Practice Recommendations for Addressing Problem Behaviors in Siblings with Autism Spectrum Disorder

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Abstract Children with autism spectrum disorder (ASD) display an increased prevalence of problem behavior, relative to the typically developing population. Given the heritability of ASD and its growing prevalence, clinicians who implement behavioral treatments are likely to encounter families with siblings with ASD who exhibit problem behavior. Thus, there is a need for guidance for treatment of problem behavior for these families. This paper presents strategies for conducting behavioral assessments, developing treatments for problem behaviors, caregiver training, and generalization strategies when there are multiple affected children in one family. A case study is presented to illustrate the key clinical decisions made to increase the likelihood of a successful treatment outcome for these families.

Keywords Problem behavior · Multiplex · Practice recommendations

Families raising children with autism spectrum disorder (ASD) evidence poorer overall functioning when compared to those raising children without ASD (Bastiaansen, Koot, Feridnand, & Verhulst, 2004; Khanna, Madhavan, Smith, Patrick, Tworek, & Becker-Cottrill, 2011; Kuhlthau et al., 2010; Mugno, Ruta, D'Arrigo, & Mazzone, 2007). Yet, troublingly, when the affected child regularly exhibits problem behavior,

family functioning is even more negatively impacted (Estes et al., 2013; Lecavalier, Leone, & Wiltz, 2006; Tomanik, Harris, & Hawkins, 2004). In fact, the severity of a child's problem behavior has a greater influence on family functioning than the impact of delayed adaptive skills or ASD symptom severity (Baker, Blacher, Crnic, & Edelbrock, 2002; Estes et al., 2013; Hastings & Beck, 2004; Lecavalier, et al., 2006). Problem behaviors have been found to negatively affect parents' social relationships, increase their negative feelings about parenting, and negatively impact the quality of their marriages and relationships with the affected child's siblings (Sikora et al., 2013). Such findings are particularly concerning because family functioning has been shown to be correlated with the prognosis of a child with ASD (Davis & Gavidia-Payne, 2009; King, King, Rosenbaum, & Goffin, 1999; Park, Turnbull, & Turnbull, 2002).

Complicating the influence of problem behavior on family functioning is the fact that ASD has a genetic loading, thereby increasing the chances of siblings of children diagnosed with ASD to be symptomatic (Bertrand et al., 2001). For example, Ozonoff et al. (2011) found that 18.7% of siblings with one or more older siblings with ASD met diagnostic criteria themselves. In addition, twin studies have found a concordance rate for ASD of 60–95.7% in monozygotic twins but 0–23.5% in dizygotic twins (Mason-Brothers, Mo, & Ritvo, 1985; Ritvo, Freeman, Mason-Brothers, Mo, & Ritvo, 1986; Bailey et al., 1995). The combination of the heritability of ASD and the higher prevalence of problem behavior in individuals with ASD (Soke et al., 2016; Hill et al., 2014) means that there are likely many families with more than one child with ASD who also engages in challenging behaviors. Unfortunately, there is little or no previous literature addressing the assessment and treatment of challenging behaviors in multiplex families (i.e., families in which there is more than one child diagnosed with a complex genetic disorder such as ASD). Given

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the significant negative impact one child's problem behavior can have on family functioning, it is highly likely that, in multiplex families, having more than one child who engages in such behavior greatly increases the burden of care.

There are many challenges faced by families with siblings who engage in problem behavior. However, these challenges are not unique to an ASD diagnosis and are likely similar to the challenges faced by other multiplex families who have multiple children who engage in problem behavior and are seeking behavioral interventions (e.g., parents of children diagnosed with an intellectual disability or other developmental disorder). For example, many of the behavioral treatments that have been shown to effectively reduce problem behaviors (e.g., aggression, self-injury, destructive behavior) can also be quite laborious (Allen & Warzak, 2000). Such treatments can be highly effective (Campbell, 2003; Didden, Duker, & Korzilius, 1997; Heyvaert, Saenen, Campbell, Maes, & Onghena, 2014), but often include elements such as extinction (Iwata, Pace, Cowdery, & Miltenberger, 1994b), dense schedules of reinforcement (Hagopian, Boelter, & Jamolowicz, 2011), and close supervision. Each of these elements can be difficult for caregivers to implement and may be especially difficult in the early stages of intervention. For example, when first implemented, treatments that include placing problem behavior on extinction may produce an extinction burst in the form of a temporary increase in the variability, frequency, or intensity of problem behavior (Lerman & Iwata, 1995). Continuing to implement treatment procedures when an extinction burst occurs is not likely to be viable for some caregivers when they must also care for another child who engages in problem behavior. In addition, treatments may need to be implemented with the high integrity or very dense schedules of reinforcement when first introduced (St. Peter Pipkin, Vollmer, & Sloman, 2010), which may be challenging. Even under more straightforward circumstances in which parents only have one child who engages in problem behavior, caregivers sometimes struggle to implement such effortful treatments with good fidelity (Allen & Warzak, 2000). The additional stressors and need to divide their attention across siblings mean that multiplex families requiring treatment may be even more likely to find such effortful treatments to be unfeasible.

Little research has been conducted that focuses on working with multiplex families, with one notable exception by Doyle, DeRosa, & Roane (2013). In this study, treatment was developed for two siblings who engaged in problem behavior. First, individual interventions were developed in isolation for each child, which consisted of functional communication training (FCT) with delay to reinforcement. FCT was effective in reducing both children's problem behavior; however, it presented a challenge for generalization, as the implementation of both interventions at the same time was too laborious for a single caregiver to implement. To

address this concern, an integrated intervention was developed using a resetting differential reinforcement of other behavior (DRO) schedule, where the DRO interval was reset contingent on either child engaging in problem behavior. This intervention allowed the caregiver to use one treatment strategy for both children and ensured that reinforcement was always delivered at the same time for both children. This study provides some needed guidance on one potential treatment approach for these multiplex families. However, more research is needed in this area.

With the increasing prevalence of ASD (CDC, 2012), clinicians who work with families to develop interventions for problem behavior exhibited by children with ASD may be likely to encounter more multiplex families in need of treatment. Currently there is little guidance in the literature on how to adapt assessment procedures and treatments for these families. The purpose of this paper is to present some practice recommendations for developing effective treatments and increasing caregiver implementation of behavioral strategies to decrease problem behaviors with multiplex families. In addition to broadly discussing the challenges to effective treatment in this scenario, we will also use a case example of siblings with ASD treated for problem behavior to illustrate the strategies that were successful in overcoming these barriers. The strategies discussed in the current paper are based on practices currently implemented in a clinic that frequently provides services to multiplex families with children who engage in problem behavior. These recommendations, although based on clinical practice, still need to be vetted by well-controlled studies. Therefore, it is our goal to provide some guidance on how to effectively serve these children and their families, initiate consideration amongst those who develop treatments for problem behavior about how such families could potentially be better served, and encourage investigators working with multiplex families to conduct research on this topic.

Treatment Overview

The general steps involved in treating problem behavior exhibited by siblings in multiplex families do not necessarily differ substantially from what are otherwise considered best practices in the treatment of problem behavior exhibited by a single child. That is, although each step is likely to require adaptation, the course of treatment should still include (a) pre-admission planning, (b) establishing goals and a treatment course, (c) identifying barriers to successful treatment, (d) conducting a functional assessment to determine the environmental variables that evoke and maintain the problem behavior, (e) systematically developing individualized, function-based treatments aimed at decreasing problem behavior and increasing replacement behaviors, (f)

generalizing treatment to the natural environment and training caregivers to implement the treatment with good fidelity, and (g) providing follow-up care and ongoing consultation to ensure that treatment gains are maintained (Call, Parks, & Reavis, 2013).

Adapting these steps for multiplex families from the outset of the treatment process can pay dividends during later stages. Throughout this paper, we will highlight the critical points during treatment to make such adaptations and some ways to do so utilizing broad recommendations and a case example.

Case Example: Beck and Silas

Beck and Silas were identical twin, 9-year-old, boys receiving services in a day treatment program that specializes in the assessment and treatment of severe behavior problems. They each received 6 h of services a day, 5 days per week, for 12 weeks. Both boys engaged in dangerous elopement (i.e., running or wandering away from a designated area), which was targeted for intervention by their parents. They had obtained a service dog for the purpose of tethering (i.e., fixing a leash from a dog to a belt or harness on a person) in the hope of preventing elopement, especially when the family was out in public. Both of their biological parents resided with them, but due to their father's work schedule, the boys' mother was often responsible for caring for both boys, making it very difficult to take them out of the home.

Pre-admission Planning

For some multiplex families, there may be significant advantages to conducting functional assessments and developing treatments for all of the children in need of intervention at the same time. However, for other multiplex families, the opposite may be true: conducting assessments and developing treatments for each child separately may be advantageous. This decision could be guided by consideration of the complexity and similarity of the respective treatments and how effortful they are for caregivers to implement. These factors are likely to be impacted by the function and severity of each child's problem behavior. For example, if both children's problem behavior is maintained by the same reinforcer, then providing treatment at the same time may have advantages because treatment is likely to be similar. For children whose problem behaviors are maintained by different reinforcers, however, very different interventions may be required, as would be the case with tangible and escape-maintained behaviors. In addition, children that engage in problem behavior that is multiply-maintained may require more than one treatment. If this is the case for both children, this may require a caregiver

to master several interventions at one time (e.g., Borrero & Vollmer, 2006; Day, Horner, & O'Neill, 1994; Ingvarsson, Kahng, & Hausman, 2008; Lalli & Casey 1996; Smith, Iwata, Vollmer, & Zarcone, 1993). When considering which child to treat first, it may be the case that the more severe problem behavior requires more intensive interventions or may be more resistant to treatment. In contrast, problem behavior that is mild may be more easily addressed with simple and more commonly used interventions. In either of these scenarios, it may be optimal to intervene with the children in a sequential order. Conversely, if both children engage in relatively mild problem behavior, it may be better to conduct treatment at the same time.

Unfortunately, it is frequently difficult to determine the function or severity of problem behavior before certain treatment decisions have to be made. For example, a clinician may have to decide whether to treat siblings' problem behavior together or separately before a functional assessment has been conducted. Yet making this decision depends in part upon whether the problem behaviors serve the same function. If both children engage in problem behavior maintained by the same class of reinforcement, there may be considerable advantages to conducting functional assessments and developing treatments simultaneously. Such assessments and treatments are likely to be very similar across children, if not identical. As such, not only are efficiencies introduced by conducting assessments at the same time, but training caregivers to implement treatment may be greatly simplified because they only need to master one set of procedures. Therefore, hypotheses must be developed based upon as much information as can be gathered about each child's problem behavior (e.g., topography or severity of the behavior, indirect assessments, structured observations) at the time. Conversely, if different classes of reinforcement maintain the problem behaviors exhibited by each sibling, then their treatments may differ significantly. Caregivers are then likely to be required to learn different interventions for each child. The need to master multiple interventions, which may themselves involve several components, may be overly challenging for many caregivers.

In addition, for families who are likely to struggle with availability for training, treatment may need to be provided to each child sequentially to decrease the time commitment at any given moment. In these scenarios there may be advantages to providing treatment for each child in a sequential fashion. Doing so allows caregivers to master one child's treatment at a time, significantly simplifying the task and dispersing the time needed to train over a longer interval, which may be more feasible for some families. When sequential treatment is determined to be the best course for a family, it is important to revisit treatment priorities to ensure that the child and behavior that is having the greatest impact on the family is given precedence.

Case Example For Beck and Silas, caregiver interviews and observations were conducted prior to treatment that suggested that elopement served the same function for both boys. Their elopement was hypothesized to be maintained by access to preferred items and activities. Therefore, it made sense to treat them simultaneously because it seemed likely that treatments would be similar. Subsequent functional analyses (FA) confirmed these hypotheses and, as a result, their treatments were sufficiently similar such that the decision to treat them simultaneously resulted in significant efficiencies for clinicians and caregivers.

Key Points Prior to an Admission:

- The clinician should weigh the pros and cons of conducting the admission either simultaneously or sequentially.
- When making this decision, it is important to gather as much information as possible to help make an informed decision.
- Information should be gathered on the potential function of each child's problem behavior, severity of each child's problem behavior, and complexity of potential final interventions.

Establishing Treatment Goals

It is always important to work with caregivers to establish meaningful yet achievable treatment goals. However, establishing achievable goals is particularly important when working with multiplex families. What may be considered merely a daily hassle for many families, such as resistance during daily routines like brushing teeth, can be a significant ordeal for multiplex families. For example, when a parent has only one child who engages in problem behavior during tooth brushing, it may be feasible for relatively straightforward behavioral interventions to achieve the goal of increasing compliance and decreasing problem behavior to a manageable level. However, for a multiplex family, it may be unrealistic or even impossible for a caregiver to follow through with the demand simultaneously for both children. Thus, treatment goals must be achievable within the context of each family's circumstances and resources. In this example, a more appropriate goal may be to maintain low levels of problem behavior for both children while one child brushes his/her teeth and the other child engages in a leisure activity. To achieve such a goal, the focus of treatment would need to be twofold for each child: (a) decreasing problem behavior and increasing compliance with demands and (b) teaching each child to play independently when a caregiver's attention is diverted towards his/her sibling. Without proper planning at the beginning of treatment, it may be difficult to achieve such a goal.

Case example Beck and Silas' parents identified the following goals: (a) teaching each boy to tolerate intervals (up to 10 min) in which their preferred item or activity was restricted and (b) being able to have one caregiver take both boys out in public (e.g., a grocery store) without either child eloping. An additional goal was added later to Silas' treatment: for him to sit and wait while overcorrection procedures were implemented with Beck. This added goal was important because Beck's final treatment package included an overcorrection procedure in which he was guided back and forth from the location he had eloped to and from. This procedure was repeated three times each time he eloped. The only way for one caregiver to safely implement the overcorrection procedure was to teach Silas to remain in one spot when it was implemented with his brother.

Key Points When Establishing Treatment Goals:

- When establishing goals for treatment, it is important to consider both children.
- In particular, it is important to consider how one child's intervention may influence the other's and if additional goals need to be added.
- It is important to focus on all of the children that are in need of treatment and the feasibility of meeting those goals.

Identifying Barriers to Successful Treatment

Part of the process of establishing treatment goals involves identifying potential barriers to treatment success (Kazdin, Holland, Crowley, & Breton, 1997). Barriers may include many factors that are endemic to the home, family, or community setting. Some barriers, such as the availability of caregivers and the number of dependents in the home, have the potential to significantly impact treatment outcomes. Thus, these issues require special consideration and adaptation by clinicians.

If a family has only one affected child, the number of available caregivers may not be as significant of a concern, as behavioral interventions are often designed to be effective when utilizing a one adult to one child ratio. Even single caregiver homes are frequently able to maintain such a ratio with a single child at least some of the time. However, when there are siblings who engage in problem behavior, this 1:1 ratio likely cannot be consistently maintained, thereby requiring additional consideration of goals and treatment planning. Determining how many caregivers are able to devote their time to implementing treatments sets some parameters around how complex interventions can be and may rule out certain treatment components altogether. For example, strategies that require physical guidance may be

impossible if multiple children require that level of prompting simultaneously. Similarly, it will frequently be difficult for a single caregiver to provide attention to multiple children at the same time. However, when more than one caregiver is consistently available, there may be greater latitude to utilize more effortful or complex interventions. Even so, most treatments will need to be implemented by a single caregiver at least some of the time, and therefore it is generally prudent to plan for that possibility from the outset.

Families that have other dependents aside from the affected children may also need treatments that are particularly flexible and/or have programmed times to allow the caregiver to tend to other family members (e.g., an infant sibling, sick spouse, aging parent). The presence of other dependents also makes it important to develop a treatment plan that includes intervals when the children can be left unattended for brief periods while still maintaining low levels of problem behavior. These intervals are critical for situations in which a caregiver needs to leave one child unattended to implement treatment with his/her sibling. However, when there are additional individuals in the household that require the attention of those caregivers, beyond the other sibling that engages in problem behavior, such intervals may need to be longer or more frequent. The addition of these intervals requires upfront planning, especially when the caregivers' need to attend to other dependents is not directly related to the primary treatment goals for the affected children.

Aside from being an important factor to consider in treatment development, the presence of additional dependents may also cause caregivers to be less available for training. This issue is made more acute when caregivers have more than one child in need of intervention, as more time will generally be required to train them to implement treatment. Assessing at the onset of treatment for the presence of barriers such as these can allow for better planning and more effective treatments. Failure to identify and address these barriers can lead to attrition, ineffective treatments, or treatments that are difficult for the family to implement in the natural environment.

Case Example One such barrier identified for Beck and Silas was that their father worked night shifts and therefore slept during the day, leaving him unavailable during most day and nighttime hours. This schedule meant that their mother was often alone with both boys. Therefore, treatments needed to be designed so that she could implement them simultaneously without the help of another caregiver. This potential obstacle to treatment success could have been overlooked because their father attended all admission meetings and otherwise appeared to be available to help implement the treatment. Thus, taking care to ascertain the number of caregivers available for treatment implementation was a key to the treatments' success.

Key Points in Identifying Barriers to Successful Treatment:

- Consider availability of caregivers to implement treatment.
- Consider how flexible the treatment will need to be to accommodate sibling needs.
- Consider including programmed times for the caregiver to tend to other family members.
- Consider caregivers' availability for training.

Conducting a Thorough Functional Assessment

Identifying the environmental variables that evoke and maintain a child's problem behavior is essential to effective treatment development (Campbell, 2003; Heyvaert, Saenen, Campbell, Maes, & Onghena, 2014). Although experimental FAs (e.g., Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994a) are often considered the gold standard for identifying the function of problem behavior (Beavers, Iwata, & Lerman, 2013), such a thorough analysis may not always be feasible. Alternatives to the traditional full-length Iwata et al. methods include brief functional analysis (Northup et al., 1991) and trial-based functional analysis (Lambert & Bloom, 2012). These methods provide viable alternatives and can be quicker and easier to implement across a variety of settings (Bloom, Iwata, Fritz, Roscoe, & Carreau, 2011; Lang, et al., 2008). If no version of an experimental FA is feasible, other possible methods include indirect and descriptive assessments. Indirect assessments, such as questionnaires or interviews (e.g., Motivation Assessment Scale [MAS], Durand & Crimmins, 1988; Questions About Behavioral Function [QABF], Applegate, Matson, & Cherry, 1999; Functional Analysis Screening Tool [FAST], Iwata & DeLeon, 2005), typically ask caregivers questions about situations and consequences that are correlated with problem behavior to develop hypotheses about its function. Descriptive assessments consist of directly observing the antecedents, the problem behavior, and its consequences without directly manipulating these events. Indirect and descriptive assessment methods require fewer resources and less expertise to conduct. However, in spite of such advantages, the conclusions one may draw from them may not be as reliable as those drawn from experimental methods (Iwata, DeLeon, & Roscoe, 2013; Iwata, Kahng, Wallace, & Lindberg, 2000; Hall, 2005; Lerman & Iwata, 1993). Therefore, it is advisable to conduct an experimental FA whenever possible.

Regardless of the method used to assess the function of each child's problem behavior, it is important to examine whether there are interactions between the problem behaviors of siblings. For example, one child's problem behavior may only occur when the other child engages in problem behavior

(e.g., a child only engages in destructive behaviors such as throwing items when his sibling screams loudly during a tantrum). When there are indications that interactions such as this exist between the children's problem behavior, there may be advantages to conducting an FA with both children in a single assessment. This can be done either by having the second child present during the assessment or by having two therapists simultaneously conduct FA sessions with each child while in the same room. Another reason to conduct the FA together is to provide a more ecologically valid analog to the home environment. That is, because siblings are frequently part of one another's environment, conducting the FA with siblings together ensures that the assessment resembles naturalistic circumstances to a greater degree. However, it should be noted that strict control of a sibling's behavior can be difficult to achieve, potentially introducing unwanted variability in the antecedents and consequences a clinician is attempting to control or evaluate within the FA.

Another adaptation to FA methodology that may be appropriate for siblings who engage in problem behavior is to have one therapist conduct sessions for both children simultaneously. Such a procedure is similar to a more traditional FA, with the exception of the order of conditions, which are carefully arranged so that one session can serve as different conditions for each child. For example, in a typical FA, a condition designed to evaluate whether problem behavior is maintained by attention generally involves having a caregiver divert his/her attention to another activity. In contrast, during an escape condition, a caregiver may place demands on a child. Thus, the same session can serve as an attention condition for one child and an escape condition for the other when the caregiver diverts their attention from the first to provide demands to the second. Other conditions can be combined in a similar manner to simultaneously assess the function of the problem behavior of more than one child.

Case Example For Beck and Silas, FAs on elopement were conducted with the boys together (see Fig. 1). That is, independent FAs were conducted simultaneously with both boys in the same room. All sessions were conducted using one therapist per child, with the sequence of conditions independently randomized for each boy. By randomizing the conditions, there were sessions when both boys were exposed to the same condition as well as sessions in which each boy was exposed to a different condition. The FA was conducted using two rooms so the boys could elope from one room and enter another where reinforcement was provided (see Piazza et al., 1997). Both FAs of elopement replicated the procedures described by Piazza et al., with the exception of two separate control conditions: one that controlled for attention and escape (i.e., noncontingent attention) and one that controlled for preferred tangible items and escape (i.e., noncontingent toys). During the noncontingent attention condition, the boy(s)

received continuous attention but no tangible items were provided. During the noncontingent toys condition, they received continuous access to toys but no attention was provided.

Both Beck and Silas engaged in elevated rates of elopement in the tangible condition relative to the toyplay condition, indicating that, for both boys, elopement was maintained by positive reinforcement in the form of access to preferred items/activities. In addition, elevated rates of elopement were observed in the attention condition relative to the toyplay condition for Beck, indicating that his elopement was also maintained by access to attention. The inclusion of both boys in each session allowed for the evaluation of interactions between their problem behaviors. That is, if the behavior of one boy had influenced the elopement of the other, this analysis would have been well-equipped to detect such an effect. This combined model of FA was also a more ecologically valid analog to their home environment because Beck and Silas were rarely separated, even in their educational settings.

Key Points to Consider When Conducting a Thorough Functional Assessment:

- Consider how one child's problem behavior may influence his/her sibling's problem behavior.
- Consider the pros and cons of conducting the functional assessment with both siblings in a single assessment or conducting the functional assessments with each child individually.

Treatment Development and Evaluation

In many respects, developing and evaluating a treatment for multiplex families follow the same course as for families with only one child with ASD who engages in problem behavior: treatment should be developed based on the results of a thorough functional assessment. Treatment should be evaluated for its effectiveness based on a change from baseline rates of the behaviors targeted for intervention. However, there are several aspects of the treatment development and evaluation process that require special consideration when working with multiplex families. We will focus exclusively on those aspects here, highlighting only the elements that are unique to these families. One such factor is the feasibility of implementing treatments for more than one child simultaneously. As discussed above, this issue is important to consider early on by ensuring that the aims of treatment are realistic. However, it is also important to consider it again during the treatment development stage to make certain that the individual treatment components implemented with each sibling are complementary to one another (Doyle, DeRosa, & Roane, 2013). That is, the treatments must not include components that are impossible for the caregiver to implement at the same time.

Fig. 1 Functional analysis data for Beck and Silas. These assessments were conducted with Beck and Silas together. The stars represent sessions in which both boys were in the same condition (e.g., session 1 was an escape condition for both Beck and Silas)

Similarly, it is also important to design treatments that are as simple as possible. This can be achieved by using similar treatment procedures whenever possible. This goal is aided when the behaviors serve the same function across children and requires special planning when the behaviors serve different functions across children.

Case Example Treatment development for Beck and Silas required extra steps to ensure that the reinforcers maintaining each boy's elopement could be delivered contingent upon appropriate replacement behaviors. Although results of their FAs demonstrated that each boy's elopement was maintained by positive reinforcement, the specific reinforcers differed. Silas' elopement was maintained by access to preferred toys (e.g., balls, TV) whereas Beck's elopement was maintained by access to preferred activities (e.g., going on walks, taking pictures of industrial equipment). Functional communication training (FCT; Carr & Durand, 1985), conducted with each

boy independently, resulted in successful replacement of elopement with requests for the relevant reinforcer. However, the difference in the specific type of reinforcer that maintained their elopement (i.e., large toys that could only be accessed in one place for Silas and walking for Beck) frequently made it impossible for both Beck and Silas to access reinforcement at the same time. That is, a single caregiver could not take Beck on a walk while simultaneously monitoring Silas' access to preferred toys.

To address this problem, a multiple schedule (Hanley, Iwata, & Thompson, 2001; Betz, Fisher, Roane, Mintz, & Owen, 2013) was utilized that included three schedules of reinforcement, rather than two as is typical: (a) reinforcement for Silas, (b) reinforcement for Beck, and (c) no reinforcement for either boy. Discriminative stimuli, in the form of different colored bracelets, signaled the condition underway at the time to each boy: a green bracelet was paired with reinforcement for Beck, which in turn signaled restricted access to activities

for Silas. A blue bracelet signaled the opposite arrangement. However, a red bracelet signaled restricted access to the functional reinforcer for both boys. This modification to the typical multiple schedule procedure allowed each boy to access his functional reinforcer when he emitted an appropriate request during times when the corresponding bracelet signaled that those requests would be reinforced. It also gave their mother control over when reinforcement was available, including designating times when neither boy would be able to access reinforcement, such as when they were running errands. Designing this treatment required several additional steps beyond those typically required to establish a clinically useful multiple schedule (e.g., teaching discrimination for more than two stimuli, teaching in isolation prior to teaching with both children present, planning for activities that were appropriate for each individual child, etc.).

The multiple schedule included an overall contingency such that if either boy eloped during reinforcement the reinforcement interval ended and their mother used the red bracelet (signaling that neither boy's requests would be reinforced). Incidentally, it appeared that, at least for Silas, intervals during which his reinforcer was not available but Beck's reinforcer was were still more preferred than those in which neither boy's requests were reinforced. Thus, the multiple schedule arrangement had a highly beneficial collateral outcome: without explicit training, we observed that during times that they were required to wait to access one of Beck's preferred activities, such as standing in a line at a carnival, Silas would stand behind him and hold the collar of his shirt, ostensibly to prevent his brother from eloping. In essence, the reinforcement contingencies had given Silas sufficient incentive to prevent his brother from engaging in problem behavior, and he had become an additional therapist. Although this outcome was not a planned strategy, the possibility of having children assist in the implementation of portions of their siblings' interventions, when appropriate, appears to be an approach worth consideration.

It was also important to teach Beck and Silas to sit down and wait if their sibling eloped. Beck and Silas quickly learned to remain seated when their mother left to retrieve an eloping sibling because doing so resulted in access to a potent reinforcer. This strategy was particularly important for Silas because treatment analyses had shown that Beck's intervention required the use of overcorrection. Thus, knowing that Silas was stationary in a safe location gave their mother some assurance that she would be able to implement treatment procedures with good fidelity without leaving her other child at risk.

Key Points During Treatment Development and Evaluation:

- Consider the feasibility of implementing treatments for both siblings at the same time
- Ensure that all treatments for both siblings are complementary to one another rather than incompatible.

Generalizing Treatment and Caregiver Training

Generalizing treatment to the natural environment is an important step in the treatment process and a point at which new and necessary modifications to treatment may become apparent. Caregiver training is often one of the final steps in the treatment process, often occurring only after an effective intervention has been identified. In addition to the factors already discussed that can affect the efficiency of training, it is also important to determine the advantages and disadvantages of conducting caregiver training simultaneously versus sequentially (i.e., whether caregivers should be trained to implement interventions for all children being treated or first for one child followed by training for the other child).

If treatments are similar or do not require substantial effort to implement, there may be advantages to training caregivers on all treatments simultaneously from the outset. However, even when individual treatments are similar or involve few components, the challenges of learning to implement them with more than one child at the same time may be overly taxing for many caregivers. If the individual treatments are substantially different and involve several procedures, it is even more likely that mastering two new interventions simultaneously may overwhelm a caregiver, with the result not only of slowing the rate of acquisition but potentially negatively impacting parent buy-in to the treatment. In such instances, it is likely advantageous to train caregivers to implement treatment with one child at a time.

Regardless of whether parents are trained on their two child's treatments simultaneously or sequentially, effectively training parents to mastery will likely increase the chances that they consistently implement those treatments on their own (Beauchaine, Webster-Stratton, & Reid, 2005; Strain & Bovey, 2011). Whenever the second child's treatment is introduced, decreases in procedural fidelity are likely with two children being treated; thus, data collection and additional coaching on caregiver implementation will frequently be necessary.

Case Example Figure 2 depicts the treatment and generalization data collected for Beck and Silas. During the initial phases of treatment (Baseline, FCT and Multiple Schedule Treatment Development), treatment sessions were conducted separately for each boy. During the Multiple Schedule Combined phase, sessions were conducted with both boys present and treatment was implemented simultaneously. In an effort to simplify caregiver training, each child's treatment was as similar as possible to the other child's treatment. Silas' treatment consisted of a multiple schedule with response cost. During the S^D intervals (signaled by a blue bracelet), reinforcement was provided for appropriate mands (FCT), and all problem behavior was on

Fig. 2 Treatment and generalization data for Beck and Silas. *Open data points* indicate when the caregiver was conducting sessions. *Closed data points* indicate when the therapist was conducting sessions. The *top panel* depicts Beck's data and the *bottom panel* depicts Silas' data

extinction. During the S^{Δ} intervals (signaled by a red bracelet), extinction was in place for both mands and problem behavior, problem behavior resulted in a response cost (i.e., the interval restarted), and activities or demands were presented using either a least-to-most prompting procedure or a time-based vocal prompt. Beck's treatment was identical, except that a green bracelet was used to signal the S^D interval and an overcorrection procedure (described above) was implemented contingent on elopement. It was possible to have treatments that were almost identical because both the function and topography of problem behavior were identical. By making a decision at the outset to simultaneously treat both boys and designing the similar treatments for both boys, caregiver training was simplified. This decision likely reduced the overall amount of time and effort required of the caregiver to participate in treatment.

Key Points During Generalization:

- Consider the pros and cons of training parents to implement both child's treatment plans simultaneously versus sequentially.
- In training caregivers, consider the impact of the similarity of the two child's treatment plans and caregiver availability.
- Consider collecting data on the fidelity of caregiver implementation of treatment plans

Follow-Up and Ongoing Consultation

Providing follow-up and ongoing consultation is an important part of the treatment process any time services are provided to address problem behavior, regardless of the complexity of the family. Follow-up and ongoing consultation allows the clinician to monitor treatment implementation and ensure that caregivers continue to implement treatment consistently. In addition, follow-up and ongoing consultation provide the opportunity to make modifications to the treatment. Modifications may be needed to adjust for changes in the child's behavior or to address situations that were not addressed in the initial treatment process. How these services are provided does not seem likely to change based on the complexity of the family, however multiplex families may require more regular follow-up and support to ensure treatment gains are maintained since changes to one child's treatment could impact the implementation of the other child's treatment.

Conclusions

Clinicians who treat problem behaviors exhibited by children with ASD should familiarize themselves with the specific challenges that must be addressed when there is more than

one child in a family in need of intervention. Potential obstacles to success include complications with identifying effective treatments (e.g., the possibility of interactions between children's problem behaviors) and constraints upon effective caregiver implementation (e.g., the need to divide caregiver attention amongst multiple children). In general, it is appropriate to employ the same treatment approach used when there is only one child in the family receiving treatment for problem behavior. However, it is critical to consider how each of those practices may need to be modified to produce optimal treatment outcomes when there are multiple children in need of intervention. In particular, consideration of how to best maintain a treatment's social and ecological validity is critical. This article has discussed some of the unique challenges faced by caregivers of siblings with ASD who exhibit problem behavior, although other challenges may exist while providing services to this unique population. The paper has provided some practice recommendations for this population. However these recommendations are based primarily on clinical experience and a logical extrapolation and extension of evidence-based practices for individual clients, and thus the recommendations should be considered somewhat tentative. This topic warrants further investigation by researchers.

Given the increasing prevalence of ASD and the fact that a sibling of a child with ASD is five times more likely to be affected with the diagnosis (Mason-Brothers, Mo, & Ritvo, 1985; Ritvo, Freeman, Mason-Brothers, Mo, & Ritvo, 1986; Bailey et al., 1995), it is likely that clinicians will increasingly encounter families dealing with the types of challenges described here. Thus, future research on how to best serve these families is warranted. For example, much of the literature on the prevalence of problem behavior in children with ASD, how to best treat it, and its effect on families could be adapted for this purpose. Similarly, measures of caregiver stress, its impact on treatment fidelity, and methods for minimizing stress have the potential to produce significant benefit. Finally, studies specifically evaluating treatment outcomes for siblings may be integral to further developing practice recommendations for treating problem behavior exhibited by siblings with ASD.

Compliance with Ethical Standards

Funding This study was not funded by any grants or external sources.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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