Evaluation and Treatment of Swimming Pool Avoidance Exhibited by an Adolescent Girl With Autism

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We evaluated and treated swimming pool avoidance that was exhibited by a 14-year-old girl diagnosed with autism. In part, treatment involved blocking for flopping (dropping to the ground) and elopement (running away from the pool) and access to food for movements toward a swimming pool. Treatment also involved reinforcement for exposure to various depths of water. Generalization of treatment outcome was demonstrated by showing sustained effects with her mother without food reinforcement and, subsequently, by replicating these effects with her mother in an untrained setting.

THE LITERATURE is replete with studies demonstrating successful treatment of phobic or avoidant behavior exhibited by typically functioning adults. By contrast, relatively few studies have evaluated interventions for individuals with developmental disabilities (DD) who display comparable behavior. In addition, few studies on phobic behavior have emphasized direct measurement of the target behavior and systematic replication of behavior change. Most studies have used either indirect or ordinal measures of avoidance behavior (e.g., steps completed in a hierarchy; Freeman, 1976; Mansdorf, 1976), attempted to demonstrate functional control of the intervention on "phobic" behavior with potentially insufficient designs (e.g., A-B; Houlihan et al., 1995; Luiselli, 1977), or supported the effectiveness of the interventions with little or no emphasis on the behavior of individuals (e.g., Peck, 1977). Conversely, only a few studies have directly and repeatedly measured overt escape or avoidance behavior in the presence of the aversive stimulus (Burgio, Willis, & Burgio, 1986; Erfanian & Miltenberger, 1990; Waranch, Iwata, Wohl, & Nidiffer, 1981). With respect to water avoidance, at least one study evaluated intervention for a typically functioning child (e.g., Pomerantz, Peterson, Marholin, & Stern, 1977); however, none has evaluated intervention for children with DD.

Research has demonstrated that contact desensitization, which involves systematic exposure to a hierarchy of avoided stimuli and reinforcement (e.g., edibles, praise) for proximity to each stimulus within the hierarchy, has decreased avoidance of dogs (Erfanian & Miltenberger, 1990), escalators (Runyan, Stevens, & Reeves, 1985), and mannequins (Waranch et al., 1981) displayed by individuals with DD. Burgio et al. (1986) treated the stair avoidance of an individual with DD using modeling, guidance, and contingent praise and edibles for traversing ascending and descending stairs. Burgio et al. emphasized the use of operant procedures and did not use an explicit hierarchy. Because the verbal abilities of individuals with DD are often limited, researchers have used variables such as distance to the avoided stimulus (e.g., Erfanian & Miltenberger, 1990) or number of steps completed within a hierarchy (Runyan et al., 1985) to measure "fear" or avoidance. Consistent with this position, effective intervention involves increasing the individual's proximity to or interaction with the previously avoided stimulus.

The purpose of the present study was to evaluate the effects of an intervention involving physical guidance and reinforcement, without a hierarchy, for pool avoidance exhibited by an individual with autism and severe mental retardation. The present study was unique in three ways. First, unlike prior studies (Erfanian & Miltenberger, 1990; Runyan et al., 1985; Waranch et al., 1981), proximity to water (the avoided stimulus) was arbitrarily decreased as a function of time rather than the behavior of the individual (i.e., "emotional" behavior or attempts to run away without permission did not decrease exposure to the avoided stimulus). Second, in addi-

Portions of the present study and manuscript preparation were funded by NICHD Grant #HD38698 to the second author. John Rapp is now at the Texana Behavior Treatment and Training Center, Richmond, TX. Alyson Hovanetz is now at the Marcus Behavior Center, Atlanta, GA. We would like to thank Andrew Samaha and April Cope for their help with conducting sessions and collecting data.

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BEHAVIOR THERAPY 36, 101–105, 2005
005-7894/05/0101–0105$1.00/0

tion to pool avoidance, the current participant also displayed self-injurious behavior in the presence of water. Last, the extent to which contingent edibles affected the individual's exposure to various parameters (i.e., water depth) of the avoided stimulus was evaluated.

The intervention was first evaluated during pool approach. Subsequently, once the participant entered the pool, the amount of time spent at various depths of water was measured. Finally, the sustained effects of the treatment were assessed at a local swimming park with the participant's mother.

Method

PARTICIPANT AND SETTING

Amy was a 14-year-old girl who weighed approximately 160 lb, was 5′ 6″ tall, and was diagnosed with autism and severe mental retardation. She was able to request a few items via picture exchange communication and mechanical switches. According to her mother, Amy became fatigued while swimming 2 years earlier with an instructor, swallowed a considerable amount of water, and became visibly distressed. Prior to that event, swimming had been a highly preferred activity for Amy. Since that time, Amy exhibited several forms of problematic behavior (described below) when asked to approach pools or other swimming areas when she was in school or on family outings. Amy did not exhibit problem behavior during bathing.

All treatment sessions were conducted at the same public pool once per week for 8 weeks. The duration of each session varied as a function of the time required for Amy to enter and remain in the pool. Subsequent to treatment, a generalization session was conducted at a spring. Three follow-up sessions were conducted (at the same pool) 10 months after the generalization assessment.

DEPENDENT VARIABLES AND DATA COLLECTION

The topographies of problem behavior exhibited by Amy during water approach included elopement, flopping, face hitting, choking, and screaming. *Elopement* was defined as two or more steps in a direction opposite or parallel to the pool. *Flopping* was defined as any contact of Amy's buttocks with the ground. *Face hitting* was defined as forceful contact of either hand to the face. *Choking* was defined as placement of either of Amy's hands around her neck. *Screaming* was defined as the emission of any vocal sound while Amy's mouth was visibly open. Videotaped sessions were scored in real-time using a computer or VCR recording method (for pool depth only; Miltenberger, Rapp, & Long, 1999). Each behavior was scored as a discrete event, except screaming, which was scored using a variation of the 10-s whole-interval recording method (i.e., if screaming occurred for an entire 10-s interval, it was counted as one instance). All instances of behavior were collapsed and presented as occurrences of problem behavior (PB) during 3-min segments of the respective session. Once Amy entered the pool, data were collected on the depth at which she spent the most time during each minute. Interobserver agreement (IOA) for PB was assessed with a second observer who scored 24% of the total minutes across the sessions. With the exception of screaming, IOA for each form of PB was calculated using the average agreement within 10-s method. IOA for screaming was calculated using the agreement within 10-s interval method. The IOA score for PB (combined) was 98.9% (range, 95.7% to 100%). A second observer also scored 38% of the total minutes across sessions for water depth. IOA for depth was calculated by breaking down each session into successive 10-s segments whereby an agreement was counted when both observers scored the same depth for a majority of the segment. The number of agreements was divided by the total number of 10-s intervals and multiplied by 100. The IOA score for agreement on water depth (collapsed across depths) was 97.13% (range, 85.2% to 100%).

EXPERIMENTAL DESIGN AND PROCEDURE

An intervention for reducing Amy's PB during pool approach was evaluated using a series of reversals. Each session began under baseline conditions in the parking lot, which was approximately 200 ft from the swimming pool. The pool was surrounded by an 8-ft fence and was not visible from the parking lot. Contingent on the passage of 6 min or any event that might result in injury to Amy (e.g., running into the street), the intervention phase was initiated and continued until Amy entered the pool. Once Amy entered the pool, another reinforcement procedure was implemented. During a given session, it was possible for baseline conditions to be in effect during pool approach and, subsequently, for the intervention to be implemented only after Amy entered the pool (see condition "C" below).

Baseline (A). During this condition, Amy's mother was instructed to escort Amy to the pool using her usual techniques. She was not informed as to when the treatment procedures would be implemented and was not provided feedback concerning the techniques she used (primarily verbal and physical prompts). Each session began approximately 30 min before the pool was opened to the public. This arrangement was made in order to minimize prob-

lems that might result from Amy flopping or eloping in the street or parking lot.

Blocking plus reinforcement for pool approach and occupancy (B). Treatment involved a multicomponent intervention that was implemented by three therapists. The first part of the intervention involved blocking by two therapists, where attempts to elope or flop were blocked or prevented by prompting Amy to sit in a rolling chair. A third therapist stood 5 ft to 10 ft in front of Amy with a food item and verbally prompted her (e.g., "Amy, come over here") to move toward the pool every 15 s to 20 s. If Amy did not comply with a prompt after approximately 15 s, the two therapists pushed the chair until Amy reached the item. Independent and prompted movement toward the pool resulted in one edible item (e.g., small piece of licorice). The sequence was repeated until Amy entered the pool. Due to the fact that the sessions began before the pool was open to the public, Amy always entered a pool that was devoid of other swimmers and objects (e.g., balls), but other children arrived shortly after she entered the pool (sessions continued in their presence).

Blocking plus reinforcement for pool occupancy only (C). During this condition, the circumstances under which Amy approached the pool were identical to baseline (i.e., no intervention was in effect); however, treatment was implemented as soon as Amy entered the pool. The procedures involved delivery of an edible item to Amy on fixed interval (FI) schedules of reinforcement (ranging from FI 1 min to 3 min) contingent upon her standing or swimming within the criterion water depth. A therapist, who walked or stood within the criterion depth, delivered a reinforcer to Amy after the interval elapsed. At the beginning of the second session of this condition (5th overall session), a probe was conducted to evaluate whether Amy would remain in the pool without edible reinforcement.

Results and Discussion

Figure 1 depicts the frequency of Amy's PB during baseline and treatment conditions across the 12 sessions. During Session 1, which was terminated due to a thunderstorm, Amy exhibited high levels of PB during baseline (M = 4 per min) and intervention (B; M = 5.7). In Session 2, high levels of PB were again displayed during baseline (M = 9.66) and during the first half of intervention (B), but were followed by a reduction to near-zero levels in this phase. In Sessions 3, 4, and 5, PB increased during baseline (Ms = 14.73, 8.5, and 8.33, respectively) and rapidly decreased with the introduction of the intervention (B; Ms = 1.6, 0.42, and .33, respectively). The intervention was implemented after just 3 min in Session 3 because Amy flopped in the parking lot and then made repeated attempts to elope toward a busy street. During Session 6, Amy engaged in low levels of PB during baseline (M = 2.88), but entered the pool without intervention. Once Amy was in the pool (C), PB decreased to near-zero levels, but increased sharply when the reinforcement schedule was thinned to FI 1.5 min.

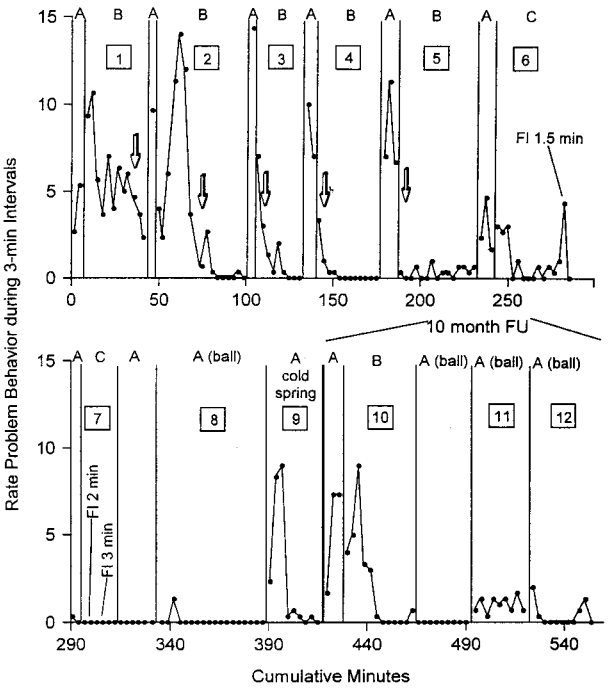

FIGURE 1 Frequency of problem behavior across 3-min intervals during sessions 1 through 6 (top panel) and 7 through 12 (bottom panel). Session numbers are depicted in boxes. Arrows indicate where Amy entered the pool during condition B.

During Session 7 (beginning with the lower panel of Figure 1), Amy exhibited few instances of PB (M = 0.17) and entered the pool without intervention. While she was in the pool (C), PB was absent even as the schedule was twice thinned (in Session 7) and edibles were replaced with noncontingent access to a ball (in Session 8). The ball was added because Amy obtained toys (without permission) from other children on several occasions during the previous session (toys were present during earlier sessions, but she did not attempt to manipulate them; also, continued use of food reinforcers in the pool was viewed as unsanitary and impractical). In Session 8, Amy entered the pool without intervention and without engaging in PB. She remained in the pool with the ball and exhibited only 2 instances of PB. Data from the generalization assessment (Session 9) show that even though Amy exhibited some PB as she approached

the spring, she entered the water without intervention and, thereafter, exhibited low levels of PB (M = 2.25).

During Session 10, which was conducted 10 months after Session 9, Amy exhibited high levels of PB during baseline (M = 5.44); however, PB rapidly decreased following the introduction of intervention (B) and remained at or near zero (M = 2.11). Following the removal of the intervention (during Session 10), Amy remained in the pool and did not engage in PB. Thus, it appeared that Amy's avoidant behavior had recovered during the 10-month period without exposure and reinforcement. In Sessions 11 and 12, Amy entered the pool without intervention and she displayed low levels of PB (Ms = 1.26 and .39, respectively), which primarily entailed vocalizations that were exhibited by Amy as she smiled and played with the ball. These vocalizations technically met the definition of PB, but were not actually viewed as problematic in this context. Amy's class took a trip to a swimming pool approximately 3 weeks after the last session. It was reported that Amy was one of two students (in a class of 10) who willingly entered and remained in the pool.

Figure 2 shows the depth where Amy spent her time when she was in the pool during Sessions 4, 5, and 6. In general, data from Session 4 show that Amy spent most of her time at the shallowest depth where reinforcement was provided (reinforcement was available at the criterion depth or deeper). At the beginning of Session 5, no reinforcement was provided and Amy left the pool. The intervention was subsequently reinstated and Amy remained in the 1.5 ft to 2 ft areas when reinforcement was available for any depth. She quickly moved into the 3.5 ft and 4 ft areas when the criterion for reinforcement was changed to 3.5 ft and 4 ft, respectively. Following a bathroom break, Amy reentered the pool and pursued a girl across various depths of the pool (seemingly to gain access to the beads in her hair). Following several verbal prompts by the therapist, Amy returned to the criterion depth and remained there after the reinforcement schedule was thinned to FI 1.5 min. In Session 6, Amy immediately walked into the 4 ft area and remained at this depth while the schedule was thinned and edible reinforcement was replaced with a ball.

The present results show that a treatment package involving reinforcement and blocking eliminated pool avoidance and other disruptive behavior. The present results extend the literature on treatment of avoidant behavior in individuals with DD by demonstrating treatment effects using a within-subject design that involved extensive data collection, multiple reversals, assessment of generalization, and long-term follow-up of behavior change. Similarly, the initial results of the in-pool intervention demonstrated that Amy exposed herself to deeper water (i.e., greater parameters of the aversive stimulus) only when food reinforcement was provided for such exposure. Further, the present outcome was obtained in the participant's natural environment and sustained effects did not require specific training of her mother.

The results of this study may contribute to the literature on phobic behavior displayed by individuals with DD in several ways. First, to our knowl-

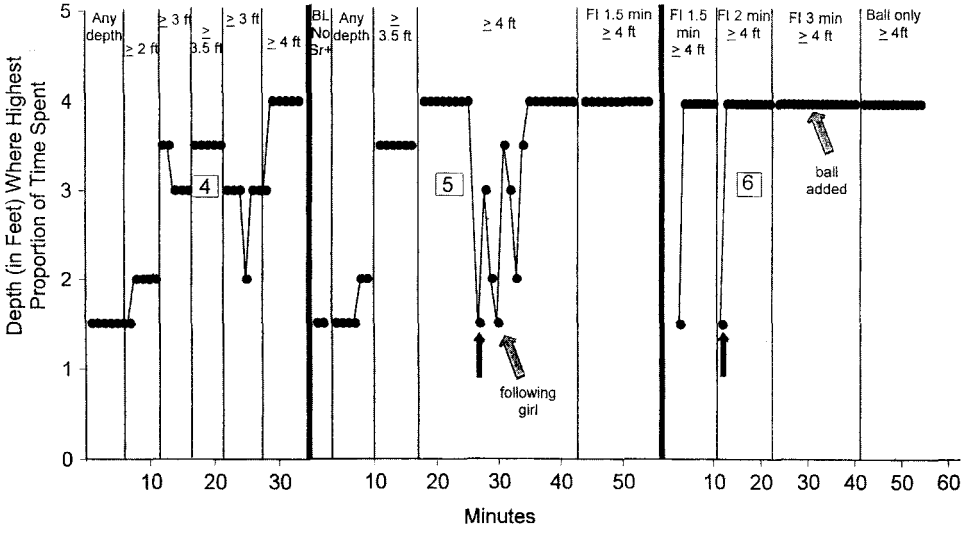

FIGURE 2 Proportion of time spent at water depth during successive minutes across sessions 4, 5, and 6. Session numbers are depicted in boxes. Arrows denote bathroom breaks. The schedule of reinforcement was FI 1 min unless otherwise noted.

edge the present investigation represents the first to demonstrate functional control of an intervention for "phobic" behavior using a reversal design. To the same effect, it is also the first study to utilize a changing criterion design to demonstrate functional control of an individual's exposure to varying parameters of an aversive stimulus (in this case, water depth). Second, this is the first study to use intermittent positive reinforcement schedules (in conjunction with other procedures) to increase an individual's exposure to an aversive stimulus. Third, transfer of treatment effects was demonstrated in nontraining contexts without additional training of the participant's care-providers.

Some limitations to the present results should be noted. First, although the intervention was very effective for Amy, it is not clear whether the same procedures would be useful in treating other children with DD who display similar behavior. At one time, swimming was a reinforcing activity for Amy. Following intervention, swimming, once again, appeared to function as a reinforcer for Amy. For other children, access to pools or other swimming areas may not function as reinforcement. In addition, the intervention involved three therapists (two to block elopement and self-injurious behavior and one to deliver reinforcers). Such resources may not be available in other treatment settings. Our inability to differentially code vocalizations that were displayed by Amy during exposure to aversive stimulation (during conditions A and B) versus vocalizations that were emitted when she played with the ball in the pool (during condition C) should be considered another limitation. Vocalizations in the latter context appeared to be correlated with positive emotional affect.

Finally, the present results are potentially limited to the extent that it is unclear whether blocking or reinforcement alone could have produced a comparable outcome. However, given that Amy did not expose herself to deeper water (at least initially) in the absence of edibles, it is likely that contingent reinforcement, at least in part, contributed to more rapid exposure to greater parameters of the avoided stimulus. Regardless of the mechanism of behavior change, the outcome was desirable as Amy continued to approach, enter, and remain in the pool or other bodies of water without guidance or edible reinforcement.

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RECEIVED: August 1, 2003
ACCEPTED: January 15, 2004