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Preliminary Evaluation of the Impact of Service Modality on Treatment Outcome and Acceptability Using a Function-Based Behavioral Caregiver Training Program

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ABSTRACT

Few studies have investigated caregiver choice surrounding the modality for behavior therapy for pediatric challenging behavior. This preliminary study sought to (1) understand the factors impacting consumer decisions regarding virtual or in-person behavior therapy and (2) evaluate the associated clinical outcomes using a quasi-experimental design. Forty nine participants received behavioral services for the assessment and treatment of tantrum behaviors. Paired sample *t*-tests and a one-way ANOVA were conducted to evaluate outcomes. Results suggest choices were most frequently based on caregiver perceptions regarding speed of improvement; modality changes were most associated with failure to make progress. Implications of these findings are discussed.

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Telehealth (i.e., synchronous use of audio and visual conferencing between a clinician and identified patient/caregiver from separate physical locations for the purpose of providing healthcare services) is an ever increasing mode of treatment delivery for behavioral therapies (Alvarado, 2021; Samson et al., 2021; UnitedHealth Group, 2022). Although not a new medium for service delivery, prior to the pandemic telehealth was used mainly in areas with reduced access to behavioral services (Barnett et al., 2018). Social distancing and stay-at-home orders due to the COVID-19 pandemic may have accelerated the use of telehealth services to provide behavioral services, but use of telehealth as a component of service provision remains elevated as infection rates recede (Li et al., 2022).

Recent studies have focused on validating methods for direct assessment and treatment delivery via telehealth (e.g., Ferguson et al., 2020; Pellegrino & DiGennaro Reed, 2020; Pollard et al., 2021; Wacker et al., 2013) and

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training or coaching caregivers to deliver assessments and treatments via telehealth (e.g., Gerow et al., 2021; Schieltz & Wacker, 2020; Tsami et al., 2019; Comer et al., 2017). For example, Gerow et al. (2021) increased daily adaptive skills in children with autism spectrum disorder using behavioral skills training (BST) consisting of instructions, prompting, and feedback to teach caregivers via telehealth to conduct preference assessments, baseline appointments, and therapy appointments including a least-to-most prompting procedure and delivery of reinforcement. Although the current literature supports the use of telehealth in delivering behavioral interventions, more research is needed to understand contexts in which, behaviors for which, populations for whom, telehealth is most effective or could be made more effective, especially as it relates to treatment of problem behavior (Neely et al., 2021). Researchers have started publishing data demonstrating the efficacy of telehealth delivered services in the treatment of problem behavior but still note that the limits of telehealth-delivered interventions are unknown. Indeed, rigorous data collection is needed to inform how and when to use off-site service modalities (e.g., Schieltz et al., 2018; Schieltz & Wacker, 2020).

In addition to potential for achieving similar outcomes, researchers also report that overall appointment attendance is improved among individuals receiving behavioral interventions via telehealth (Childs et al., 2021; Waite et al., 2022). However, some have observed that although patients and caregivers may attend more appointments, treatment engagement and retention are lingering barriers encountered with telehealth treatments (Chacko et al., 2016; Hall et al., 2020; Herbert et al., 2017). One variable seldom reported in comparisons of telehealth versus in-person service delivery is the number of appointments required to achieve a desired outcome. Increased time to achieve significant symptom reduction may lead to a higher probability of attrition. Additionally, technological or rapport-building challenges associated with online service provision (Sullivan et al., 2021) may lead to challenges with working with clients and training caregivers.

One possible solution for combining the benefits of both in-person and telehealth treatment modalities is to offer patients a hybrid approach that allows for some appointments to be conducted in each mode. Hybrid models that accommodate both in-person and telehealth services have been examined in other disciplines (e.g., Aweidah et al., 2020; List et al., 2021) but, to our knowledge, have not been investigated in the treatment of problem behavior. Such an option might be advantageous particularly because it allows therapists to directly train caregivers in multiple locations and program for generalization (Neely et al., 2021). Of course, telehealth is accessible because it allows caregivers and

patients who might otherwise be unable to attend appointments due to distance or other responsibilities to schedule appointments to attend appointments. Therefore, for a hybrid approach to take advantage of the accessibility of telehealth, caregivers and clients would necessarily have to be allowed to choose each appointment's modality based on their availability. However, additional research is needed to determine which benefits if any are offered by a hybrid approach as compared to entirely in-person or telehealth treatment.

Behavior-analytic assessment and treatment procedures have been shown to be effective when caregivers have been trained via telehealth (Barretto et al., 2006; Gibson et al., 2010; Shieltz & Wacker, 2020). These procedures are technical and conceptually systematic and are well-suited to being trained incrementally (Wacker et al., 2013). Moreover, telehealth is likely to see increased use if similar outcomes are obtained in a more cost-efficient manner (Lindgren et al., 2016). However, research on the use of the telehealth for behavioral interventions is still emerging, and scant research has evaluated factors impacting caregiver choice of service modality. The purpose of the current preliminary evaluation was to evaluate behavioral outcome differences based on of treatment modality and self-reported rationales for modality selection. Specifically, we examined changes in problem behavior for patients of caregivers that selected to be trained to deliver function-based treatments exclusively via telehealth, exclusively in-person, or using a hybrid of both modalities.

Method

Design

The study was an open-trial, quasi-experimental design. All work was conducted in accordance with the Declaration of Helsinki, and with the approval of the Institutional Review Board.

Participants

Participants included children and their caregivers who had either self-referred or had been referred to a large-volume outpatient clinic for the assessment and treatment of externalizing problem behavior. Families were sampled from those that received behavioral intervention between August 20, 2020 and March 30, 2022. Additional inclusion criteria included (1) the child targeted for intervention (i.e. identified patient) was between 2 and 12 years of age, (2) the primary caregiver (i.e. adult identified as providing care for the child for the majority of the week) agreed to be trained to deliver a function-based behavioral intervention, (3) all participants

Table 1. Participant characteristics via different service delivery models.

Variable	In-person (<i>n</i> = 9)	Telehealth (<i>n</i> = 10)	Hybrid (<i>n</i> = 30)
Age: <i>M</i> (range)	6.4 (5–10)	5.9 (4–7)	5.2 (3–9)
Gender	2F, 7 M	1F, 9 M	12F, 18 M
Self-identified race: <i>n</i> (%)			
White	1 (11%)	5 (50%)	11 (36%)
Black	5 (55%)	4 (40%)	14 (47%)
Other	3 (33%)	1 (10%)	5 (17%)
Ethnicity: <i>n</i> (%)			
Hispanic	1 (11%)	0 (0%)	0 (0%)
Primary diagnosis: <i>n</i> (%)			
ODD	8 (89%)	10 (100%)	24 (80%)
ADHD	1 (11%)	0 (0%)	5 (16%)
DMDD	0 (0%)	0 (0%)	1 (3%)
Distance from clinic			
Miles: <i>M</i> (SD)	5.6 (4.3)	23.7 (28.9)	21.5 (19.3)
Miles: range	1.3–12.5	4.6–78.4	0.8–70.9

Note. F: female; M: male; ODD: oppositional defiant disorder; ADHD: attention deficit hyperactivity disorder; DMDD: disruptive mood dysregulation disorder.

receiving intervention spoke English as their primary language. Family constellations were heterogeneous and included grandparents, biological parents, and/or foster parents as primary caregivers; however, only one caregiver was identified as the primary caregiver for the purposes of consistency in training and data collection. Additional caregivers were eligible to be trained in study procedures following successful participation from the primary caregiver.

Treating clinicians identified 63 participants as meeting eligibility criteria for inclusion, 49 of whom went on to complete treatment. *Tantrums* (e.g., screaming, vocal protests, and throwing items) were the target problem behaviors for all participants. Participants were categorized into one of three groups based on treatment modality. Those who received treatment entirely in-person and online were categorized as In-Person and Telehealth, respectively. Those who received any combination of in-person and online treatment services were categorized as Hybrid. Table 1 includes characteristics of all child participants. Most children were male ($n = 35$; 71%), black ($n = 25$; 51%), and averaged 5.5 years of age ($SD = 1.63$). The majority of the families had government-sponsored health insurance (e.g. Medicaid; $n = 40$; 82%), and met criteria for Oppositional Defiant Disorder (American Psychiatric Association, 2013; $n = 42$; 86%).

Settings and equipment

The study was conducted within a large outpatient program at a hospital-based psychology department. All in-person appointments were conducted in 10-by-12-foot outpatient treatment rooms at the clinic. Rooms were barren except for video-recording equipment, tables, chairs,

and items necessary for appointments (e.g., preferred stimuli, demand tasks). Therapists conducted telehealth appointments from on-site offices to families receiving live remote instruction in their homes (e.g. living spaces, child's bedroom). Families were encouraged to use their own technology (e.g. smart phones, tablets) that contained audio/visual components and internet. However, the clinic provided these items (e.g., tablet devices, portable internet hotspots) for families unable to access the internet or obtain an appropriate smart device. Therapists communicated with families using a web-based interface (i.e., Zoom) to conduct remote appointments. Participants' caregivers determined treatment modality. Therapists provided anecdotes of their experiences regarding modality type when solicited for input. Caregivers could shift between in-person and telehealth modalities during the course of treatment based on their preferences. Clinical appointments were 50–60 min, regardless of service modality. Safety plans were developed prior to appointments to address any potential concerns that might occur during therapy.

Outcome measures

Text Message Behavior Rating is a system used to standardize the daily collection of between-appointment problem behavior. Caregivers were enrolled in a text-message service that prompted them each evening at the same time to respond with a numeric value of the frequency of tantrum behavior for that day (e.g., “How many tantrums did you observe today?”). Caregivers were instructed to respond by texting the number the corresponded to their observation of the total number of tantrum behaviors that occurred that day. Caregivers that opted out of the text-message service were provided with paper data sheets to fill out between appointments and return to the clinician.

Daily Behavior Rating Scale is a one-item question measured on a using Likert scale that caregivers used to rate their impression of the functional impairment caused by their child's problem behavior. At the beginning of each appointment, caregivers were asked, “on a scale of 0–10, please rate the impact of your child's tantrum behavior on your family's functioning since the previous appointment.” Anchors were set at 0–3 (mild issues), 4–7 (moderate issues), and 8–10 (severe issues).

Response definitions

The primary dependent variables were (1) clinical outcomes following implementation of a function-based intervention, including retention in services and child problem behavior reduction and (2) caregiver report

around factors impacting service modality selection. Clinical outcomes were categorized as *attendance*, *number of appointments*, *attrition*, and *problem behavior*. *Attendance* and *number of appointments* were calculated on an appointment-by-appointment basis. An appointment was counted and scored as a “attended” if the family arrived within 15 min of their scheduled appointment time and remained for the scheduled duration of the appointment. *Attrition* was scored if a family (a) missed an appointment (e.g. “no-show”) and did not contact the clinician within 2 weeks to reschedule or (b) cancelled in advance of an appointment and did not seek to reschedule within 30 days.

Rates of child *Problem behavior* were collected by caregivers between appointment and by trained observers on a trial-by-trial basis within-appointment for both service modalities. These data were used by therapists to make data-based treatment decisions related to caregiver skill acquisition and child behavior reduction. However, for purposes of reporting in the current study, data analyzed include only those collected by caregivers between appointments (i.e., rate of child problem behavior between appointments). The rationale for limiting data reporting to only include between-appointment data involved limitations inherent to direct observation via synchronous audio-video teleconferencing. Specifically, it was simply more difficult to reliably observe the entire corpus of child problem behavior during telehealth appointments than it was in-person. In order to standardize data reporting across service modalities, the decision was made to evaluate outcomes only on parent observation of between-appointment rates of child problem behavior.

Procedure

Therapists were advanced doctoral students with 2 or more years’ experience in providing behavioral caregiver training and treating problem behavior. Families were assigned to a specific therapist at the onset of their treatment course, regardless of which modality they opted to receive services. Therapists reviewed their availability with each family on a week-to-week basis, which was generally a very broad choice of times (e.g., therapists worked 8-hour days, with availability distributed throughout the week to include morning, afternoon, and evening therapy slots). Treatment plans and behavioral data were reviewed each week with a dually licensed doctoral-level Board-Certified Behavior Analyst and psychologist supervisor. Therapists trained caregivers to conduct all assessment and intervention components described below using instruction, modeling, role play, and feedback (i.e. behavioral skills training; Sarokoff & Sturmey, 2004). Teaching procedures differed between modalities in that therapists were

unable to model the use of behavior skills (e.g. physical prompting procedures) with identified patients via telehealth. As such, children participating in-person were included in the parent skills training procedure after the initial instruction phase. In contrast, children were included later on in the caregiver skill acquisition process for those families participating in telehealth: skills were provided via vocal and written instructions and then practiced using relevant stimuli with the caregivers prior to including the child. Therapists used in-vivo coaching to interrupt if procedures were being implemented incorrectly.

Functional interview

Therapists worked with caregivers to complete a semi-structured functional interview during the first appointment. Caregivers were asked to select problem behaviors from a checklist and report on relevant environmental events (e.g. antecedents and consequences) that may influence problem behavior. The purpose of this indirect assessment was to determine behavioral issues that may be impacting the child at home, school, and the community, create operational definitions of the target behavior, and to develop functional hypotheses that could then be tested experimentally as part of the assessment process.

Synthesized contingency analysis

Therapists trained caregivers to implement a synthesized contingency analysis (SCA; e.g., Hanley et al., 2014) using a standardized teaching procedure called the “Analog Teach” in which therapists deliver scripted instructions to caregivers that provide information about the analysis procedures and solicit information to check understanding (Edelstein et al., 2021). Prior to implementing SCA, caregivers were asked to role play the relevant test condition with the therapist to ensure fluency with the procedures. The teach procedure was created to ensure reliability between therapists and was able to be conducted either in-person or via telehealth. As such, participating families were not required to change their preferred service modality in order to complete the assessment process or complete a valid synthesized contingency analysis. In order to minimize the safety risk during the analysis, the Teach trains caregivers on identification and reinforcement of “low level” or precursor challenging behaviors (e.g., whining, grunting) as opposed to significant interfering behaviors (e.g., aggression, property destruction). In that way, the analysis could be conducted safely from the caregivers’ homes via telehealth. Therapists also discussed safety planning with caregivers prior to the implementation of baseline

procedures. The written analog teach procedure is available from the first author upon request.

The SCA was conducted by the caregiver along with their child in order to assess the variables hypothesized to evoke and maintain problem behavior using a multielement design in which test and control conditions were alternated. Conditions were individualized for participants based on information provided by caregivers in the functional interview and included both synthesized tests for positive reinforcement (i.e. tangible + attention) as well as tests for both positive and negative reinforcement contingencies (i.e. escape + tangible). Tests for synthesized positive reinforcement contingencies involved the removal of a highly preferred item and attention by the caregiver and were returned for approximately 30 seconds contingent on the first instance of operationally defined problem behavior. Alternatively, tests for both positive and negative reinforcement contingencies involved both the removal of a high preferred item (i.e. tangible) as well as the presentation of a demand by a caregiver (e.g., “time to do homework”). Both evocative stimuli were then removed for approximately 30 seconds contingent on the first instance of problem behavior. These procedures were repeated until 5 minutes elapsed. Finally, in control conditions, caregivers were taught to allow their child unrestricted access to preferred activities as well as provide noncontingent attention for the duration of the 5 minute condition.

Data were collected by trained observers in real time using pencil and paper data, and converted to responses per minute by dividing the total number of target behaviors observed over the total amount of time in each condition. Observance of problem behavior in test conditions and absent in relevant control conditions confirmed the functional hypotheses generated from the caregiver interview and aided in selection of relevant treatment components. Data obtained from the test conditions of each participant’s SCA served as the baseline for subsequent within-appointment data collection.

Treatment evaluation

Treatment for all participants involved a wait-training procedure designed to shape appropriate communication and teach tolerance for delays to positive reinforcement (Edelstein et al., 2021). Data were collected as number of target behaviors per minute on a trial-by-trial basis by trained observers using pencil and paper data collection. At the beginning of each treatment appointment, caregivers were coached to conduct a preference assessment consistent with multiple stimulus without replacement procedures (MSWO; DeLeon & Iwata, 1996) to confirm their child’s preferences. This procedure

was repeated as needed throughout the treatment evaluations in order to account for fluctuating preferences (e.g., MacNaul et al., 2021).

The first phase of treatment involved functional communication training (FCT; Carr & Durand, 1985), designed to teach functional communicative responses (FCRs) to replace problem behavior. Specifically, consequences observed to maintain problem behaviors were no longer provided following problem behavior (i.e., extinction) and were instead FCRs provided following independent emission of an FCR. FCRs included “my turn” (tangible) and “help please” (attention). In each modality, caregivers were trained to use physical prompting using a card exchange paired with a vocal response to ensure participants reliably accessed reinforcement. After the child emitted three consecutive physically prompted communication responses, therapists coached caregivers to use less-intrusive prompting procedures, such as pointing to the FCR card, to promote independent requesting. The second phase of treatment began after the child emitted three consecutive independent communication responses in the absence of problem behavior.

In the second phase of treatment the schedule of reinforcement for FCR emission was thinned. Specifically, following an FCR, participants were required wait appropriately (i.e., without any problem behavior) for a set duration before delivery of the putative reinforcer. For all participants, initial wait criteria were set for 5 s to standardize the procedures and increase the likelihood of accessing reinforcement after waiting. Following three consecutive trials with independent FCR emission and appropriate waiting (i.e. absence of problem behavior for the specified interval), the wait duration was increased. Using a changing-criterion design (Cook et al., 2015), functional control was demonstrated when the duration without problem behavior increased following changes to the wait interval. Terminal wait criteria were established collaboratively with caregivers prior to the start of this treatment phase, and ranged from sixty seconds to three minutes.

The final phase of treatment involved teaching tolerance for denied access, which required children to refrain from engaging in problem behavior when preferred items were unavailable. Following an appropriate request for a preferred item, caregivers were instructed to indicate that the requested item was unavailable. Contingent on 3–5 seconds of appropriate behavior following the adult denial statement, participants were then offered access to alternative, lesser-preferred items or activities (as determined via preference assessment). Denial trials were alternated on a variable schedule in order to avoid signaling to the child that their request would be denied. Once an item or activity was denied, it was unavailable for the duration of the appointment.

Service Selection Questionnaire

Following each treatment course, caregivers were sent emails requesting their completion of the Service Selection Questionnaire. The Service Selection Questionnaire is a 13-item measure developed by the first author (Appendix A) designed to assess (1) factors impacting caregivers' decisions around service modality for therapy, and (2) caregivers' overall satisfaction with services. Respondents were asked to respond to questions using a 5-point Likert scale, ranging from 1 = strongly disagree to 5 = strongly agree. Therapists were available to answer any questions about survey items by email or by phone.

Data analysis

In order to evaluate the effects of the intervention within groups, paired sample *t*-tests were conducted in Microsoft Excel[®] to compare dependent variables pre- and post-treatment. Cohen's *d* effect size estimates were also provided for all significant results. In addition, a one-way ANOVA was performed to compare the impact of different service modalities on appointment attendance, number of appointments, and treatment attrition. Missing data were handled by excluding cases pairwise. All data and materials can be made by the first author upon reasonable request.

Results

Participant characteristics

Table 1 details the characteristics of the participants in treatment across service modalities. Children did not differ substantially with regard to age, gender, or diagnosis between service modality groups. Perhaps unsurprisingly, there were differences in the distances to the clinic, with the in-person group living fewer miles away ($M = 5.55$, $SD = 4.3$) than either the telehealth ($M = 23.7$, $SD = 28.9$) or hybrid groups ($M = 21.5$, $SD = 19.3$). There were also some small differences in self-identified races between service groups, though those differences were not statistically significant.

Service modality outcomes

Table 2 highlights the differences in behavior outcomes across service delivery modalities. Mean percentage reduction of tantrum behavior was largest among the in-person group ($M = 81\%$, $SD = 20.1$), with participants demonstrating statistically significant improvement from baseline ($p < 0.005$). Both telehealth and hybrid service modalities had similar

Table 2. Behavioral outcomes across different service delivery modalities.

	% Reduction <i>M</i> (SD)	Pre-Tx rate <i>M</i> (SD)	Post-Tx rate <i>M</i> (SD)	<i>t</i>	Effect size (<i>d</i>)
In-Person					
PB/Day	81% (+/-20.1)	3.7 (2.6)	0.6 (0.7)	3.79*	1.65
BRS	55% (+/-2.34)	7.6 (1.3)	3.3 (2.4)	6**	2.23
Telehealth					
PB/Day	21% (149)	3.4 (2.3)	1.9 (2.3)	1.42	–
BRS	30% (2.5)	7 (1.5)	4.4 (2.4)	3.78*	1.31
Hybrid					
PB/Day	21.2% (169)	3.8 (2.5)	1.8 (2.3)	3.19*	0.83
BRS	30% (2.29)	8.2 (1.6)	4.8 (2.3)	7**	1.69

Note. PB/Day: problem behavior per day; BRS: Behavior Rating Scale; Tx: treatment.

* $p < 0.005$; ** $p < .0001$.

Table 3. Participant characteristics via different service delivery modalities.

Variable	In-person (<i>n</i> = 9)	Telehealth (<i>n</i> = 10)	Hybrid (<i>n</i> = 30)
% Attendance: <i>M</i>	69	71	72
% Attrition: <i>M</i>	31	33	14
Num. of Appointments: <i>M</i>	5.6	8.1	8.2

pre-post outcomes regarding caregiver-reported reductions in problem behavior (telehealth: $M = 21\%$, $SD = 149$; hybrid: $M = 21.2\%$, $SD = 169$) and subjective report of functional impairment (BRS; telehealth: $M = 30\%$, $SD = 2.5$; hybrid: $M = 30\%$, $SD = 2.29$). However, only pre-post behavior reduction in the hybrid modality reached statistical significance ($p < 0.005$). Further, a higher percentage of participants reached the 80% reduction goal when receiving in-person services (55%) than in either telehealth (25%) or hybrid (46%) services. For a complete description of pre-post results across treatment groups, see Table 2.

Table 3 shows data on attendance and attrition. Caregiver choice of service modality did not appear to influence attendance, with in-person appointment show rates averaging 69% (telehealth), 71% (in-person), and 72% (hybrid). However, caregivers that elected to access services via a hybrid format (i.e. some in-person and some telehealth appointments) had the lowest attrition ($M = 14\%$) as compared to in-person and telehealth-only types ($M_s = 31$ and 33% , respectively). One-way ANOVA analyses revealed no significant differences between the groups with regard to attendance $F(2,46) = 0.289$, $p = 0.75$, number of appointments $F(2,46) = 3.08$, $p = 0.055$, or attrition $F(2,46) = 1.44$, $p = 0.243$.

Within group analyses

To better understand the influence of treatment modality on behavioral outcomes, we examined outcomes across the percentage of appointments conducted in-person or via telehealth. Figure 1 displays average rates of problem behavior during baseline and the final three appointments of

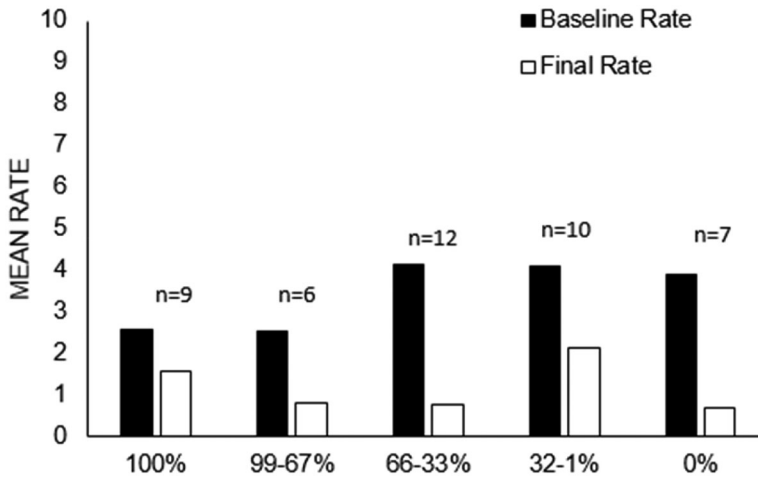


Figure 1. Average rate of parent-reported problem behavior pre-post treatment. *Note.* Percentages are out of the total number of appointments conducted via telehealth.

treatment as a function of the percentage of appointments that occurred via telehealth. That is, participants captured by the 0% category received all of their services in-person, whereas participants in the 100% category received all of their services remotely. As families were permitted to change their service modality depending on their individual needs, these data reflect only the total proportion of appointments conducted remotely and not a single shift from one modality to another. Baseline rates of problem behavior were generally lowest for individuals that received 67–100% of appointments via telehealth. No systematic effect was observed such that lower percentages of telehealth appointments were associated with greater reductions in problem behavior. However, final rates of problem behavior were marginally lowest among participants who received services exclusively in-person ($M = 0.68$ behaviors per day).

To further evaluate whether switching modalities affected outcomes, we categorized participants based on the average type of modality received after their first appointment. For example, a participant whose first three and final seven appointments were in-person and via telehealth, respectively, was categorized as In-Person to Telehealth. [Figure 2](#) reflects the mean rate of problem behavior during baseline and the final three appointments of treatment across service modalities. Visual inspection of these analyses suggest that participants that received all of their services in-person had the lowest rate of behavior at the final appointment. Individuals that started services via telehealth and transitioned to in-person had the overall greatest reductions from baseline (71.7%; Baseline $M = 3.9$; Final treatment appointment $M = 1.1$). Participants that received their entire treatment course via telehealth

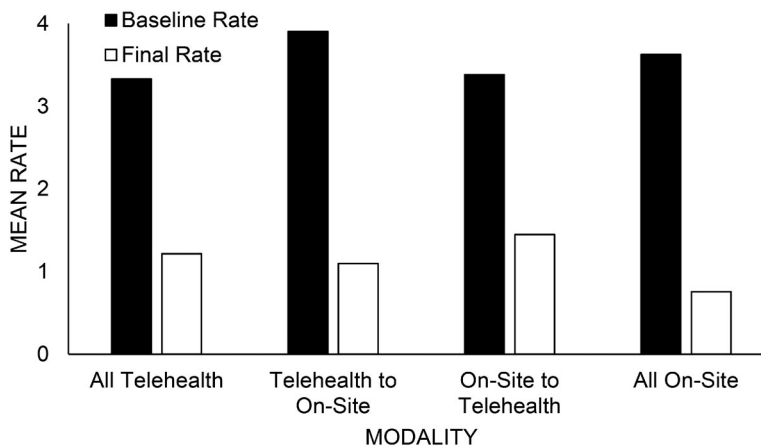


Figure 2. Average rate of parent-reported problem behavior across service modality type. *Note.* Telehealth to in-person and in-person to telehealth refer to treatments that began remotely and moved to in-person and began in-person and moved to remote, respectively.

Table 4. Service Selection Questionnaire results.

Question Summary	In-person (<i>n</i> = 6)	Telehealth (<i>n</i> = 7)	Hybrid (<i>n</i> = 13)
	<i>M</i> (range)	<i>M</i> (range)	<i>M</i> (range)
Caregiver availability	2.3 (1–4)	4.3(4–5)	3.9 (2–5)
Perceived speed of improvement	4.3 (3–5)	3.7 (3–5)	3.9 (2–5)
Therapist availability	1.5 (1–2)	1.9 (1–3)	1.8 (1–3)
Comfort with technology	1.2 (1–2)	3.7 (3–5)	3.2 (2–4)
Therapist support	4.7 (4–5)	4.3 (4–5)	4.5 (4–5)
Able to learn skills	4.3(4–5)	3.4 (3–5)	3.6 (3–4)
Treatment effective	4.5 (4–5)	3.3 (3–4)	3.5 (2–4)

Table 5. Additional service Selection Questionnaire questions given to hybrid group.

Question summary	Hybrid: <i>M</i> (range)
Switch based on:	
Caregiver availability	3.1 (2–5)
Tech. difficulties	1.6 (1–2)
Progress failure	4.3 (4–5)
Modality effectiveness	
Equally effective	2.2 (2–3)
In-person more effective	4.6 (4–5)
Telehealth more effective	1.5 (1–2)

had the least symptom reduction, with an overall percent reduction of 63.3% (Baseline $M = 3.33$; Final treatment appointment $M = 1.21$).

Service Selection Questionnaire

Twenty-six caregivers responded to the Service Selection Questionnaire (see Tables 4 and 5). For the participants that received in-person services only, the questions that averaged the highest scores asked about amount of support from the clinician ($M = 4.7$) and the effectiveness of therapy

($M = 4.5$). The questions that averaged the lowest scores asked about the degrees to which modality choice was based on either caregiver availability ($M = 2.3$) or comfort with technology ($M = 1.2$).

For participants that received telehealth services only, the questions that averaged the highest scores asked about support from the therapist ($M = 4.3$) and the degree to which modality choice was based on caregiver availability ($M = 4.3$). The questions that averaged the lowest scores asked about the effectiveness of the therapy ($M = 3.3$) and the degree to which modality choice was based on therapist availability ($M = 1.9$).

Participants that received both telehealth and in-person (i.e. hybrid; Table 5) services over the course of their treatment averaged the highest scores around the support provided by their clinician ($M = 4.5$), the degrees to which their choices were based on their own availability ($M = 3.9$), and their perceptions around speed of improvement ($M = 3.9$). They averaged the lowest score in the degree to which their choice was based on the clinician's availability ($M = 1.8$). This group was also asked to answer additional questions around their choices for switching modalities, and endorsed the most agreement around failure to make progress ($M = 4.3$). This group of participants also reported on their perceptions of effectiveness between modalities, indicating that in-person services were more effective ($M = 4.6$).

Discussion

Thorough understanding of the benefits and shortcomings of interventions delivered via telehealth as compared to in-person are needed given the increasing use of telehealth-delivered treatment services (Samson et al., 2021). Recently, hybrid service delivery models in which patients receive care both in-person and via telehealth have started receiving attention across disciplines (e.g., Aweidah et al., 2020; List et al., 2021). However, investigations of the use of hybrid models for the treatment of problem behavior requires additional research. The results of this preliminary investigation suggest that behavioral interventions delivered via a hybrid model resulted in greater reduction in problem behavior than those delivered fully via telehealth.

Although all participants demonstrated reductions in problem behavior from baseline, we observed the greatest reductions with families that chose in-person only services ($M = 81\%$). In contrast, though reductions were observed for families receiving treatment entirely via telehealth, these reductions were not statistically significant for the group. Notably, function-based behavioral treatments delivered via telehealth have been observed to be effective when delivered via telehealth (e.g., Schieltz &

Wacker, 2020; Suess et al., 2016). Speculatively, one reason for the difference between the current investigation and previous studies may be due to the populations included in each. Children included in the current study were diagnosed primarily with behavioral disorders but were otherwise typically developing; whereas the majority of participants in some prior studies were diagnosed with autism spectrum disorder or another developmental disability. Further research is needed to evaluate characteristics of patients and caregivers that might influence the efficacy of behavioral interventions. For example, histories of contact with treatment procedures may differ between caregivers of children with autism and those without.

Families that chose the hybrid approach combining both in-person and telehealth service modalities achieved greater behavioral reductions than those that opted for telehealth alone. Specifically, those that began treatment via telehealth by ended treatment with primarily in-person appointments saw greater reductions than those who started in-person and shifted to telehealth. These outcomes could be due partially to caregivers selecting inopportune times to change treatment modality, or could instead reflect a broader limitation of the primary outcome measure used in the current study (i.e. frequency of tantrums per day, reported by caregivers via text message system). Alternatively, it may be that some of the skills used later in treatment (e.g., denial training) were coached more effectively in-person rather than via telehealth. Researchers have observed that in-person feedback improves performance greater than other modalities of feedback (Warrilow et al., 2020). Whether certain skills in the treatment process are more easily trained or coached requires additional research. Researchers and therapists may be able to develop a more systematic hybrid model if they know whether particular skills are learned more effectively or efficiently in-person.

Caregiver choice of whether to receive behavioral services in-person or via telehealth appeared to differ among groups. Caregivers that selected treatment entirely in-person reported making their selection primarily based on perceived improvement speed; whereas, caregivers that selected entirely telehealth-based treatments reported doing so primarily because of their availability. Interestingly, average scores for those in the hybrid group fell between the in-person and telehealth groups. These results suggest that caregivers choosing telehealth were doing so primarily due to their availability. Caregiver availability may have also affected caregiver deliver of consistent treatment and thus, influenced the efficacy of treatment. Neither caregivers that received telehealth and hybrid treatments reported high agreement that therapy was effective. However, those that received hybrid treatment reported that in-person was more effective than telehealth. These

preliminary results may not be surprising, as previous research on the systematic teaching of behavioral skills to children and caregivers has been well established using in-person services (Tiger et al., 2008). However, given the recent increase research documenting the utility and acceptability of telehealth following COVID-19 pandemic-related social distancing (Sullivan et al., 2021), additional investigation regarding the conditions under which caregivers choose a given treatment modality seems warranted. Caregivers may choose a telehealth option because of availability, lower response effort, cost-effectiveness. Choice skewed toward the use of telehealth, with 84% of all families choosing to incorporate remote service provision in some way (i.e. telehealth only or hybrid). Ultimately providing caregivers a choice about how to receive their services seems valuable, as evidenced by low attrition data among the hybrid group. Researchers should more formally assess the conditions under which caregivers make treatment choices of varying types and evaluate correspondence between such choices and actual outcomes.

The current study is a preliminary investigation of caregiver modality choice and related treatment outcomes. As a preliminary study, this evaluation is limited in a number of ways. First, the results were based on small sample sizes across service modalities. As such, larger-scale replications are needed to evaluate the generality of such outcomes. Future researchers might build off of these methods using larger randomized groups, as larger numbers in each group would increase power and reduce Type II error. For instance, with a significance criterion of $\alpha = 0.05$ and power set at 0.80, the minimum sample size needed to reach a medium effect (i.e. 0.50) would be at least 30 participants in each group (Faul et al., 2007). Second, participants were not randomized across groups and could switch groups at any time by asking. Allowing participants to change groups was done intentionally to examine whether and how often participants would change groups. However, participants should be randomized across groups to best isolate the influence of treatment modality. In addition, the validity of the results in any future extension would be bolstered by minimizing other sources of bias, including blinding authors to service modality during data analysis.

Third, therapist input was not controlled across caregivers. Input was only provided when solicited by caregivers and consisted primarily of therapists describing the benefits and limitations associated with each type of service modality. However, such input was not structured in a specific way and may have influenced initial caregiver selections. Finally, participants received the same treatment protocol. Although use of a well-defined independent variable is a potential strength of the current report, implications for the impact of service modality on other

behavioral treatments may be limited. However, the procedures used in the current intervention of socially-mediated problem behavior have a strong evidence base, both in the behavior-analytic literature (e.g., see Hanley et al., 2014) and in the behavioral caregiver training literature more broadly (e.g., Barkley, 2013). Future research should seek to evaluate the impact of service modality more systematically, with participants being randomized to specific service modalities for treatment delivery. Other avenues for future research include identifying specific caregiver variables as well as different types of behavior problems that may lend themselves best to specific service modalities.

Overall, the current study sought to offer preliminary guidance for practitioners seeking to integrate different service modalities into their practice. Although caregivers tended to choose telehealth over in-person services for the majority of appointments, the use of in-person services was correlated with better outcomes (particularly if in-person services occurred early in treatment). Although there is still much work to be done in order to prescribe specific service modalities in a given treatment course, clinicians may find it useful to be “armed” with both caregiver values around modality selection as well as outcome data to guide families. As such, the current investigation offers initial takeaways relevant to the work of behavioral therapists navigating the post-COVID world.

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Data availability statement

All study materials can be made available by the corresponding author upon request.

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Appendix A. Caregiver Treatment Selection Questionnaire

Service Selection Questionnaire

Client initials: _____ Caregiver initials: _____

Please select service type: In-person Telehealth Both

If you selected “both” please indicate which type you started with: In-Person Telehealth

	1	2	3	4	5
	Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree
My initial choice of service type (in-person/telehealth) was based on my scheduling/availability to attend appointments	1	2	3	4	5
My initial choice of service type (in-person/telehealth) was based on how quickly I thought my child’s difficulties would improve	1	2	3	4	5
My initial choice of service type (in-person/telehealth) was based on therapist availability	1	2	3	4	5
My initial choice of service type (in-person/telehealth) was based on my ability to reliably use audio/visual technology (e.g. web cameras, personal computers, Zoom [®])	1	2	3	4	5
I felt supported by my child’s therapist throughout treatment	1	2	3	4	5
I felt that I was able to learn the skills necessary to help my child to be successful	1	2	3	4	5
I felt that therapy was effective in addressing the challenges my child was experiencing	1	2	3	4	5
If you attended both in-person and telehealth appointments:					
My reason for switching service types (in-person/telehealth) was based on my scheduling/availability to attend appointments	1	2	3	4	5
My reason for switching service types (in-person/telehealth) was based on difficulties with audio/visual technology (e.g. web cameras, personal computers, Zoom [®])	1	2	3	4	5
My reason for switching service types (in-person/telehealth) was due to my child’s failure to make progress	1	2	3	4	5
I felt that therapy was equally effective in both service modalities (in-person and telehealth)	1	2	3	4	5
I felt that in-person services were more effective than telehealth at addressing my child’s behavior problems	1	2	3	4	5
I felt that telehealth services were more effective than in-person at addressing my child’s behavior problems	1	2	3	4	5

Thank you for completing our survey. If you have any additional questions or concerns, please reach out to our intake team at XXX-XXXX

Comments:
