Functional Analysis and Communication Training to Reduce Problem Behavior and Time in Restraint: A Case Study

Author note

Abstract

We combined a functional analysis of precursors and problem behavior with subsequent communication training to reduce time spent in restraint. The patient was a man in his thirties with autism and life-long severe problem behaviors resulting in restraint. The highest frequencies of both problem behavior and precursors were observed in the demand conditions of the functional analysis. However, the precursors were observed across all conditions. Based on these findings we introduced functional communication training to establish an alternative functional response. He was taught to ask for a break when demands where presented, first in an analog setting and later in natural settings throughout his daily life. This resulted in a significant reduction in problem behavior and what followed was a significant reduction in the time spent in restraints. The much-reduced level of restraint was maintained in the patient's natural environment at a 12-month follow-up assessment. Our findings suggest that a functional analysis and functional communication training may be an approach to consider when the ultimate goal is to reduce the time spent in restraint. These findings need to be replicated with a better experimental design.

Keywords: Reducing Restraint, Functional Analysis, Functional Communication Training

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Problem behaviors in adults with developmental disorders may be severe and dangerous, necessitating the use of restraint to prevent injury to self or others. Such practices are often described as crisis management or restrictive behavior management. These practices raise ethical issues that need to be considered. First, restraint can be aversive to the patient and to the staff who implement them (Cunningham, McDonnell, Easton, & Sturmey, 2003). Second, there are reports of overuse, and dangerous implementation resulting in severe injuries or death (Weiss, 1998). Third, restraint is often used without appropriate behavioral treatment (Sturmey, Lott, Laud, & Matson, 2005). Furthermore, contradictive to its purpose, the use of restraint may exacerbate severe problem behavior (Magee & Ellis, 2001). This is likely when procedures are momentarily behavior altering rather than function altering (e.g., function has not yet adequately been identified). Ethical practices are therefore crucial for ensuring client safety and welfare. The current ethical guidelines for behavior analysts specify instances in which restraint is acceptable, such as in crisis management for dangerous behavior, when it is included in a comprehensive behavior support plan, and where alternatives to restraint have been attempted (Behavior Analyst Certification Board, 2016; see also Vollmer et al., 2010). In such instances, social validity for an agreed restraint procedure can be sought by including staff or legal guardians. For instance McDonnell and Sturmey (2000) showed that service staff rated a chair restraint as more acceptable than two types of floor restraints. Also, a study by Luiselli, Sperry, and Draper (2015) found that with frequent supervision, training, and strict adherence to guidelines, staff may view physical restraint procedures as acceptable and safe. The authors noted that the rationale, conditions, and scenarios when restraint was to be used had to be explicit. Moreover, empirically validated

methods of deriving socially valid restraint procedures have involved assessing legal guardian and client preference (e.g. Hanley, Piazza, Fisher, & Maglieri, 2005).

The social significance of restraint reduction also has empirical support. Notably, Sanders (2009) found that a service-wide restraint reduction of 99.4% achieved a 93% reduction in costs related to sick leaves, and a 37% decrease in staff injuries.

Only two behavior analytic studies have attempted to reduce the use of restraints. In one study restraint reduction was achieved for three students by changing release criteria from behavior-based to time-based (Luiselli, Pace, & Dunn, 2006). In the second study, the use of restraints was reduced in two adolescents with antecedent modifications, which targeted increasing functional activities and relocating the students (Luiselli, Kane, Treml, & Young, 2000).

An alternative to these procedures may be to implement a function-based analysis and treatment for problem behavior (Williams, 2010). Functional analysis (FA) is a well-established methodology for assessing the function(s) of problem behavior (Beavers, Iwata, & Lerman, 2013). For example Kahng, Abt, and Schonbachler (2001) successfully assessed and treated a highly intensive problem behavior in a natural setting by using a function based VM-DRO treatment. However, evoking problem behavior in an FA may be problematic due to risk of severe injury to the patient, other people or property. If this is the case, an FA of precursors to problem behavior may be a better alternative (Herscovitch, Roscoe, Libby, Bourret, & Ahearn, 2009). If precursors and problem behavior are functionally related, precursors may serve as cues for staff to change antecedent conditions, or to prompt an alternative response (Najdowski, Wallace, Ellsworth, MacAleese, & Cleveland, 2008). It has been shown that different topographies of an escalation hierarchy of problem behaviors may serve the same function (belong to the same response class). An intervention on the least severe behavior can thus reduce the frequency of the entire response class of problem behavior (Lalli, Mace,

Wohn, & Livezey, 1995). These analyses may be built on further, by replacing the problem behavior with an appropriate functional response. In functional communication training (FCT) the consequences that maintain problem behavior are instead made contingent on appropriate communication responses (Tiger, Hanley, & Bruzek, 2008).

The purpose of the present study was to conduct a functional analysis and subsequent functional communication training to reduce problem behavior. We also wanted to assess whether this could lead to a reduction in the time the patient spent in restraint.

Patient Background

Arne was a Caucasian male in his thirties that presented with a long history of severe problem behavior and restraint. He was diagnosed with autism and moderate developmental disability. Arne lived in his own flat in a specialized residential facility for individuals with severe behavioral disorders. During all waking hours Arne received direct care from two staff members. Verbally, he could perform easy discrimination tasks (listener responding), follow 1-2 step instructions, do advanced intraverbal tasks, advanced tacting and could mand for all preferred activities, edibles and beverages. His gross motor skills were typical for his age, but his fine motor skills were delayed. In daily life Arne followed an activity schedule with an accompanying point system for completing various activities. These points could be exchanged for a preferred beverage, edibles or an activity. No behavior analytic treatment had been tried for his aggressive behavior, but several medications had been attempted, with little success. At the time of this study Arne was taking Orfiril 2100 mg, Risperdal 3.5 mg, Phenergan 75 mg and Lithionith 250 mg. His severe problem behaviors had for many years been managed with physical restraint. No reduction in problem behaviors had been observed over the last years.

Presenting Problem

His records show that Arne had engaged in several severe problem behaviors since before he started school at age seven. Since he was a teenager these problem behaviors usually resulted in the staff employing physical restraints as an emergency procedure to prevent injury to self and others. The frequent and long duration of restraints was a particular concern for staff and administrators of the residential facility, as it caused distress and discomfort for both the patient and staff.

Behavioral Assessment

Problem behavior and potential precursors were identified through interviews with the direct care staff. Following these interviews, a brief assessment was conducted where the precursors and the problem behavior were operationalized and recorded. Precursors were observed to reliably occur prior to problem behavior. Next, the function of precursors and problem behavior was assessed through a functional analysis (Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994). The frequency of problem behaviors and functional responses was measured in 1-min intervals and the frequency of precursors in 10-s intervals. A verbal precursor was counted if it was separated by 3 s or more from a previous verbal precursor (similar to Najdowski et al., 2008). All measurement and scoring were done from video recordings using a tailor-made data sheet.

IOA was assessed in a randomly selected sample of recordings (23% of the FA sessions and 24% of the FCT sessions). The first and the second author scored these samples independently of each other. IOA was assessed separately for problem behavior, precursors and functional communication responses using the following formula: lower frequency/higher frequency X 100. Average agreement in the FA sessions was 98% for problem behavior (range = 89-100%) and 85% for precursors (range = 40-100%). Agreement in treatment sessions was 94% for problem behavior (range = 56-100%) and 86% for functional responses (range = 50-100%). When a low IOA score was obtained for a session, the authors viewed the

videotapes together, reviewed the operational definition and discussed the reasons for the disagreement and finally re-scored the session. This always resulted in agreement. Disagreement usually occurred when problem behavior and precursors co-occurred. For example if Arne spoke loudly and raised his knuckles (precursors) while hitting himself (problem behavior).

Each instance of restraint use was timed with a stop watch. It was started when Arne was put into restraint and stopped when he was fully released. These intervals were added together, to get his total time in restraint every 24 hours. Total time in restraint was chosen per 24 hours as the outcome measure rather than the frequency, since each instance varied considerably in time. No formal IOA assessment was done on this. However, two staff members had to sign off on the daily report that included the total time that Arne had been restrained.

Behavioral Case Formulation

Behavioral Definitions

Problem behavior was defined as behavior that could result in injury to self, others, or property. This included audible blows to the head, self-biting, self-pinching, striking, kicking, pinching, scratching, head butting, strikes with elbows, and spitting. It also included destroying or throwing objects. The precursors to problem behaviors were spitting on the ground, talking in an irritable tone of voice, speaking loudly, tapping to the face or back of hand, raised knuckles, hand raised towards others, or comments that specified harm to others. The alternative functional communication response for Arne, was to ask for a break from the demanding tasks with appropriate language (e.g., saying: “Break” or “I want a break!”).

Restraint

The criterion for implementing a restraint procedure was that Arne engaged in problem behavior that could potentially cause serious harm to self or others. A restraint

consisted of the staff blocking Arnes' arms on each side, wrapping an arm around his shoulder from behind, and keeping his arms in a down-held position. This restraint prevented Arne from engaging in problem behavior such as self-injury and hitting others. A sitting or a lying restraint was used if the problem behavior did not stop or escalated further. The release criteria were the absence of precursors and problem behavior, and a breathing tempo defined as breathing in a calm manner for at least 1 minute.

Evaluation of Behavior Change

The effects of FCT were evaluated in an ABCBAB reversal design. In addition, a modified alternating treatments design was employed to evaluate the effects of response cost during the first B phase. The effects of FCT in daily life were evaluated by comparing the time spent in restraint in the months prior to intervention with the time spent in restraint in the months following the intervention, which also included a 12 months follow-up assessment.

Procedure

Functional Analysis

The FA sessions were conducted in the living room of Arne's flat, while he and the experimenter (first author) were seated at a small dining table. During sessions, one direct care staff member was seated approximately 1.5 m away and provided no attention to Arne. Another member of staff sat approximately 3 m away and filmed all sessions. In all the FA conditions both the precursors and the problem behavior resulted in the programmed consequence. This was done to limit the occurrence of problem behavior. A safety protocol dictated that injuries requiring medical attention (e.g. bleeding, open wound, blows to sensitive areas such as the nose, ears, jaw, front of neck), would result in the termination of the session. To limit the possibility of injury the experimenter sat at a table opposite to Arne. This created sufficient distance so that Arne could not reach or hit the experimenter and sufficient time to ask for help and for Arne to be restrained if necessary. However, this was

never needed. Because of the risk of injury, the number of FA sessions was limited as much as possible.

The functional analysis was based on the standard conditions: alone, demand, attention, and control (Iwata, et al., 1982/1994). In addition, two special conditions were included: divided attention and social demand (see Iwata & Dozier, 2008). All conditions were designed to emulate typically occurring scenarios. Sessions were ran in random order and lasted 10 min.

The demand conditions were added since precursors and problem behavior was often observed when demands were presented. The demand condition consisted of verbally prompting Arne to complete puzzles until he started working on the task or until a precursor or a problem behavior occurred. In all instances this required 1-3 verbal prompts. On the occurrence of either a precursor or problem behavior, the puzzles and the requests were removed for 30 s. Praise was provided contingent on working on the task and completion. One demand condition was 13 minutes in length because Arne threw the material to the floor. It took some time to collect the puzzles, which delayed introducing the demand material.

During the attention condition, the therapist turned completely away from Arne and gave no attention unless a precursor or a problem behavior occurred. Attention was provided for 2-4 s by turning towards and looking straight to Arne while commenting on his behavior (e.g., saying: “Please don’t do that!”).

The tangible condition was included because problem behavior was reported to occur following manding for and being denied access to preferred items. The tangible condition consisted of giving Arne a preferred tangible (e.g., a doll or a photo album) and removing it after 5 s. The item was given back again for approximately 10 s on the occurrence of either precursors or problem behavior.

In the control condition, the experimenter was present with Arne, who had access to all preferred stimuli. The experimenter sat oriented towards Arne during this condition. He provided verbal attention and/or eye-contact only if Arne sought it out, by looking or talking. This was done to avoid introducing social demands in this condition.

The social demand condition was included because staff experience was that problem behavior was likely to occur when staff demanded that Arne interact with others. Social demand was identical to the demand condition except that the experimenter repeatedly attempted to initiate conversation with Arne instead of presenting task demands.

The divided attention condition was included because staff suspected that problem behavior was more likely to occur when Arne was observing an interaction between other people (usually staff). Divided attention differed from the attention condition in that instead of being directed away from Arne the experimenter was turned toward another staff member, and directed his attention and conversation toward him.

Functional Communication Training

The initial FCT sessions took place in the same setting and were of the same duration as the FA. Later FCT took place throughout Arnes' daily life - in other areas of the facility and in various outdoor settings. The FCT addressed the negative reinforcing function of problem behaviors and precursors by prompting an appropriate response to escape demands. Demand stimuli (e.g., puzzles) were presented with a verbal instruction to complete the task (e.g., “Complete the puzzle”). On the occurrence of a precursor or a problem behavior, a verbal prompt was provided for the functional response (e.g., “Say break!”). On the occurrence of a functional response, Arne was given a 30 s break from the task. During the break, he was seated at the table or if he wanted, in a sofa about 3 m away. When the break was over, he was again instructed to complete the task. Problem behavior was placed on extinction. For example, if Arne threw training material to the floor, new material was immediately

reintroduced. If Arne spat towards the experimenter, the material was kept on the table, and a clipboard was used for blocking the spit. During the first treatment phase (B phase), FCT alternated with a condition where response cost was added to the FCT. In the response cost condition problem behavior resulted in the removal of a half-cup (1 dl) of a preferred beverage. In the second FCT phase (C), Arne was given access to a preferred activity during breaks. The remaining FCT sessions (B phases) were done without the alternating response cost condition. Response cost and access to a preferred activity in breaks were tested out for different reasons: Response cost was tested since Arne had a history of less problem behavior in contexts where this had been implemented (e.g., removing a beverage or leaving a cafe if problem behavior occurred). Access to a preferred activity to the breaks was tested, since this represented a more typical break in Arnes' daily life.

FCT in Natural Settings

Due to work schedules, seven different direct care staff were directly involved in the FCT in the natural settings. A six-hour workshop introduced staff members to the functions of the problem behavior that were identified through the FA, FCT training procedures, how to schedule and arrange demanding activities, and how to identify precursors to problem behavior occurring in demand conditions. Arne was reminded before each scheduled activity and demanding task that he could ask for a break whenever he wanted. If precursors to problem behavior were observed, staff verbally prompted Arne to either ask for a break or for that activity to be terminated. The first author provided oversight and monitored the implementation of the procedures across different settings and staff. Staff performance was scored using a checklist. The goal was to maintain 95% correct implementation.

Challenges to Implementation

The main challenges to implementation were training and monitoring the staff involved. Because of the 2:1 staff to patient ratio, a total of seven staff was involved. Ensuring

integrity in implementation across all of them required considerable logistics. Conducting the FA was challenging since Arnes' problem behavior was dangerous to both himself and staff. The FA sessions were kept to a minimum and several safety measures needed to be in place.

Results

Results of the FA showed the highest occurrence of precursors and problem behavior in the demand condition. Problem behavior only occurred in demand sessions, two, four and five with a rate of 0.3, 0.1 and finally 4 responses per minute (rpm); precursors appeared at a rate of 2.3, 1.0 and 2.1, in the same sessions (see figure 1). Figure 2 shows that during phase 1, FCT reduced problem behavior to zero in all sessions. Alternative responses increased from zero in baseline to between 0.2 and 0.9 rpm in treatment, while the alternating response-cost contingency resulted in a rate of problem behavior at between 0.4 and 2.3 rpm. Alternative responses occurred between 0.4 and 0.6 rpm, in both treatments. In the second treatment phase, FCT with an activity break also resulted in an increased rate of problem behavior of 2.7 rpm, with alternative responses occurring at 0.4 and 0.6 rpm. The remaining two FCT phases reduced problem behavior to zero or near zero levels, with problem behavior only reappearing in reversal to baseline, with the exceptions of a spike in FCT session 35. Alternative responses occurred between 0.5 and 0.7 rpm during the first four FCT sessions, and then reduced to between 0.3 and 0.4 rpm for the remainder of treatment. Results of the restraint reduction is depicted in figure 3. Time in restraint was on average 145 min per week during the 23 weeks before treatment started. Average restraint time was reduced to 52 min per week during analog FCT, and when extended to staff and Arnes' natural setting, the time was further reduced to an average of 30 min per week.

Follow-up Assessment

A follow-up at 12 months showed that restraint was reduced further, and maintained at 5 min of restraint per week. During this 12-month period, staff reported that prompting a

functional response often occasioned problem behavior. This was confirmed in a brief analysis employing an alternating treatment design (data available from the first author). Because of this, prompting functional responses was stopped. Even though prompting was stopped, functional responses remained at what was deemed to be an appropriate level.

Discussion

The problem behavior appeared in three of the demand conditions. Precursors also showed the highest rate in the demand conditions. This indicated that problem behavior was maintained by negative reinforcement through escape from demands. Precursors remained less differentiated in all other conditions, which suggests that the precursors had additional functions. Teaching Arne an alternative appropriate response through FCT reduced problem behavior to near zero levels. Neither the FCT sessions that included response cost (initial B phase) nor the FCT sessions that included access to a preferred activity in the breaks (C phase) were successful in reducing problem behavior. In the response cost sessions, problem behavior was observed following each presentation of response cost.

We observed an increase in the functional responses and a reduction in problem behavior in all of the remaining FCT sessions. The time in restraint was reduced considerably with the introduction of FCT. When direct care staff continued to implement FCT throughout his daily life, time in restraint was further reduced. However at follow-up assessment, problem behavior was seen to appear on each instance of prompting an alternative response. This possible side effect of prompting functional responses should be considered when designing treatment plans for problem behavior maintained by escape from demands.

While social validity was not evaluated, direct care staff reported increased satisfaction working with Arne. In addition, administrative staff members reported that they had noticed that Arne seemed to be “feeling much better”.

We need to mention some limitations of the present study. Similar to what was

reported by Kahng, Abt, and Schonbachler (2001) we observed variable levels of problem behavior in baseline. This may reflect the transitory states of severe and intensive behavior; a potential predecessor to stable responding (Lattal, 2012). An investigation of the variance of severe problem behavior in transitory states may warrant further study.

Another limitation is that no formal treatment integrity data were used in this study. Also, we cannot rule out that staff training, and not the analog FCT may have sufficed to achieve restraint reduction. There is also a possible issue with measurement reactivity, as all sessions were filmed by another person present in the room.

Finally, we did not directly demonstrate that the time in restraint was functionally related to FCT. Rather, time in restraint was continuously measured several months prior to and directly following the intervention, including a twelve-month follow-up.

Conclusions and Recommendations

The results of the present study suggest that an FA and subsequent FCT may serve as an effective analysis and treatment. Problem behavior was almost eliminated and what followed was a marked reduction in the time the patient spent in restraint. Future studies should be done with an improved design that could allow conclusions to be drawn on the relationship between an FA, a subsequent FCT and restraint reduction.

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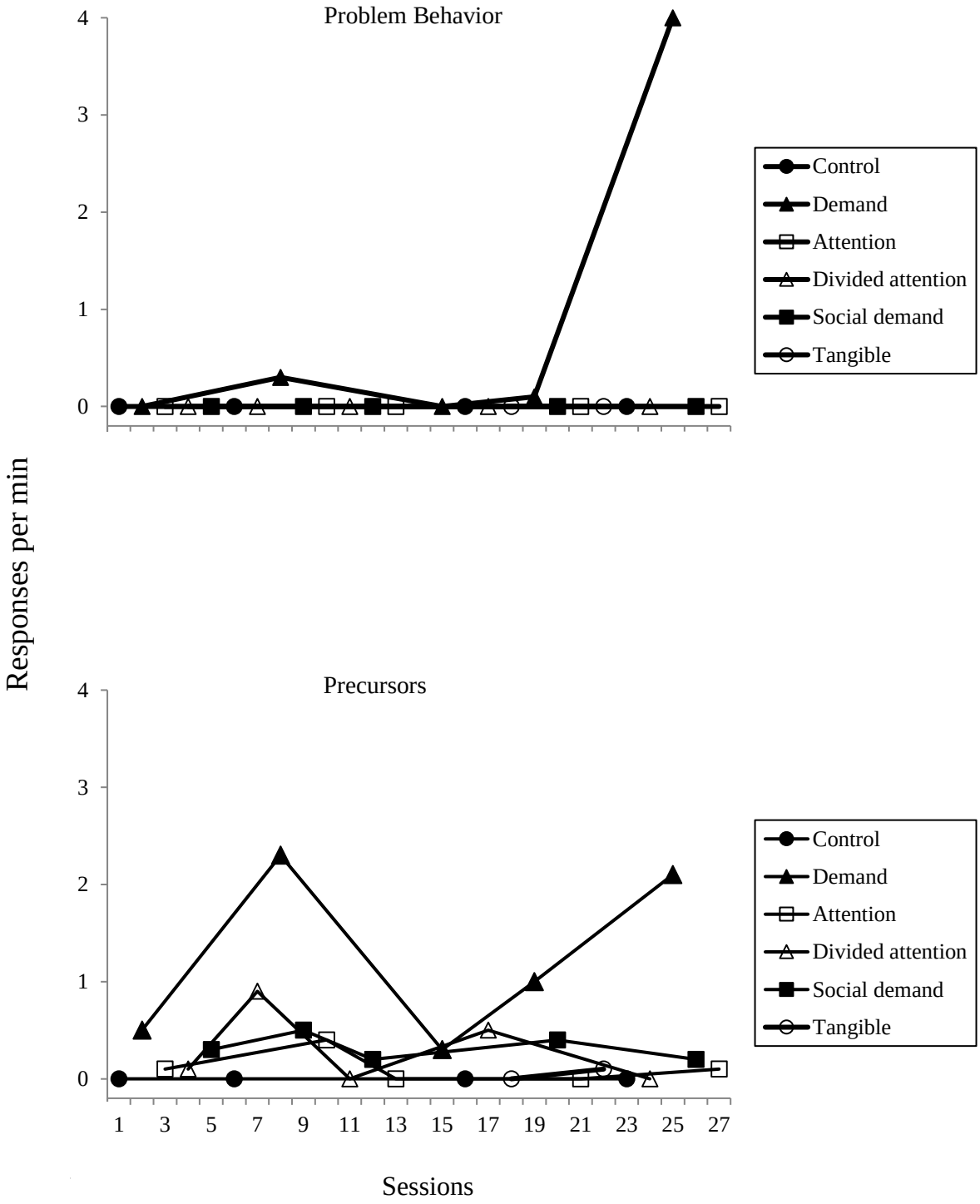

Figure 1. Results of the functional analysis of precursors and problem behavior. The rate of problem behavior is shown in the top panel and the rate of precursors in the bottom panel.

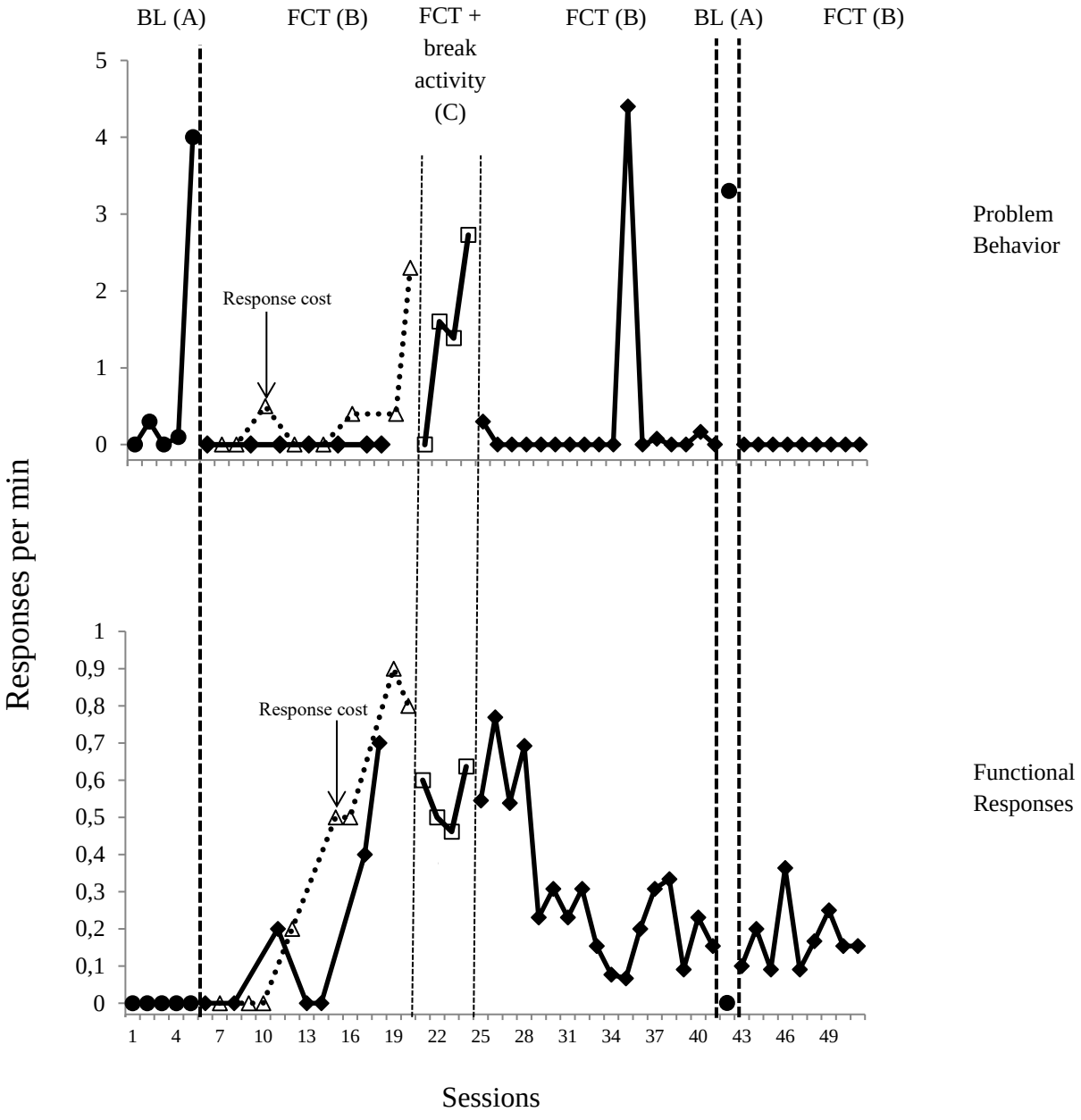

Figure 2. A treatment analysis of problem behavior and functional responses during baseline conditions and during functional communication training (FCT). Problem behavior and functional responses in sessions with response cost are indicated by open triangles and a broken line, respectively. Sessions with FCT are indicated with filled diamonds. FCT sessions with activity breaks are indicated with open squares.

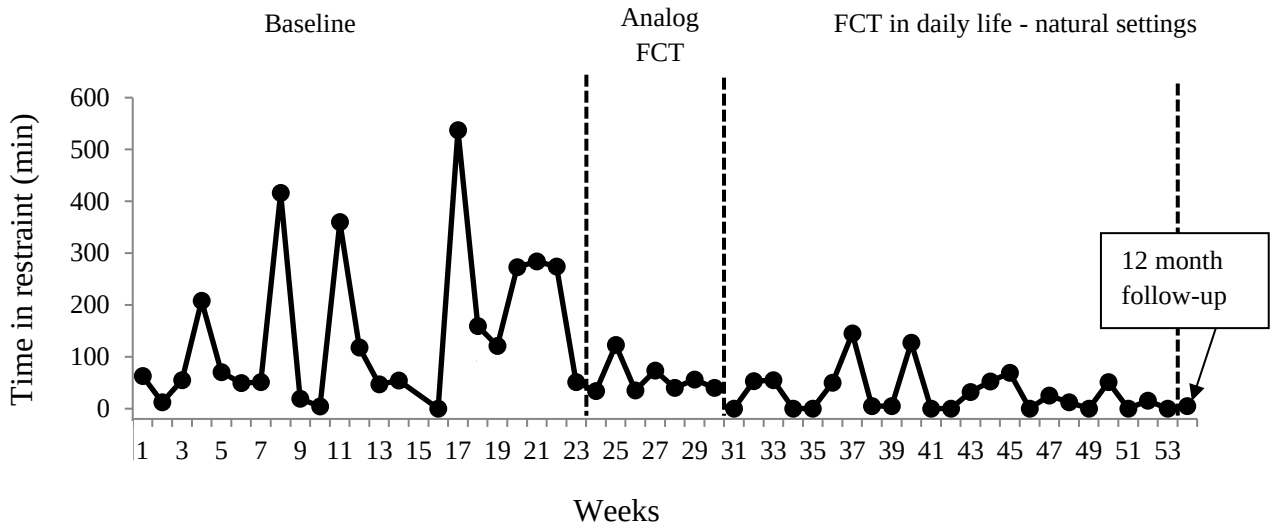

Figure 3. Time in restraint across conditions.