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Effects of Noncontingent Peer Attention on Problem Behaviors in Students with Autism in General Education Settings

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EFFECTS OF NONCONTINGENT PEER ATTENTION ON PROBLEM BEHAVIORS
IN STUDENTS WITH AUTISM IN GENERAL EDUCATION SETTINGS

by

Alison L. Walker

A thesis submitted in partial fulfillment
of the requirements for the degree

of

MASTER OF SCIENCE

in

Special Education

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2012

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ABSTRACT

Effects of Noncontingent Peer Attention on Problem Behaviors
in Students with Autism in General Education Settings

by

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Utah State University, 2012

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Department: Special Education and Rehabilitation

Many students with autism spectrum disorders (ASD) display problem behaviors that are maintained by teacher attention. Although noncontingent reinforcement (NCR) can be effective in reducing attention maintained problem behavior, it can be difficult for general education teachers, who have many other students in their classrooms, to implement NCR interventions when teacher attention is the maintaining reinforcer. In this study, we evaluated the effect of an NCR intervention in which peers delivered social attention to two students with ASD in Grades 3-6 whose problem behavior was shown to be maintained by teacher attention. The results of the study demonstrated that the Peer NCR intervention resulted in a clinically significant decrease in problem behavior and that it can be effectively implemented in a general education classroom environment.

(47 pages)

PUBLIC ABSTRACT

Effects of Noncontingent Peer Attention on Problem Behaviors in Students with
Autism in General Education Settings

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Alison L. Walker

As more children are being identified with autism spectrum disorders (ASD), more of them are being served in public schools with their typically developing peers. Many of these students have behavioral challenges that impact their ability to learn, or the ability of other students in their classes to learn. It is therefore increasingly important that schools are equipped with behavioral interventions that are both effective and easy to implement in order to meet these students' needs. This study evaluated the effects of one such intervention in which classroom peers were trained to provide attention to the student with autism on a regular schedule.

All parts of this study were conducted in local public schools at no cost to the teachers, students, or schools. Researchers identified students with autism whose behavior was interfering with their learning or the learning of others, and who were using that behavior to gain the attention of their teachers. For each target student with autism, two peers in his class were identified and trained to provide attention on a consistent, or fixed, schedule when signaled by a small vibrating device. Researchers collected data on

the frequency of problem behavior before and after implementation of the intervention and surveyed peers regarding their feelings toward participation in the intervention.

The results of the study showed a decrease in the frequency of problem behavior for both participants, indicating that the intervention could be useful for more students in similar situations. The peers surveyed were overall positive in their feelings about their participation in the intervention.

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INTRODUCTION

In 2012, the Centers for Disease Control and Prevention concluded that the prevalence of Autism in the United States was 1 in 88 births, up from 1 in 125 in 2004 (Centers for Disease Control and Prevention, 2012). With the dramatic rise of children being identified with autism spectrum disorders (ASD) comes a similar increase in the number of students with autism being served in public schools. Many of these students are served in a general education setting for at least a portion of the school day (Utah State Office of Education, 2009). Because there are an average of 23.6 students in each public school primary classroom in the United States (Rampell, 2009), the individual time teachers have to spend with each student is scarce. While federal law mandates that teachers provide an appropriate education to students with ASD (Individuals with Disabilities Education Improvement Act, 2004), they are also legally bound to ensure *all* students in their classes make sufficient progress (No Child Left Behind Act, 2001). Students with ASD often need more intensive academic and behavioral instruction and classroom teachers who serve students with ASD may be forced to choose between allocating their time to the class as a whole or to providing individualized attention to the students with ASD. It can be difficult for teachers to take time away from instruction to provide the high rates of attention often required for a reduction in problem behavior for students with autism, even though they may want to do so. With so many demands placed on their time, teachers need manageable and effective strategies to reduce problem behavior of students with ASD.

Noncontingent reinforcement (NCR) is the delivery of reinforcement on a time-based schedule, regardless of the behavior of the student, and has been shown effective in

the reduction of problem behaviors maintained by attention (Vollmer, Iwata, Zarcone, Smith, & Mazaleski, 1993). Although NCR is more effective when the reinforcer being delivered is the same as the reinforcer maintaining of the problem behavior, it has also been effective when an arbitrary reinforcer (one which is not relevant to behavioral maintenance) has been used (Fischer, Iwata, & Mazaleski, 1997). Because teacher attention, which is often the maintaining reinforcer for problem behaviors, is not always available, alternative reinforcers may need to be substituted in NCR implementation. One such strategy might involve using typically-developing peers to deliver NCR attention. Implementation of an intervention using peer attention delivered noncontingently would involve training a peer who is already seated near the student to deliver brief appropriate attention (talking to, looking at and/or touching) to the target student each time they are queued by a timer. This peer attention, which may be more readily available, may be an effective substitute to teacher attention as an alternative reinforcer.

LITERATURE REVIEW

A search of numerous search engines (including Google Scholar, ERIC, Education Full Text and Academic Search Premier) found no research on using NCR peer attention to reduce problem behaviors of children with autism. However, searching the same engines for NCR interventions with no restriction on target populations or reinforcers and reviewing reference sections from relevant articles, I found 30 articles. Searching Google Scholar, I found a single study on using NCR peer attention. The articles found in these searches can be combined to gain an overall picture of the state of research concerning NCR and peer attention.

In 1993, Vollmer et al. studied the role of attention in the treatment of attention-maintained self-injurious behavior using NCR and differential reinforcement of other behaviors (DRO). The purpose of this study was to compare NCR to DRO to determine NCR's viability as a treatment procedure for behaviors with an identified function. Prior to the study, DRO had been widely used as an intervention for individuals with self-injurious behavior (SIB). That is, reinforcement was typically delivered after a period of time for the absence of SIB. The participants in this study were three adult females, all of whom lived in a public residential facility and demonstrated SIB maintained by attention as determined by a functional analysis. All study sessions were conducted in a unit at a day-program designed for individuals with SIB. Researchers compared the rate per minute of SIB in NCR and DRO conditions for each participant using multi-element within-subject and multiple baseline across subjects designs. The findings of this study suggest that both DRO and NCR are effective interventions for SIB maintained by positive social reinforcement. In light of this finding, NCR appears to be a viable

intervention in which participants receive high rates of reinforcement with lower rates of extinction related problem behaviors.

Hagopian, Fisher and Legacy (1994) found similar results when using NCR for students with destructive behavior maintained by attention. Researchers compared dense and lean schedules of reinforcement to determine if an initially dense NCR schedule was necessary or if a leaner schedule would be as effective. Five year-old identical quadruplets with mental retardation and pervasive developmental disorder (PDD) participated in this study. Each of the siblings had been admitted to an inpatient unit for treatment of destructive behaviors. Functional analyses suggested these behaviors were maintained by attention. Using a multi-element design, researchers compared the rate of destructive behavior during baseline, a dense fixed-time FT 10-s NCR schedule condition and a leaner FT 5-min NCR schedule condition. After a brief return to baseline conditions, researchers implemented a dense NCR schedule with progressive fading. All but one of the participants demonstrated a reduction in destructive responses per min compared to baseline in the 5-min NCR schedule condition. All four participants demonstrated a reduction in the rate of destructive responses per minute in the FT 10-s schedule. For all participants, the rate of destructive responses was lower in the dense schedule condition than during the lean schedule condition. All participants maintained lower than baseline rates of destructive responses during the dense NCR with fading condition. These findings echo those of Vollmer et al. (1993) in demonstrating that NCR is effective in reducing problem behaviors maintained by attention. Additionally, the data suggest that a dense NCR schedule is more effective in reducing behavior than a lean one, even if the dense schedule is incrementally faded, increasing the amount of time

between delivery of reinforcement. These findings have implications for classroom application of NCR schedules. The data showing that NCR was effective in reducing behaviors with differing topographies (SIB and destructive behaviors) are promising, and the relatively quick response to the interventions would be desirable for students in general education settings. However, although dense NCR schedules are more effective in reducing problem behavior, they require more effort and time from teachers than do leaner schedules.

Of interest to Fischer et al. (1997) was whether arbitrary reinforcers (those with no functional tie to problem behavior) would be effective in suppressing behaviors when delivered in an NCR intervention. They compared the rate of SIB during FR1, NCR, and FR1 with NCR conditions. The study participants were two adults, one male, one female, both with mental retardation, who lived in a public facility for persons with disabilities. Both participants had been referred to a day program for treatment of SIB. Functional analyses suggested that although both participants were being treated for SIB, the maintaining variable differed for each individual. One participant's SIB appeared to be maintained by access to tangibles and the others' by attention. In order to determine potential competing reinforcers, researchers conducted reinforcer assessments for each participant. The top reinforcer for each participant was then tested to ensure it was not functionally tied to the individual's problem behavior. This was arranged by using a baseline-intervention (AB) design in which A was a FR1 schedule of contingent delivery of the determined maintaining reinforcer and B was a FR1 schedule of contingent delivery of the arbitrary reinforcer. Once researchers confirmed that the reinforcer chosen during the reinforcement assessment was not functionally related to the problem

behavior, they implemented a FR1 schedule of contingent delivery of the maintaining reinforcer simultaneously with a FT 10-s NCR delivery schedule of the arbitrary reinforcer, or, in other words, they began an arbitrary NCR intervention without extinction. For both participants, rates of SIB decreased in this condition. These findings suggested both that NCR can be effective without extinction, and perhaps more pertinent to the current discussion, that arbitrary reinforcers were effective in the implementation of NCR interventions. Even when a child's behavior is maintained by teacher attention, a different reinforcer could be substituted and result in a reduction of behavior.

Arbitrary reinforcers can be effective, but research on the substitutability of reinforcers suggests that some reinforcers may be more comparable substitutes to the maintaining reinforcer than others. One early study on substitutability examined the rate of lever pushing in rats for two different reinforcers (root beer and Tom Collins) (Kagel et al., 1975). The rats were given a finite number of lever presses in each 24 hr period and had to allocate their responses accordingly. Researchers adjusted the "price" of each reinforcer by altering the number of lever presses needed to gain access to the reinforcer in each experimental condition. In baseline, the "price" of root beer and Tom Collins was the same. All rats allocated more responses to root beer than to Tom Collins under this condition, indicating that, all other things being equal, the rats preferred the root beer. When the price of Tom Collins was halved and the price of root beer doubled in the next condition, the rats allocated more of their responses to the Tom Collins mix than the root beer. When the price of root beer was halved and the price of Tom Collins doubled, the rats allocated more responses to the now cheaper root beer. Overall, when the price of one of the reinforcers increased, the rate of lever pushing for that reinforcer decreased

and the responses were instead allocated to the cheaper reinforcer. This indicates that root beer and Tom Collins are highly substitutable, even though the rats showed preference for the root beer. Researchers then used the same basic procedure to evaluate the substitutability of food and water. When water became cheaper, there was a slight increase in the allocation of responses for water, but it was far less dramatic than the adjustment seen when the prices of Tom Collins and root beer were adjusted. This suggests that food and water are nonsubstitutable. The cheap price of water did not overcome the reinforcing power of food. Based on this information, it is possible that there could be reinforcers that are more highly substitutable for teacher attention than others. Peer attention may be more highly substitutable for teacher attention than other arbitrary reinforcers because it is more similar in form than provision of a tangible or removal of a task demand, etc. Because of the current teacher to student ratios in classrooms, attention from peers is accessible, abundant, and may function to decrease problem behavior if delivered on a noncontingent basis.

While no studies have investigated the effects of NCR peer attention on behaviors maintained by teacher attention, there has been one study that investigated the use of NCR peer attention on problem behavior maintained by peer attention. Jones, Drew, and Weber (2000) successfully implemented NCR using peer attention. They compared the effects of contingent peer attention on percentage of intervals with disruptive behavior to those of noncontingent peer attention using a reversal design. The only participant in this study was an 8 year old boy diagnosed with attention deficit hyperactivity disorder (ADHD) who had above average intellectual and achievement scores. All sessions were conducted in a clinic-based summer academic program in which he was enrolled. A

functional analysis suggested that this child's disruptive behavior was maintained by peer attention. Researchers first implemented a FR1 peer attention schedule in which a peer was trained to provide attention each time the subject got out of his seat, played around, or talked out. They then implemented a 90-s NCR schedule in which students were allowed to "play with each other for 30 s" (p. 344). There was no extinction component and the peer continued providing attention following disruptive behavior. The participant had very high rates of behavior during the contingent peer attention condition and inconsistent but lower rates during the NCR condition. Toward the end of the NCR condition, the percentage of intervals with disruptive behavior was nearly zero. Although in this study, peer attention was functionally related to problem behavior and the sample size was very small, it does have a promising implication. They showed that a peer could be trained to reliably implement NCR, and that the NCR schedule led to a reduction in his problem behavior. These findings, taken with those of Vollmer et al. (1993), Hagopian et al. (1994), and Fischer et al. (1997) create a compelling argument that peer-reinforced NCR strategies can be effectively implemented in a school setting.

Four factors speak to the need for more research specific to the use of noncontingent peer attention as an arbitrary reinforcer for students in settings where adult attention may be limited: (a) the demonstrated effectiveness of NCR in reduction of problem behavior for behaviors of varying topographies and functions, (b) the effectiveness of arbitrary reinforcers in NCR interventions, (c) the successful use of NCR from a peer in the research, and (d) the paucity of research studying the combination of these components.

As a teacher who is consistently striving to provide the best services available to students, I am concerned with the increasing lack of resources available in the classroom and believe exploring different implementations of research-based strategies may lead to better services requiring less time. To that end, the purpose of this research is to determine the effectiveness of peer attention used as an arbitrary reinforcer in reducing problem behavior in students with ASD. The primary research question to be addressed is: Given 3-6th grade students with autism in a general education classroom whose problem behavior is maintained by teacher attention, will noncontingent peer attention reduce levels of problem behavior? A secondary research question was: If teacher attention-maintained problem behavior can be reduced using NCR peer attention, can the NCR schedule be thinned to a level that is manageable within the classroom? Finally, to what degree will peers be willing to assist in this type of intervention and will it affect the peers' perception of their ability to complete their own work?

GENERAL METHODS

Participants and Settings

Two participants were selected for participation in the Functional Analysis and Peer NCR Evaluation in this study. Participants were initially identified based on a referral from special education staff in their public schools. Researchers confirmed that the students referred were in Grades 3-6, had an educational classification of autism, spent time in a general education classroom as part of their daily schedule, and had problem behavior that was disrupting their learning and/or the learning of other students.

Jake is a 10-year-old Caucasian student who is in fifth grade. He qualifies for special education services under the autism classification. Jake has a full-scale intelligence quotient (IQ) of 105 as measured by the Wechsler Intelligence Scale for Children – 4th Edition (WISC IV). On the Behavior Assessment for Children – 2 (BASC II), Jake scored in the clinically significant range in the areas of anxiety and atypicality and at-risk in hyperactivity, depression, internalizing problems, attention problems, behavioral symptoms and social skills. He is served primarily in his general education classroom with support from resource staff as needed and weekly pull-out guidance services.

Charles is a 9 year old Caucasian student who is in third grade. He also qualifies for special education services under the autism classification. As measured by the Wechsler Preschool & Primary Scale of Intelligence – 3rd Edition (WPPSI-III), Charles has a full-scale IQ of 80. On the BASC II, he scored in the clinically significant range in the areas of hyperactivity, aggression, externalizing problems, atypicality and

withdrawal. Charles is placed in a special class designed to meet the needs of students with ASD, but attends a general education class for portions of the day including reading instruction, special activities and recesses.

In addition to participants, this study required the participation of peers in each participant's general education class. Two peers were identified for each target participant in order to split the responsibility, ensure study procedures could be implemented in the event of the absence of one peer, and more easily facilitate training as the peers could practice with one another. The peers were students who were responsible, at or above grade-level, not easily distracted, preferred by the participant, and sat near (or could be moved to sit near) the target participant as identified by the general education classroom teacher.

Jake's FA and study sessions were conducted in his general education classroom during the class' math block, which included group instruction and independent work time. There were 30 total students in the class and one classroom teacher. Charles' FA and study sessions were conducted in his general education classroom during the class' literacy block, which included independent work time and small group instruction. There were 28 total students, one classroom teacher, and two literacy assistants in the classroom during this block.

Preexperimental Assessments

Function Screener

Following verification of the participants' information from their records and prior to their further participation in the study, researchers used the Functional

Assessment Screening Tool (FAST) to select participants whose primary behavioral function appeared to be teacher attention. Researchers conducted the FAST interview with Jake's classroom teacher and his mother and with Charles' special education teacher and classroom teacher. For both participants, the results of the FAST indicated that the hypothesized function of their problem behavior was attention.

Dependent Variables and Response Measurement

The dependent variable for both participants was disruptive behavior. Based on interviews with teachers and classroom observation prior to any FA or treatment sessions, disruptive behavior was further defined for each participant. Jake's disruption was defined as making loud noises for more than 2 seconds (tapping his pencil, clicking his pen, stomping his feet), talking out without permission during group instruction, singing in a voice above a whisper, and/or being out of his assigned seat/area. For Charles, disruption included talking out without permission during group instruction, speaking above the volume of the class during work time, making silly hand gestures (putting fingers up nose, pulling eyes wide open, pulling mouth open with fingers) and/or laughing louder than normal speaking volume. Researchers recorded the frequency of disruptive behavior for each participant using 10 s partial interval recording on a paper data sheet. Interval length was measured using the RoundTimer app for Android devices or a MotivAider (a small, vibrating timer).

METHOD – FUNCTIONAL ANALYSIS

Interobserver Agreement (IOA)

In order to measure reliability, a second observer independently recorded data during FA sessions. IOA was calculated by dividing the number of intervals in which there was agreement between observers by the total number of intervals for that session and multiplying by 100. Two observers were present in 14.29% of Jake's FA sessions. IOA for disruptive behavior was 95.83% (ranging between 95% and 96.67%). Two observers were present in 20% of Charles' FA sessions. IOA for disruptive behavior was 95.11% (ranging between 92% and 98.33%).

Procedures-Functional Analysis

Researchers used the standard experimental FA conditions as described by Iwata, Dorsey, Slifer, Bauman, and Richman (1994) for each participant with two alterations. Because there was no suspicion that the problem behavior of either participant was automatically reinforced, the alone condition was omitted. Additionally, researchers were interested in how peer attention might affect the participants' problem behavior so a peer attention condition was added. The conditions used were *play/control*, *escape*, *teacher attention* and *peer attention*. These conditions were evaluated using a multielement research design. For each condition, percentage of 10 s intervals in which behavior occurred was measured using partial interval recording. FA session conditions were alternated randomly and conducted during 2 to 4 ten-minute sessions per day until a clear pattern of behavior could be established through visual inspection of the data. For

both participants, FA sessions began once informed consent was obtained but it took a couple of days after that to identify and obtain informed consent for peer participants. For this reason, the peer attention conditions were run later in the FA process.

Play

In the play condition, the participant had access to leisure materials and attention from the researcher or classroom teacher at least every 30 s. No restriction was placed on the attention of other students, so peer interaction was also available. No demands were placed on the participant in this condition.

Escape

In the escape condition, the teacher presented low-probability instructional tasks (tasks which the participant does not often complete spontaneously). Upon initiation of the participant's target problem behavior, the academic demand was withdrawn, the teacher saying "It's ok, you don't have to do this right now" and turning away for 30 s. At the end of the 30 s, the teacher would re-present the same academic task.

Teacher Attention

In the teacher attention condition, the teacher engaged in other activities and withheld attention from the participant until the initiation of problem behavior. The teacher would inform the student, "I have some things to do, I can't help you now. Get to work," or a similar phrase. When the participant initiated the problem behavior, his teacher provided attention in the form of statements of disapproval (e.g., "Stop that!"; "I've told you a hundred times not to do that!"; etc.) or assistance. The attention did not

have to be corrective in nature, the teacher simply had to attend to the participant's problem behavior with attention in some form.

Peer Attention

The peer condition was similar to the teacher condition except that one of the identified peers provided attention contingent on problem behavior. The peers were instructed to give attention to the target participant following problem behavior by laughing, commenting, reminding them to get back to work, saying "shh, I'm trying to work," or with other statements they might typically use when the participant was being disruptive.

Results-Functional Analysis

The results of each participant's functional analysis are presented in Figure 1. For both participants, clear patterns of responding developed during the alternating FA conditions. For Jake, the highest rate of problem behavior was seen during the Teacher Attention condition with a mean of 34.95% of intervals with problem behavior (ranging between 31.7% and 46.67%). The next highest rate of behavior was seen during the Peer Attention condition, with a mean of 18.34% of intervals with problem behavior (ranging between 16.67% and 20%). The lowest rates of responding were seen in the Escape and Control conditions with mean rates of problem behavior in 9.43% (ranging between 6.67% and 13.33%) and .56% (ranging from 0% to 1.67%) of intervals respectively.

Charles' highest rate of problem behavior was also seen during the Teacher attention condition with a mean of 33.2% of intervals with problem behavior (ranging between 20% and 46%). His second highest rate of behavior was also during Peer

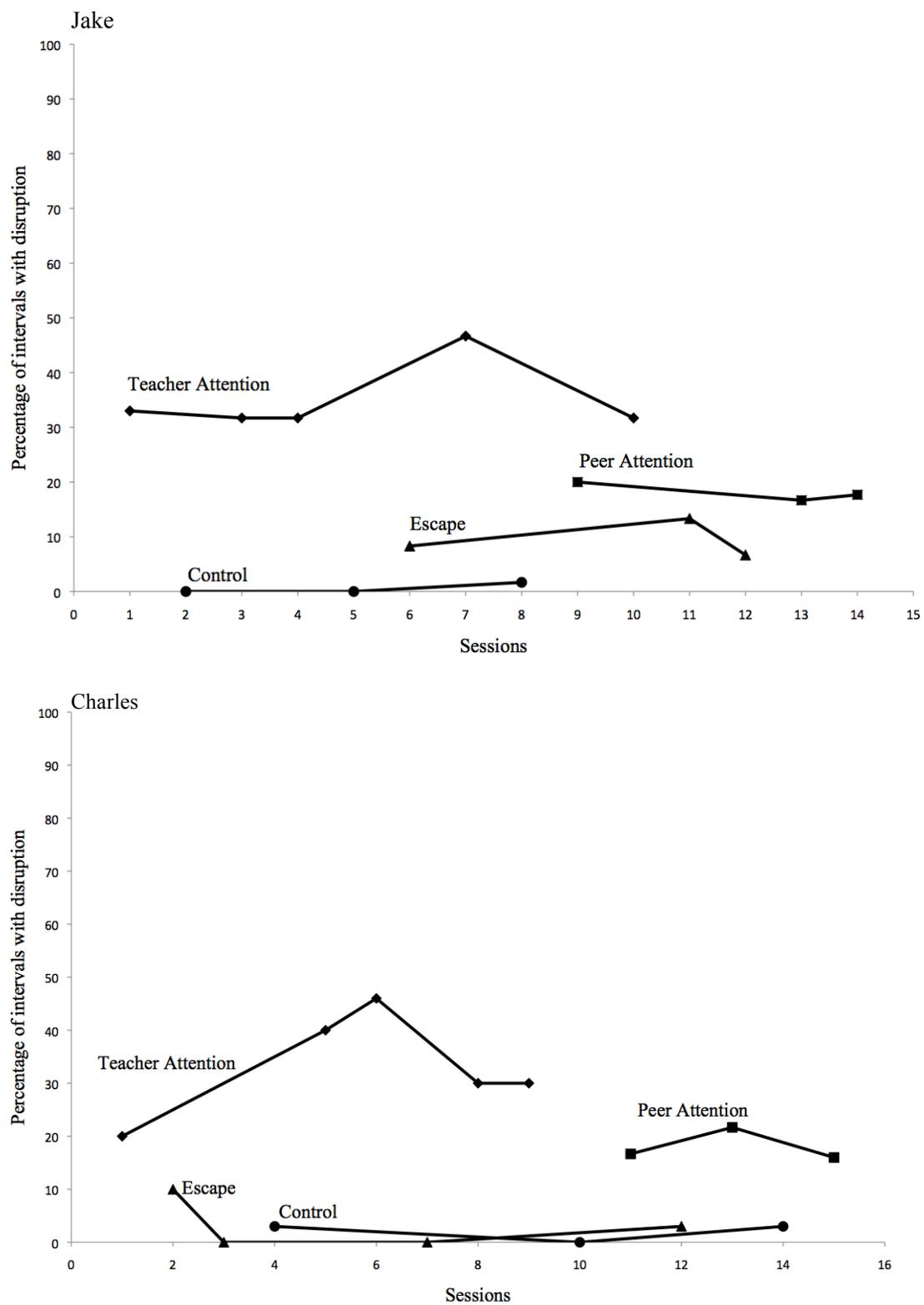


Figure 1. Results from Jake's and Charles' functional analyses.

Attention with a mean of 18.11% of intervals with problem behavior (ranging between 16% and 21.67%). Low rates of behavior were seen in the Escape and Control conditions with mean rates of problem behavior in 3.23% (ranging between 0% and 10%) and 2% (ranging between 0 and 3%) of intervals, respectively. Based on these data, it is likely that both participants' behavior was maintained by teacher attention. The data also indicated that their problem behavior was sensitive to peer attention, although to a lesser degree.

METHOD - PEER NCR EVALUATION

Dependent Variables and Response Measurement

The primary dependent variable for both participants during this phase was disruptive behavior, defined and measured as previously described.

As a secondary dependent measure during this phase, researchers also recorded levels of on-task behavior for each participant using a 10-s momentary time sampling procedure. Researchers measured on-task behavior as they were interested to see if on-task behavior would increase as disruptive behavior decreased. On-task behavior for both participants was defined as being with the class during group instruction (on the right page, answers written when they should be, choral responses given, no manipulation of unrelated materials), writing on given assignments or reading given material, and/or asking questions related to the material. If the participant was displaying these behaviors at the end of each 10 s interval, researchers marked that interval as “on-task.”

Interobserver Agreement (IOA)

In order to measure reliability, a second observer independently recorded data during at least 33% of study sessions. IOA was calculated by dividing the number of intervals in which there was agreement between observers by the total number of intervals for that session and multiplying by 100. Two observers recorded data during 41.67% of sessions for Jake. IOA was 96.11% for disruptive behavior (ranging between 83.33% and 100%) and 94.85% for on-task behavior (ranging between 83.33% and 100%). Two observers recorded data during 37.93% of sessions for Charlie. IOA was

98.09% for disruptive behavior (ranging between 93.33% and 100%) and 96.19% for on-task behavior (ranging between 90% and 100%).

Treatment Integrity

In order to evaluate the integrity with which the Peer NCR intervention was implemented, researchers recorded the delivery of attention in 74% of treatment sessions for Jake and 75% of treatment sessions for Charles. Integrity was evaluated by calculating the number of times attention was delivered to the target participant within 10 s of the scheduled time and dividing it by the number of times attention should have been delivered according to the current FT schedule and converting this number to a percentage. Treatment integrity for Jake averaged 96.47% (ranging between 80% and 100%). For Charles, treatment integrity averaged 95% (ranging between 62.5% and 100%). The lowest integrity sessions occurred early in the study and were due to uncertainty of the peers on how to provide attention in circumstances that were not practiced during training. Higher levels of integrity were reached following some problem-solving with the peers and classroom staff including making temporary seating and group changes and informing additional classroom staff of study procedures.

Procedures

A simple ABAB reversal design (Cooper, Heron, & Heward, 2007) was used to evaluate the effectiveness of the peer attention NCR intervention. Researchers alternated baseline and peer attention phases in an ABAB format with fading during the final treatment phase. 3-5 ten min baseline or treatment sessions were conducted 3-5 days per

week for each participant with the exception of a one-week break for Jake when he went on vacation. Researchers were prepared to implement a teacher NCR intervention in the event that either participant did not respond to peer NCR but it was not needed for either participant.

Peer Training

Prior to participation in any treatment sessions, each peer was trained to appropriately respond to a MotivAider device by giving attention to the target peer. Once the peers were identified and researchers obtained informed consent, the peers were pulled out of the classroom for an initial 10-min training session. The researcher explained to them, in age-appropriate terms, what the purpose of the study was and how their participation could help their peer to be more successful. The researcher modeled examples and non-examples of appropriate attention and then had the peers demonstrate appropriate ways to provide attention and we discussed them. The researcher then modeled wearing the MotivAider and providing attention each time it buzzed. In order to provide more opportunities for practice, the interval set on the MotivAider during the training time was 20 s. Each peer then took a 3-min turn wearing the MotivAider and providing attention to the other peer as the researcher gave feedback. Following this out of class training, the peers practiced with one another in the natural classroom environment. Each peer took a turn wearing the MotivAider set to the initial reinforcement interval for the participant in his or her class and practiced responding to the buzzing by providing appropriate attention to the other peer for 10 min. We gave no feedback during this time, but debriefed with the peers outside of the classroom following

that experience. All peers responded with appropriate attention within 10 s for at least 95% of expected opportunities during the in-class practice.

Baseline

Researchers used the data from the teacher attention condition during the FA as an analog baseline. Baseline sessions for Jake were conducted during his math instruction block, which included large group instruction and independent practice. Baseline sessions for Charles were conducted during his literacy instruction block and included small group instruction and independent practice. Participants only had attention from their teachers following disruptive behavior. From these baseline data, the interval for NCR treatments was determined by taking an average of the time elapsed between problem behaviors, or inter-response time, and choosing an interval duration slightly shorter than that average. Jake had an average IRT of 60.81 s during this phase and researchers chose an initial FT schedule for him of 45 s. Charles' average IRT during this phase was 37.81 s and researchers chose an initial FT schedule for him of 30 s.

Peer NCR

During this condition, one trained peer provided the participant attention noncontingently on a FT schedule based on responses during baseline as previously described. The expectation for the classroom teacher during treatment sessions was identical to those during the teacher attention FA condition. Teacher attention was available to the student, but only contingent on disruptive behavior, therefore the motivating operation for teacher attention and a reinforcement contingency for teacher

attention were still in place during treatment sessions. No limitation was placed on attention given from other students in the classroom. To initiate a session, the researcher or data collector would check the interval set on the MotivAider, turn it on, and present it to one of the trained peers. This was a cue to the peer that they were to begin providing the target participant with attention each time it buzzed. Peers were expected to provide appropriate attention within 10 s of the MotivAider buzz for 95% of expected opportunities during each session. At the end of the 10 m session, researchers collected the MotivAider from the peer to signal that they could discontinue providing attention. Peers were alternated every one to two sessions as possible. At times, one peer or the other would be absent or gone from the classroom for some reason and alternation was not possible.

Reversal

Following the peer NCR condition, researchers reinstated the same conditions which existed in the initial baseline phase for three to five sessions, or until rates of behavior stabilized to acceptable pre-treatment levels. No restrictions were placed on peers during this time and we do not know to what level they did or did not give attention to the target participant. Anecdotally, it does not seem likely that peer attention was a big factor during this phase as the peers were under the control of the MotivAider during treatment, and the device was not present during the reversal phase.

Peer NCR + schedule thinning

After the reversal, researchers reinstated the Peer NCR intervention. Jake's interval for attention returned to 45 s and Charles' to 30 s. If decreasing or consistently

low levels of disruptive behavior were seen for three consecutive sessions, the FT reinforcement schedule was increased incrementally. One exception can be seen for Charles in session 25 where the interval was increased after just two sessions at the previous schedule. This was done as Charles had demonstrated consistently low levels of disruptive behavior and there were limited school days left to reach the target schedule (120 s). If increasing behavior was seen following an increase in the FT schedule for three sessions, researchers returned to the previous FT schedule until decreasing or consistently low levels of problem behavior were seen and then increased the schedule by a smaller percentage. The terminal target schedule for this study was 120 s, as it seemed reasonable for peers to give attention on an ongoing basis once every couple of minutes.

Results-Peer NCR Evaluation

The results of the peer NCR intervention and its effect on disruptive behavior are shown in Figure 2. Both Jake and Charles had relatively stable levels of disruptive behavior during baseline conditions and an immediate drop in disruptive behavior upon initiation of the Peer NCR intervention.

Jake showed disruptive behavior in a mean of 34.95% of intervals (ranging between 31.7% and 46.7%) during baseline conditions. In the first peer NCR phase, his disruptive behavior decreased to a mean of 6.65% of intervals (ranging between 1.67% and 11.6%). Jake demonstrated an overall low level of disruptive behavior during this phase with a therapeutically significant decrease from baseline levels. During the reversal, Jake's behavior increased dramatically, reaching levels higher than those seen

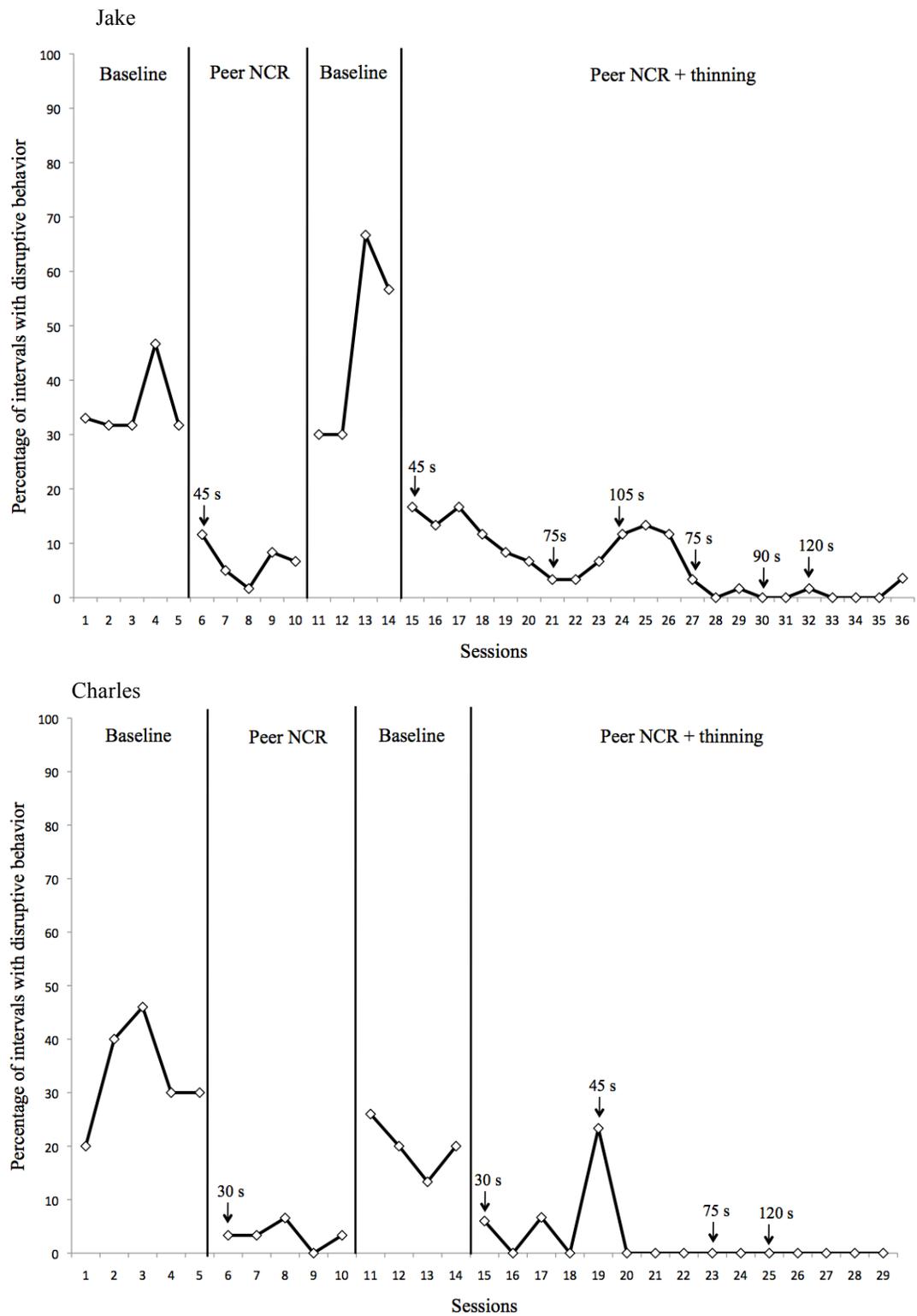


Figure 2. Percentage of intervals with disruptive behavior during baseline and treatment sessions.

during the initial baseline phase with a mean of 45.83% of intervals with disruptive behavior (ranging between 30% and 66.67%). Upon reinstatement of the Peer NCR intervention, Jake's level of disruptive behavior again dropped and then continued to decrease over the next seven sessions. For the remainder of treatment sessions, Jake had disruptive behavior in fewer than 10% of intervals with the exception of sessions 24-26, following a FT schedule increase from 75 to 105 s. When the schedule was decreased back to 75 s and then increased more slowly, Jake had disruptive behavior in a mean of 1% of intervals (ranging between 0% and 3.57), even as the schedule thinned to 120 s. During the entire NCR + thinning phase, Jake showed disruptive behavior in a mean of 6.07% of intervals (ranging between 0% and 16.67%). The data for this phase show an overall decreasing trend in disruptive behavior to near-zero levels.

During baseline, Charles had disruptive behavior during a mean of 33.2% of intervals (ranging between 20% and 46%). Upon initiation of the Peer NCR intervention, Charles had an immediate decrease in his level of disruption and a consistently low level of behavior for the remainder of this phase with disruptive behavior in a mean of 3.31% of intervals (ranging between 0% and 6.57%). With the return of baseline conditions, Jake's behavior increased to a mean of 19.83 (ranging between 13.33% and 26%) although they did not increase quite to the level seen during the initial baseline phase. In the final phase, NCR + thinning, Jake had consistently low levels of disruptive behavior, with the exception of a spike in disruption in 23% of intervals during session 19. Following this spike, behavior remained at 0 for the remainder of treatment sessions. During this entire phase, Jake had disruptive behavior in a mean of only 2.4% of intervals

(ranging between 0% and 23%). Even as the FT schedule decreased in higher percentages, Jake's behavior maintained at 0%.

The results for the percentages of intervals in which the participants were on-task are shown in Figure 3. Overall, both participants showed more variation in their on-task responses than their disruptive behavior. Jake and Charles were on-task at the end of 14.53 and 63% of intervals during baseline, respectively (ranging between 0% and 46% for Jake and 10% to 100% for Charles). Jake's responding continued to be highly variable during the initial Peer NCR condition with a mean percentage of intervals on-task of 68.32% (ranging between 48.3% and 78.33%) while Charles held steady, being on-task in 100% of intervals for all sessions during this phase. On reversal, Jake's on-task behavior dropped to a mean of 40% of intervals (ranging from 13.33% to 73.33) while remaining quite variable. Charles also had variable responding during reversal, with mean on-task intervals at 77.5% (ranging from 26.67% to 100%). During peer NCR + thinning, Jake was on-task during a mean of 54.73% of intervals (ranging between 26.67% and 100%), which was higher than baseline or reversal, but lower than during the first peer NCR phase. Charles was on-task a mean of 76.45% intervals during this phase (ranging between 20% and 100%), which, although higher than the initial baseline levels, was slightly lower than during the reversal phase. Overall, there was a small increase in on-task behavior for Jake but no significant increase for Charles, although neither participant displayed a clear pattern of responding.

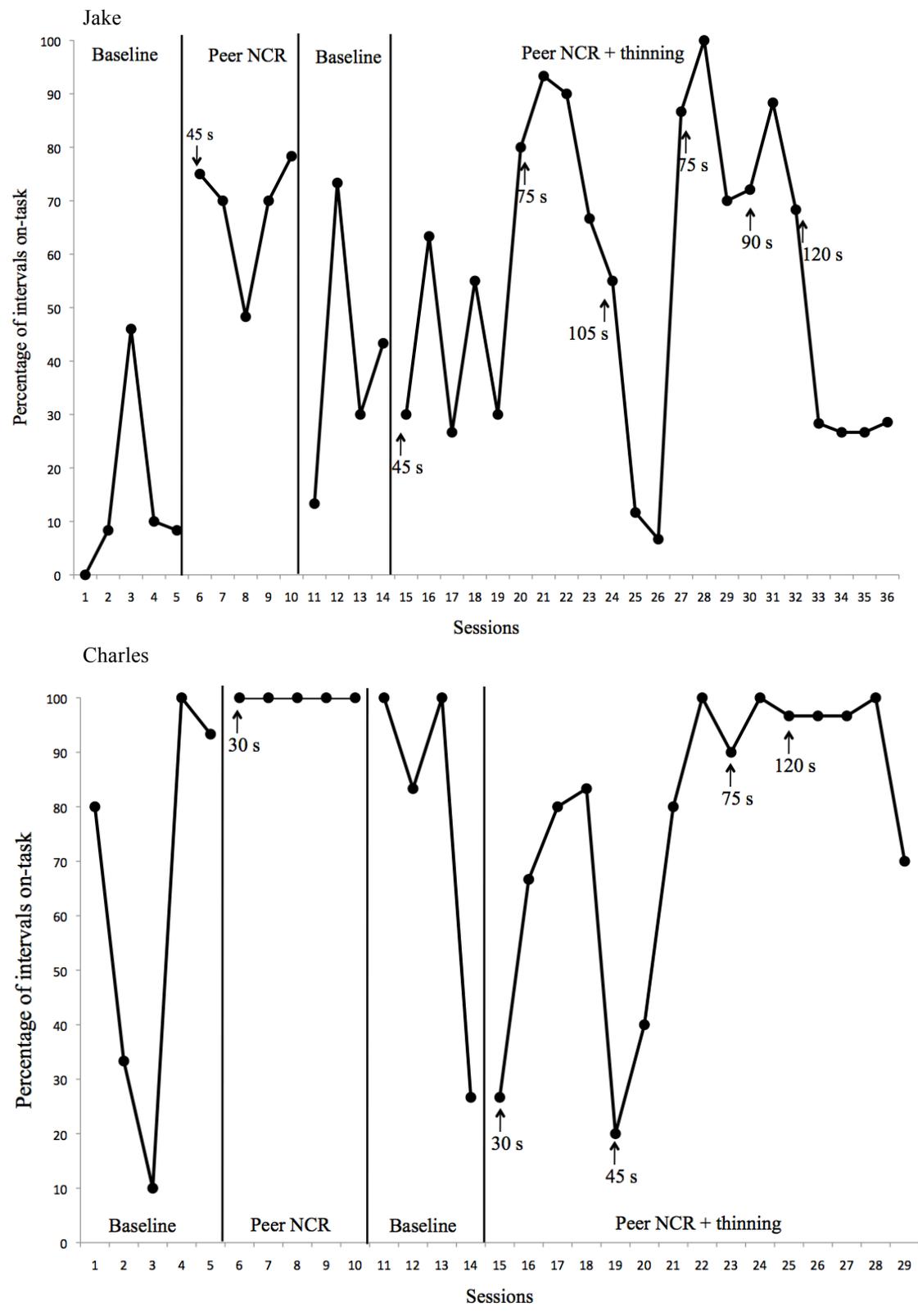


Figure 3. Percentage of intervals with on-task behavior during baseline and treatment sessions.

METHOD – PEER SURVEY

Participants and Settings

The participants for the Peer Survey were 3 of the 4 peers who participated in the other phases of this study. Two third graders, one male, one female, and one fifth grader, female, completed this survey anonymously within their classrooms.

Procedures

Following the last treatment session for the target participant in each peer's classroom, the researcher pulled the peers aside within the classroom and presented them with the 6 question survey. A copy of the survey can be found in the Appendix. The researcher read each question aloud and went over each Likert scale prior to asking the students to return to their desks and complete the survey. The peers were instructed to fold their papers in half and bring them back to the researcher when they were completed.

Results

The results of the peer survey are shown in Table 1. In response to questions one and two, "How hard was it to learn to follow the program?" and "How hard was it to do your own work while wearing the buzzer?" all respondents answered 1 (on a scale from 1-5 where 1 is "easy" and 5 is "hard"). In response to question three, "How much did you enjoy doing the program?" the mean peer response (on a scale from 1-5 where 1 is "not much" and 5 is "a lot") was 4.33 (ranging between 4 and 5). For question four, "How much do you think it helped the student?" the mean peer response (on a scale from

Table 1
Responses to Peer Survey

Question	Peer 1	Peer 2	Peer 3	Mean
How hard was it to learn to follow the program? 1(easy)-5(hard)	1	1	1	1
How hard was it to do your own work while wearing the buzzer? 1(easy)-5(hard)	1	1	1	1
How much did you enjoy doing the program? 1(not much)-5(a lot)	5	4	4	4.33
How much do you think it helped the student? 1(not much)-5(a lot)	5	4	4	4.33
Would you do it again in the future? 1(definitely not)-5(definitely)	(no answer)	4	3	3.5
What would you change to make it better or easier?	“don’t do the buzzer”	(no answer)	“Nothing, it was great!”	

1-5 where 1 is “not much” and 5 is “a lot”) was also 4.33 (ranging between 4 and 5).

When asked question five, “Would you do it again in the future?” the mean peer response (on a scale from 1-5 where 1 is “definitely not” and 5 was “definitely”) was 3.5 (ranging between 3 and 4) with one participant leaving that question blank. In order to determine what changes may be helpful to make if this intervention were implemented again in the future, they included the question “What would you change to make it better or easier?” One participant left the question blank, and the other responses were “don’t do the buzzer,” and “Nothing, it was great!”

DISCUSSION

The data from this preliminary study suggest that not only can peers be trained to appropriately provide reinforcement on a FT schedule, but that this type of NCR intervention can be effective at reducing disruptive problem behavior. Although the initial schedule of reinforcement was relatively intense, lower rates of problem behavior were maintained as we thinned the schedule, indicating that it could be feasible to implement on an ongoing basis. Although it is difficult to determine for certain from this data, there is some indication that on-task behavior may also increase as disruptive behavior decreases, although more research would need to be done to further evaluate this. Variability in on-task behavior during this study could be a function of different activities taking place during different sessions, some of which may have been more preferable to the participants than others. On-task is a very gross measure and task completion and/or accuracy data may have provided a more precise measure of participant performance.

It is worth noting that although the primary responsibility for reinforcement during this intervention fell to the peers, the classroom teacher still had the opportunity to intervene and correct problem behaviors. It is interesting that the intervention was successful in reducing disruptive behavior even in the presence of teacher attention contingent upon these behaviors. These results provide a good argument for the substitutability of peer attention for teacher attention. Additionally, it may be easier for teachers to participate in an intervention that does not require planned ignoring or extinction. Teachers sometimes have difficulty ignoring problem behavior consistently

for various logistical or philosophical reasons, and teacher buy-in could be improved if they still have a mechanism for correction within the parameters of the intervention.

While the researchers intended this intervention to decrease the pressure placed on teachers by placing some reinforcement responsibility on classroom peers, there were some factors that add a challenge to the practicality of running a peer NCR intervention on an ongoing basis. Logistically speaking, if there are only two identified peers, it can be difficult to structure and schedule the classroom so that one of the peers is always near enough the target participant to appropriately provide attention. When students are split into different ability groups for instruction, this becomes increasingly more difficult. It can also be difficult to ensure that there is a trained peer available in the classroom at all at any given time. Although two peers were selected so there would be redundancy, it is entirely feasible that in the course of a day, one peer could be absent and the other in the restroom or called to the office, etc. Another practical challenge is how the peers are impacted in their own work and social experiences while they are giving the FT attention. Although the peers reported that it was not particularly difficult to focus on their own work while participating in the intervention, researchers noticed that there were social drawbacks for the peers during times when they would otherwise have been able to choose to work with whomever they liked. It seemed disappointing at times for the peer to have to work with/near the target student rather than other friends, particularly when there was only one peer available and there could be no alternation. Although only two peers were selected for each target participant, researchers received many comments from other students in the classes, asking if they could help or have a turn. Many of these challenges could possibly be addressed by training more than two peers so the

responsibility placed on each peer would be lessened. For research purposes, having many peers could have introduced many additional variables which might be difficult to control, but for practical application in the classroom, it may be a strategy that would make the intervention much more feasible.

During this study, the intervention procedures were evaluated only within 10 min sessions, and there could be challenges in “scaling up” the intervention for use across the entire school day. Implementing the intervention for longer periods of time would certainly have implications to peer performance or willingness to participate in the intervention, especially if additional peers were not identified. It may be easier to use this as a more targeted intervention for students who spend only a portion of their day in a general education classroom setting or to select specific parts of the day during which a student has higher rates of problem behavior. Future researchers could explore how best to expand this intervention for use during longer periods of the day.

Logistical issues aside, this study does demonstrate that elementary age peers can successfully deliver attention in an NCR intervention. The intervention appeared to be effective in decreasing disruptive behavior, even though the peers had no sophisticated training in behavioral principles or theories. With approximately 30 minutes of training and minimal additional coaching, the peers were able to respond to a timer and deliver appropriate attention in a timely manner. Most of the confusion peers experienced came when unexpected circumstances came up, such as if a teacher pulled the peer or the target student to work individually or if an unexpected visitor came into the classroom. Although the training was the same, and the treatment integrity very close (96.47% and 95%), there were some quantitative differences in the attention provided by the 5th grade

peers and the third grade peers. The fifth graders had a greater ability to improvise and adjust to changes in the classroom environment and to tailor their comments to fit the current situations whereas the third grade used more of the specific phrases we practiced in training and needed more assistance deciding what to do if unexpected events came up. That being said, there were decreases in behavior for both participants so it is likely that the quantity or schedule of reinforcement is a more important factor than the natural quality of the reinforcement delivered.

There are several limitations to the current study. One significant limitation was a limited number of sessions due to the end of the school year. Although both participants did reach the terminal schedule of 120 s, there was not very much time spent in maintenance or to determine if the schedule could have been even further thinned. Another limitation is the small number of sessions in which IOA was calculated during the FA. The study is also limited in that the Peer NCR intervention was run only during brief experimental sessions and it is difficult to tell how participants might respond if the intervention were run for more extended times. An additional limitation is the lack of comparative disruption data on other students in the classrooms so we cannot compare the disruption level of the target participants to peers in their classes. Perhaps the greatest limitation to this study is the small number of participants. More research is needed to further evaluate the effectiveness of this intervention.

Although this is just a preliminary study, it does indicate that Peer NCR interventions could be an effective tool in reducing disruptive behavior for students with ASD being served in regular education settings. So often, students with ASD struggle to be included in general education classrooms because of the nature of their problem

behaviors, the amount of teacher attention they need, and the level of disruption they cause. If an intervention, such as the Peer NCR intervention studied here, could help students experience better outcomes in these settings, it is definitely worth further exploration.

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APPENDIX

Peer Survey

