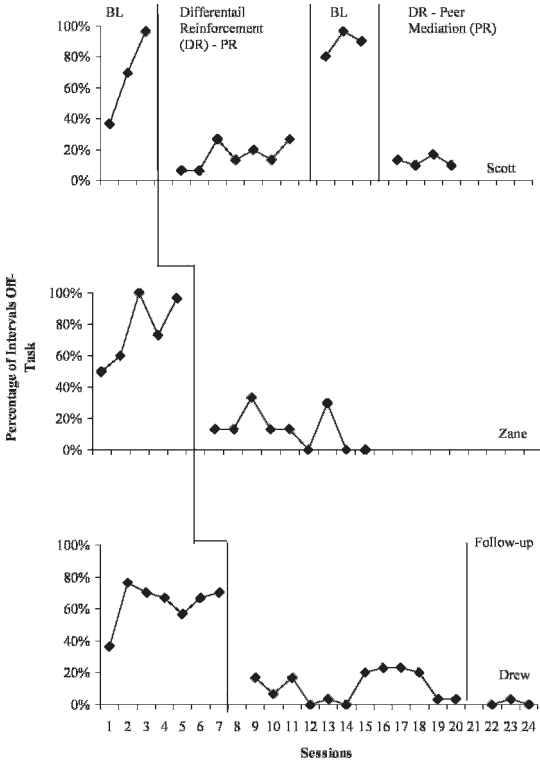


Figure 2. Percentage of 10-s intervals of off-task behavior for Scott, Zane, and Drew during baseline and differential reinforcement.

prompt the peer during these follow-up sessions. After the intervention, the participant, peer, and a staff member completed a social validity questionnaire regarding the intervention. Results

across individuals and questions were positive (see Table 1).

Results from the current study demonstrated that it is feasible to conduct both functional analyses and a peer-mediated intervention in an afterschool program. In addition, it was demonstrated that the peers were capable of accurately implementing a differential reinforcement procedure, including reinforcing the absence of problem behavior as well as ignoring problem behavior. However, difficulties were encountered that are worth mentioning. First, there were several uncontrolled situations that occurred during both the functional analysis conditions and the treatment phase due to the natural setting. Twice during the peer-attention condition of Scott’s functional analysis, another peer interacted briefly with him when he engaged in off-task behavior. The investigators determined that this was not a serious confounding effect because it was in line with the contingencies for that condition (i.e., peer attention delivered contingent on off-task behavior). A similar situation occurred once with Drew during treatment, and the staff moved the children down two seats. In addition, during the 26th session of treatment, Zane’s sister corrected one of his math problems, and he ran away. Subsequently, she was trained in how to implement the intervention. Future research may investigate the

Table 1
Social Validity Questionnaire Results

Target participant	Liked working together	I completed more work	Liked participating
Scott	Yes	Yes	Sort of
Zane	Yes	Yes	Sort of
Drew	Yes	Yes	Yes
Peer participant	Liked working together	Did it help the other student?	Liked participating
Howey	Yes	Yes	Yes
Brian	Sort of	Yes	Yes
Jeffery	Yes	Yes	Yes
Staff	Helpful for ADHD student?	Would this help others?	Would you implement this?
Carra	Yes	Maybe	Yes
Jade	Yes	Yes	Yes
Reed	Yes	Yes	Yes

feasibility of training all peers in the extinction component of treatment.

Besides the difficulties associated with the application of procedures in natural settings, using a peer to mediate the behavior of another child can be difficult. For example, it requires the peer to identify specific behaviors and respond appropriately. In the current study, we created scenarios in which the peer practiced with the investigator on how to respond. In addition, the use of the vibrating pager was useful for the purpose of training the peer as well as an effective prompt during intervention. Although this proved to be an effective way to overcome the difficulties of having peers implement the intervention, a systematic fading procedure was not used to eliminate the pager and warrants future research.

One could argue that the length of sessions used in this study was too short (only 5 min); however, it should be noted that several sessions occurred during each homework period, and participants were often on task for the duration of the homework period (up to 30 min total) during treatment. Nevertheless, future research should run extended sessions to evaluate if this type of treatment can be in place for longer periods of time.

Although the purpose of the current study was to decrease off-task behavior in children with ADHD using peers, the effects of the procedure on peers were not evaluated. Although there are several potential benefits for the peers, one could

argue that the time the peer spent with the other child during treatment may result in the peer completing less work (anecdotally, this was not observed in the current study). Thus, future research should evaluate the effects on the peer with this type of procedure.

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