IMPROVING SOCIAL VALIDITY OF BEHAVIORAL INTERVENTIONS IMPLEMENTED WITH YOUNG CHILDREN

By

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Chapter 1: Centering Autistic Perspectives: Social Acceptability of Goals, Learning Contexts, and Procedures for Young Autistic Children

Although it is critical to know what works, for whom, and under what conditions when selecting evidence-based interventions for young autistic children (Wolery, 2013), early childhood special education (ECSE) practitioners must consider more than just efficacy in educational decision-making—they are also tasked with determining whether their educational decisions are socially valid. That is, they must determine whether the goals they develop are socially significant, that intervention procedures they choose are socially acceptable, and that outcomes of these choices are socially important to the young autistic children and families they serve (Wolf, 1978).

Social validity is consequential for a number of reasons. Importantly, the field of ECSE was developed in order to "intervene early for the benefit of children and families" (Wolery & Bailey, 2002). However, in order to determine what will benefit children and families, it is critical to first determine what they find beneficial, and then make educational decisions that align with their values. Relatedly, research indicates that higher perceived social validity of a practice correlates with its use by special educators (McNeill, 2016), indicating that socially valid practices may be more likely to be adopted by practitioners. Finally, social validity has become woven into the fabric of high-quality research. For example, tools for assessing quality of single case research studies (e.g., Horner et al., 2005; Ledford et al., 2020) include measure of social validity as a quality indicator. Further, proof of social validity of findings (e.g., acceptability, feasibility, usability) is required by major funding sources for educational research, including the Institute of Education Sciences (Higgins & Brasiel, 2020; National Center for Special Education Research, 2022) and The Spencer Foundation (Ahram & Erickson, 2020).

Since the concept of social validity was first introduced into social-behavioral sciences more than 40 years ago (Wolf, 1978), ECSE researchers have made meaningful strides in measuring the perspectives of some stakeholders, particularly with adult stakeholders (e.g., parents, teachers). Although there are a variety of methods for measuring social validity, researchers typically conduct post-intervention surveys, questionnaires, or interviews with parents (e.g., Rivard et al., 2017; Rodgers et al., in preparation) and/or ECSE practitioners (e.g., Fettig et al., 2016; Trimlett et al., 2022) of young autistic children. In a large-scale systematic review of evidence-based interventions for autistic populations, 26.7% included a measure of social validity (Callahan et al., 2017). Similarly, in a 20-year systematic review of pro-social interventions for young autistic children, 44% included a measure of social validity (Ledford et al., 2016). These data represent a limited body of knowledge, capturing *some* stakeholder perspectives on the goals, procedures, and outcomes of *some* interventions designed for young autistic children.

In addition to social validity data collected within quantitative studies, ECSE researchers have also conducted qualitative research with some stakeholders. Qualitative research in ECSE typically incorporates interviews (e.g., individual interviews, focus groups), observations (e.g., classroom observations), and/or reviews of documents (e.g., individualized education plans, written communication between stakeholders; (Sandall et al., 2002), and can be used to better understand the values and perspectives of educational stakeholders for young autistic children. Researchers in ECSE and related fields have conducted qualitative studies with parents (e.g., Baglama & Demirok, 2016; Mackintosh et al., 2012; Pearson & Meadan, 2018; Schwichtenberg & Poehlmann, 2007), ECSE practitioners (e.g., Gomez et al., 2020), and combinations of parents and practitioners (e.g., Gholipour et al., 2022; Kelly et al., 2022). ECSE researchers have also conducted mixed methods studies, combining qualitative and quantitative research methods, to develop a more holistic view of the efficacy and acceptability of interventions (Corr et al., 2020). Like social validity data within quantitative studies, available qualitative and mixed methods data capture *some* stakeholder perspectives on the goals, procedures, and outcomes of *some* services provided to young autistic children.

It is reasonable that researchers would seek to understand the values and perspectives of the adult stakeholders are tasked with educational decision-making and provision. Researchers must develop practices that are acceptable and feasible to the people who will select and implement them; when evidence-based practices lack social validity, adult stakeholders fail to adopt them, and the gap between research and practice widens. However, ECSE researchers have historically overemphasized the perspectives of adult implementers, and underemphasized the perspectives of child participants. For example, in a 38-year review of social competence interventions for preschool children (including autistic participants), Hurley (2012) found that of 90 studies that met inclusion criteria, only one study (Spohn et al., 1999) reported a social validity measurement that captured the perspective of child participants. Similarly, in Ledford and colleagues' (2016) systematic review of pro-social interventions for young autistic children, authors found that the only social validity data collected of young autistic participants were of normative comparisons (i.e., assessing the degree to which participants and their peers engaged in similar behavior, prior to and following intervention). That is, across studies, no researchers consulted with young autistic children in order to determine whether they found goals, procedures, or outcomes socially acceptable. Further, social validity

measures that compare autistic children to their neurotypical peers may be considered inappropriate or problematic by neurodiversity advocates (Ne'eman, 2021), so these measures may in themselves lack social validity.

In developing and selecting interventions for use with young autistic children, it is critical to incorporate the perspectives of children directly receiving interventions. First, all individuals deserve the right to participate in decision-making about the interventions they receive (Bannerman et al., 1990), including determining that the goals and procedures selected are acceptable to them. The ethical codes for both medical care (Riddick, 2003) and social-behavioral research (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979) require that human rights and dignity be upheld within compassionate practice, including the right to make informed decisions (e.g., informed consent), to refuse treatment, and to access additional protections, when patients or participants belong to vulnerable populations whose autonomy is legally limited. It serves to reason that these principles should also extend into educational decision-making. Although preschool-aged children may have language and cognitive limitations that curb their participation in some decision-making processes (e.g., individualized education plan meetings, discussions of long-term benefits and risks of proposed interventions), researchers are developing novel methods for assessing preference for interventions, as compared to alternative intervention options (e.g., via concurrent chains preference assessments; Chazin & Ledford, 2021; Ledford et al., 2017; Owen et al., 2021) or no intervention (e.g., via the enhanced choice model; Rajaraman et al., 2022), which can be used with children with a range of ages and skill levels.

In addition to directly assessing socially validity with young autistic children, ECSE researchers can also seek the perspectives of autistic adults. Autistic perspectives allow us to identify ways typical educational practices are potentially problematic, ableist, or even cause trauma or harm. By incorporating their perspectives into educational decision-making, we can improve recommendations and practices to be more trauma informed, autistic affirming, and socially valid. For example, autistic self-advocates have identified that stereotypy may improve self-regulation and sense of well-being for autistic individuals (Heathers et al., 2019; Joyce et al., 2017; Kapp et al., 2019; Manor-Binyamini & Schreiber-Divon, 2019; Milton & Sims, 2016), which has led researchers and practitioners to call into question the propriety of reducing non-dangerous stereotypy (e.g., Ledford et al., 2021; Schuck et al., 2021). Similarly, pushback against the use of extinction procedures from autistic advocates and allies (e.g., Ram, 2020; Wilkenfeld & McCarthy, 2020) may be connected to the recent surge in research assessing augmentative and alternative procedures (e.g., Chazin et al., 2021; Rajaraman et al., 2022; Trump et al., 2020).

Despite the critical importance of including autistic perspectives in ECSE, few studies have directly assessed autistic perspectives on typical ECSE practices. Of those we were able to identify (e.g., Anderson, 2022; Kelly & Colon, 2022; McGill & Robinson, 2020), researchers asked autistic adults to reflect on experiences with behavior analytic therapies from their childhoods, rather than a current, comprehensive range of educational practices. In order to bridge this knowledge gap, and develop autistic-affirming recommendations for practitioners, we conducted a mixed methods survey of autistic adults. In order to identify gaps or discrepancies between stakeholder groups, and ensure that recommendations were aligned with practices that felt feasible and useful to most likely implementers, we also extended the survey to parents and practitioners of young autistic children. Research questions were as follows:

1. What goals, learning contexts, and behavioral intervention procedures do autistic adults prioritize and deprioritize for young autistic children, and how do these perspectives compare to those of parents and practitioners of young autistic children?
2. Which stakeholder perspectives do autistic adults consider to be most and least important in making decisions about the goals, learning contexts, and procedures implemented with young autistic children? How do these perspectives compare to those of parents and practitioners of young autistic children?

Method

Survey Design

The survey consisted of a preliminary page for reporting demographic information, followed by three sections for reporting perspectives on teaching young autistic children, including (1) developing educational goals, (2) designing learning contexts, and (3) selecting intervention procedures to reduce challenging behavior. Each section contained 1–4 matrices (with 5–28 items each), in which respondents rated the importance and acceptability of various goals, learning contexts, and procedures commonly used in ECSE settings. Respondents rated the importance of goals on a 6-pt Likert scale, which included possible responses of *very high priority, somewhat high priority, medium priority, somewhat low priority, very low priority,* and *should never teach.* Respondents rated the acceptability of learning contexts and intervention procedures on a 5-pt Likert scale, which included possible responses of *always acceptable, often acceptable, sometimes acceptable, rarely acceptable,* and *never acceptable.* Each subsequent section also contained one 5-item matrix in which respondents were asked to rate whose perspectives were most important in determining goals, learning contexts, or procedures: the child, the child's

parent(s), the child's teacher(s), autistic adults, or other ECSE practitioners (e.g., speech-language pathologists [SLPs], behavior analysts). These matrices used a forced ranking system, in which each ranking was required to be used once and only once, and stakeholder groups were ranked from *1 (most important)* to *5 (least important).* Finally, each section included an open-ended item, in which respondents were invited to clarify responses and share anything else related to the section topic.

Survey Development

The author initially developed the web-based survey. Throughout the design process, we incorporated recommendations from Nicolaidis and colleagues (2020) for creating accessible survey instruments for autistic adults. First, we screened the survey for difficult vocabulary and confusing terms, removed complex language and sentence structure, and substituted broad, non-technical language that was not associated with any specific educational profession. We also added prefaces to each section and matrix, to explain word meanings and provide additional context. Next, we added an open-ended item to each section, where respondents could clarify responses, in order to reduce anxiety about imprecise response options and answering with complete accuracy. To further reduce anxiety, we added reminders to each section preface that the open-ended item would be available later. The REDCap platform did not support use of pictorial aids within Likert scales, one of the recommendations for improving survey clarity. However, we submitted a request to REDCap administrators that they add this feature for future survey projects. Finally, to address use of ableist language and concepts, we recruited feedback from a professional with interests in neurodiversity and autistic-affirming practices. She screened the survey for these issues and provided two rounds of meaningful feedback.

The author sent a draft of the survey to one additional faculty member (the faculty advisor) and ten graduate students affiliataed with the Special Education (SPED) M.Ed. program at Vanderbilt University. Of these, the faculty member and four graduate students provided feedback. The peer reviewers were White women ages 22-41, who worked directly (e.g., providing direct instruction) or indirectly (e.g., supervising SPED graduate students) with young autistic children. One identified as neurodivergent and had a diagnosed disability. The author revised the survey in response to feedback from each reviewer, primarily to correct typographical errors, increase clarity, and further improve the degree to which content was autistic-affirming. The Institutional Review Board (IRB) at Vanderbilt University reviewed and approved the survey study. Study data were collected and managed using Research Electronic Data Capture (REDCap) an electronic data capture tool hosted at Vanderbilt University (Harris et al., 2009; Harris et al., 2019). REDCap is a secure, web-based software platform designed to support data capture for research studies.

Positionality Statement

The author is a fourth-year doctoral student in SPED, and holds certification as a Board Certified Behavior Analyst (BCBA). She identifies as neurodivergent with medically-diagnosed disabilities, and is the parent of a neurotypical three-year-old. Her primary research interest is in developing a more compassionate approach to ECSE, particularly in designing effective interventions for young children that are socially acceptable, least restrictive, and neurodivergent-affirming. Additional areas of interest include single case research methodology and augmentative and alternative communication. The faculty advisor is a faculty member in SPED who holds a doctoral-level BCBA certification and identifies as neurotypical. Her primary research interests are single case design methodology and appropriate instructional practices for young children. She regularly teaches coursework related to instruction in ECSE, single case design, and ethical issues in applied behavior analysis.

Recruitment

Prior to recruitment, we reached out to neurodivergent and autistic on-line communities, to determine most socially acceptable ways to recruit participation. We incorporated feedback into our subsequent recruitment plan whenever possible, including (a) messaging moderators prior to posting to autistic spaces that did not explicitly endorse research recruitment, (b) using the #ActuallyAutistic hashtag on Twitter, (c) posting primarily to neurodivergent-specific spaces, rather than autistic-specific spaces, and (d) posting to specifically-recommended groups. We also received feedback to include community-based participatory research in all aspects of research design; we were unable to implement this recommendation fully, as survey development was already complete. In response to this feedback, we plan to add a peer review and member checking process with 4–6 autistic ECSE practitioners.

At the start of recruitment, we sent an e-mail with an attached flyer to 85 ECSE practitioners, who qualified for the study and/or had contact with people who met inclusion criteria (e.g., professors who work in teaching certification programs, preschool teachers who have regular contact with parents). We also distributed the flyer online via Instagram, Facebook, and Reddit, on personal platforms and within groups affiliated with stakeholder populations. Facebook groups and subreddits were affiliated with early childhood education, autism, neurodivergence, parenting, applied behavior analysis, special education, speech-language pathology, research and

survey distribution, and/or combinations of these topics (e.g., parenting autistic children, ECSE). Across web-based platforms, viewers were encouraged to distribute to anyone who might qualify, and publicly-shareable posts were made available. To maintain a relatively equal distribution of responses across stakeholder groups, flyer distribution was targeted more heavily toward social media groups affiliated with underrepresented stakeholder populations toward the end of the survey period. The survey was open from June 17, 2022 to July 11, 2022.

Participants

To be included in the study, participants were required to (a) agree to participate in the survey, (b) report that they were 18 years or older, and (c) report that they self-identified with at least one of the stakeholder categories. If participants reported that they did not meet any of these criteria, the survey automatically ended. Stakeholder categories included: (a) autistic adults (including medical, educational, and/or self-diagnosis), (b) parents and legal guardians of young autistic children (i.e., ages 2-6), and (c) ECSE practitioners who work with young autistic children.

Surveys were submitted by 675 respondents. Fourteen respondents reported that they did not self-identify with any stakeholder group, and one participant selected that they were not 18 years old, at which point, their survey automatically submitted and their survey access ended. Of the 660 respondents who submitted completed surveys, 226 were autistic adults (34.2%), 168 were parents of young autistic children (25.5%), and 359 were ECSE practitioners (54.4%). These totals exceed the total number of participants, because a number of respondents self-reported intersectional identities. Seventy-six respondents (11.3%) identified with two stakeholder categories (e.g., autistic parents of young autistic children), and 9 respondents (1.4%) identified with three stakeholder categories (1.4%). See Table 1 for additional participant demographic information, including prevalence of intersectional identities.

Data Cleaning and Analysis

Prior to analyzing data, we cleaned the data set. Because all Likert scale and ranking matrices were required to be completed prior to submission, we had no missing data. We removed the 15 submissions in which participants did not meet inclusion criteria. When asked to report the age at which autism diagnosis was received, one respondent reported "2019." This response was removed. A number of responses for "other" may have adequately fit into listed categories (e.g., "preschool SPED teacher" and "ECSE teacher" were listed under "other" rather than "early childhood teacher"). Across questionable categorizations, all data were left as reported.

Next, data were divided and reported by stakeholder group. For participants with intersectional identities, data were included in all stakeholder groups to which they belonged. For example, for an autistic parent to a young autistic child, their data were included in both the autistic adult and parent data sets.

For Likert scale and ranked items, we calculated and reported median rating for each item, by subgroup. We then ranked items from most acceptable to least acceptable, for each matrix by subgroup. To determine ranking for multiple items with the same median rating, we calculated the number of respondents who scored the median rating or higher. The highest value resulted in the highest ranking within that median rating, the next highest value was assigned the next highest ranking, and so on. For example, imagine that in a matrix of four items (A-D), Item A had a median rating of *always acceptable,* Items B and C both had median ratings of *often acceptable,* and Item D had a median rating of *sometimes acceptable.* In this case, Item A was automatically assigned first ranking. If Item B had 130 responses of *always acceptable + often acceptable,* and Item C had 160 responses of *always acceptable + often acceptable,* then Item C was given second ranking, and Item B was given third ranking. Item D was automatically assigned fourth ranking.

For open-ended items, we gathered all responses together on one spreadsheet, divided by section (across tabs) and stakeholder group (within tab). The author and faculty advisor conducted all coding. We used open coding, in which we derived codes (i.e., themes) from the data provided, and then assigned codes to subsequent responses. Each response served as the unit of analysis, and one or more codes could be assigned to the response. If multiple sentences within a response related to the same code, the code was only recorded once. We initially used consensus coding to create a code list for each section, coding a minimum of 30 responses together. Once our code list reached saturation within a section (i.e., we ceased to add new codes for several responses), we independently coded all remaining responses for that section. During independent coding, if a coder came across a response they believed required an additional category, they coded it as "new code needed." If either coder marked as response as "new code needed," the coding pair discussed the response and reached consensus on whether to add a new category.

We consensus coded 16.5% of responses (n = 100). We independently coded the remaining 83.5% of responses, and collected interobserver agreement data for all of them. That is, 100% of responses were coded by two observers, whether via consensus or independent coding. For independently coded data, interobserver agreement (IOA) was determined by calculating [agreements / agreements + disagreements] * 100. Overall agreement was 77.2%, which included 79.0% IOA for goals, 76.0% IOA for learning contexts, and 75.9% for procedures. We

discussed each disagreement and reached consensus on the most appropriate code. Following open coding of all qualitative data, we collaboratively conducted axial coding, in which codes were organized into related categories. These categories serve as the subheadings in the "Qualitative Results" section below. If a code did not fit into any axial category and was reported five times or fewer, it was not included in the analysis. To ease readability of the exemplar comments included below, we made minor typographical corrections that did not alter content or meaning.

Results

Quantitative Results

Results are divided below by section (i.e., goals, learning contexts, and procedures). We also include one additional section on the ranked value of stakeholder perspectives, as results were similar across goals, learning contexts, and procedures.

Goals

See Table 2 for results related to goals. Highly-ranked items were similar across stakeholder groups, with the same five highest ranked items across groups: decreasing self-injurious behavior, refusing non-preferred things, self-help skills, communicating using multiple modalities, and decreasing aggression. The next five highest ranked items were also similar across groups, with four of five in common: communicating with a device (when applicable), identifying emotions, navigating routines, and social-problem solving. Autistic adults also ranked "eating foods that meet minimal nutritional needs" in their top ten, while parents and practitioners ranked "transitioning between activities" in their top ten.

Lowest ranked items were similar across stakeholder groups, with four of five lowest ranked items the same across groups: staying seated, learning certain times and places to engage (and not engage) in stereotypy, increasing eye contact, and decreasing stereotypy overall. Autistic adults and parents also had "tolerating loud sounds" in their bottom five, while practitioners instead had "manners" in their bottom five; across all groups, these two goals were in the bottom ten. The next lowest five ranked items were also similar across groups, with three of five in common: communicating verbally (when applicable), staying within designated areas (e.g., staying on the circle time carpet during circle time), and eating new and/or different foods. Autistic adults and parents also included "participating in group activities" in their bottom ten, while parents did not. Parents and practitioners also included "pre-academic skills" in their bottom ten, while autistic adults did not.

Learning Contexts

See Table 3 for results related to learning contexts. Rankings were similar across groups. Respondents across groups reported that the most acceptable learning contexts were ones in which young autistic children (a) spent most of the day with their peers, and/or had a day evenly split between time with peers and on-on-one, (b) spent most of the day in inclusive settings, and/or had a day evenly split between time in inclusive and self-contained settings, and (c) spent most of the day in child-led learning, and/or had a day evenly split between child-led and adult-led learning. Within a learning environment deemed "most acceptable" to the respondent (i.e., ideal amount of time spent with peers, in inclusive settings, and in child-led learning), respondents across groups agreed that is was most acceptable to receive 6-10 or 11-20 hrs of instruction per week, less acceptable to receive 1-5 or 20-30 hrs of instruction per week, and least acceptable to receive 0 hrs, 30-40 hrs, or >40 hrs of instruction per week.

Different from the "goals" and "procedures" sections, stakeholders rated nearly all possible learning contexts as *sometimes* or *often acceptable*. That is, few learning contexts were considered *always, rarely, or never acceptable* by any stakeholder group. There were a few exceptions to this trend. Autistic adults, parents, and practitioners agreed that spending 0 or >41 hrs in ideal learning environments was rarely or never acceptable, with autistic adults also reporting that 30-40 hrs in ideal learning environments is also rarely acceptable. Autistic adults and practitioners agreed that the entire day in adult-led learning was rarely acceptable, and practitioners indicated that spending the entire day in self-contained settings and/or one-on-one contexts was rarely acceptable.

Procedures

Antecedent procedures. See Table 4 for results related to antecedent procedures (i.e., responses provided when challenging behavior is not presently occurring). Although rankings differed substantially between groups, acceptability ratings were similar across groups. For the majority of items (n = 19 of 24), respondents across all three groups reported that antecedent interventions were often or always acceptable.

Highest ranked antecedent procedures were similar across groups, with eight of the same ten highest ranked items: communication devices, sunglasses, teaching communication skills when child is calm, noise-cancelling headphones, teaching emotional regulation skills when child is calm, visual schedules, providing choices between appropriate options, and designating an area of the classroom for emotional regulation (e.g., "peace corner"). Autistic adults also included "alternative seating options" and "fidget toys and/or stress balls" in their highest ten, while other stakeholder groups did not. Parents also included "incorporating child's preferences into non-preferred activities" and "reading a story about an upcoming challenging situation" in their highest ten, while other

stakeholder groups did not. Practitioners also included "scheduling breaks into difficult or non-preferred activities" and "countdown warnings before transitions" into their top ten, while other stakeholder groups did not.

Given that very few antecedent strategies were ranked as *never*, *rarely,* or *sometimes acceptable,* we will only compare the bottom five ranked antecedent procedures, which were the same across groups: area of classroom designed to be away from others (e.g., time out), providing tokens for participation, providing small edible items for participation, class-wide reinforcement-based systems, and class-wide punishment-based systems.

Consequent procedures. See Table 5 for results related to consequent procedures (i.e., responses provided immediately after challenging behavior). Rankings were similar across groups. In responding to challenging behavior maintained (at least in part) by access to attention, respondents across groups agreed that the most acceptable responses were to show the child strategies for regulating emotions, help the child ask for attention and provide it, label the child's emotions, and remind the child of classroom expectations. They agreed that it was somewhat less acceptable to immediately soothe the child, reprimand the child, or provide praise or extra attention to other children following expectations. They agreed that it was least acceptable to withhold attention during challenging behavior (i.e., planned ignoring).

In responding to challenging behavior maintained (at least in part) by access to preferred toys or activity, respondents across groups agreed that it was most acceptable to help the child ask for the toy/activity and provide it. They agreed that it was somewhat less acceptable to provide a different toy/activity or to wait until the child stops engaging in challenging behavior to provide the preferred toy/activity. They agreed that it was least acceptable to immediately provide the toy/activity or to make the toy/activity completely unavailable.

In responding to challenging behavior maintained (at least in part) by access to escape, respondents across groups agreed that it was most acceptable to help the child ask for a break and then provide it or to give the child a "first-then" reminder. They agreed that it was slightly less acceptable to provide non-physical prompts to finish the activity, to guide the child back to the activity if they leave, or to use a token board to signal activity progress and reinforce activity completion. They agreed that it was even less acceptable to immediately let the child leave the non-preferred activity, wait until the child stops engaging in challenging behavior to provide a break, physically prompt the child to finish the activity, or keep the child within a non-preferred contained area with others. They agreed that it was least acceptable to keep the child within a non-preferred contained area by themselves or to use restrictive seating.

Ranked Value of Stakeholder Perspectives

See Table 6 for results across stakeholder groups. When determining goals, learning contexts, and procedures for a young autistic child, all three groups agreed that the child's perspectives were most important, the child's parents were next most important, and the child's teacher was more important than other ECSE practitioners. Differences took place in the third, fourth, and fifth place rankings. For setting goals, autistic adults ranked themselves above the child's teacher and other practitioners, parents ranked autistic adults above other practitioners, and practitioners ranked autistic adults last. For determining learning contexts, all three groups agreed that the child's teacher ranked third. For fourth and fifth ranked, autistic adults ranked themselves above practitioners, while parents and practitioners ranked themselves above autistic adults. For determining procedures, autistic adults ranked themselves third, while parents and practitioners ranked autistic adults last.

Qualitative Results

Respondents recorded 608 total comments on the survey, including 257 on goals, 187 on learning contexts, and 164 on procedures. Of these, 105 comments were coded partially or completely as "non-codable/unrelated." Non-codable comments were variations of "no," "N/A," combinations of nonsensical letters and numbers, or comments not related to the section topic. Although most comments were highly specific to the section topic (i.e., goals, learning contexts, and procedures), three codes trended similarly across sections—context dependence, relative importance of stakeholders, and survey feedback. Counts for these codes were combined across sections, and are described together below. Following discussion of these codes, we discuss comments by section (i.e., goals, learning contexts, procedures).

Overall Results

Context dependence. Context dependence was the most frequently observed code, with 191 responses coded under this category (n = 60 for goals, 88 for learning contexts, and 43 for procedures). Across stakeholder groups, respondents consistently pointed out that selection of goals, learning contexts, and procedures vary for each individual child, given their distinct characteristics and contexts. In considering context dependence, respondents typically discussed the child's unique characteristics, including the child's age, skills, interests, preferences, strengths, sensory needs, and psychological needs. Some respondents also discussed the child's unique context for learning, including familial cultural beliefs, familial priorities, background of relevant stakeholders, and the environments the child participates in. As an example, one practitioner wrote, "Based on different children's

strengths and needs, as well as the environments that they need to use certain skills in, and the support they receive from their team of caregivers, so much of what should be prioritized is variable and individual." Although respondents across stakeholder groups discussed context dependence, it was most often discussed by practitioners (*n* = 136), less often by autistic adults (*n* = 79), and even less often by parents (*n* = 29).

Relative importance of stakeholders.

Respondents discussed children as stakeholders nearly three times as frequently as any other stakeholder group, with 141 total comments (as compared to 56 for autistic adults, 54 for parents, and 42 for practitioners). Respondents primarily wrote about the relative importance of children as stakeholders (*n* = 108), as compared to the challenges (*n* = 20) or relative unimportance (*n* = 13) of children as stakeholders. Respondents typically wrote about the necessity to include child's preferences in all aspects of educational decision-making, and reported that the child's perspectives mattered more than those of other stakeholders. For example, one autistic parent wrote, "[T]he goals should center around what the student wants to do or needs to do to be happy and safe. Not what will make it 'easier' for the teachers or parents or based on the biases of what these individuals may think is 'appropriate' based on neurotypical standards." Respondents pointed out that it can be challenging to include the perspectives of young children in decision making, either because they may lack the communication skills to effectively convey their perspectives, or because they lack the cognitive capacity and situational awareness to engage in complex decision-making. Respondents wrote about alternative ways to include children in the decision-making—for example, honoring indicators of assent/dissent, building on strengths, identifying and incorporating preferences, and prioritizing teaching communication, such that children can more effectively self-advocate. For example, one practitioner wrote that "very few children aged 2-4 are going to have the skills to prioritize these kinds of decisions (independent of diagnosis). We consider assent/non-assent as a type of advocacy, and we absolutely take that into account when helping set/modify goals, but it doesn't make sense to me to say that the child's 'opinion' of the goal is what drives it."

Respondents included a mix of comments on the relative importance (*n* = 31), relative unimportance (*n* = 19), and challenges (*n* = 6) of including autistic adults as stakeholders. Autistic adults were most likely to report relative importance, rather than challenges or unimportance (63.2% of comments), when compared to practitioners (54.8% of comments) or parents (45.5% of comments). When stakeholders discussed relative importance, they commonly shared that autistic adults can provide valuable insight into experiencing the world through an autistic lens, and offer richer perspectives than young children are able to communicate. For example, one autistic parent-practitioner wrote, "There is so much information available now from Autistic adults, who openly share their experiences from childhood to adulthood. Their experience and wisdom are so valuable when setting goals for children now, particularly when young children are not yet able to communicate what kinds of goals they would like to meet. It is vitally important for Autistic voices to get their time at the podium as their perspectives are often neglected or pushed aside by family members, educators, and paraprofessionals." Similarly, another autistic adult wrote, "I don't think that it's fair to ask if unfamiliar autistic adults should have their opinions prioritized over a child's familiar adults. However, historically, autistic adults have not ever been listened to, and they can provide useful insights and advice about goals."

When respondents discussed challenges or relative unimportance of autistic adults as stakeholders, they commonly described the autistic community as diverse, with a wide range of skills, challenges, and needs. They noted that the broad perspectives of autistic adults may be inappropriate to apply to any given individual. For example, one parent wrote, "Autistic adults or others who can verbalize have a very different set of skills than my child who is minimally verbal and engages in unsafe behaviors, has difficulty eating and sleeping, and becomes very upset at slight changes in his day. It is upsetting to think that strangers to my child who do not share his reality could decide what he works on." Further, respondents across stakeholder groups cited the importance of prioritizing perspectives of adults familiar with the individual child, whether or not they identify as autistic. For example, one practitioner wrote, "I also respect the perspective that autistic adults can provide regarding goal appropriateness overall, but each child's goals should be individualized, so I do not think it is necessarily appropriate for the perspective of any given autistic adult to override the perspectives of the family, child, or professionals who know the child well."

When respondents discussed parents as stakeholders, they primarily reported their relative importance as stakeholders (*n* = 38), with fewer respondents noting relative unimportance (*n* = 10) or challenges (*n* = 6). Similarly, for practitioners, respondents primarily reported the relative importance as stakeholders (*n* = 29), with fewer respondents noting challenges (*n* = 7) or relative unimportance (*n* = 6). Overall, respondents noted that these adults (particularly parents) are most likely to know the child well, and be able to effective advocate on behalf of the child's wants and needs. Conversely, respondents cited concerns that parents and practitioners may not always understand the child's experience with autism, or may value their own interests over the interests of the child. For

example, one autistic practitioner wrote, “Sometimes BCBAs want to focus on a goal because it's important to the way they do things but may not be important to the child (or even harmful), but sometimes the BCBA really knows what the child needs. Sometimes parents have expectations that are not reasonable for the child or are based in their own convenience, and that would lower their score of whose opinion matters.” Similarly, another autistic practitioner wrote, “We need to learn from the autistic community about what is important to them. Parents often need an education on what it's like to be autistic if they are not. They often focus on making their child fit in with others, which I believe is so wrong.”

Survey feedback.

Sixty-nine responses included comments about some aspect of the survey itself (n = 25 for goals, 25 for learning contexts, and 19 for procedures). Most commonly, respondents noted that the survey was difficult to complete, given the ways responses might vary based on the needs and preferences of the individual child. For example, one autistic adult wrote, “These questions feel like we're trying to identify what works best for people with autism. What works for one person with autism, works for that one person. We are not a monolith, each of us have different needs and comfort with different things, so it's extremely difficult to answer these questions.”

Respondents also indicated that the system for ranking stakeholder importance was difficult, confusing, or problematic. Some respondents were confused by the requirement that each ranking had to be assigned once and only once. Others were critical of forced ranking, noting that responses may vary based on stakeholder characteristics; for example, how well, the stakeholder knows the child, understands autism, or has the expertise required to make developmentally-appropriate decisions. Further, respondents noted that decision-making should be collaborative, without prioritizing some stakeholder perspectives over others. For example, one practitioner wrote, “I don't think this question should be a forced rank. This is a collaborative process and there are many variables to consider in each situation.”

Goals

Respondents submitted 257 comments about goals; this included 110 comments from autistic adults, 61 from parents, and 146 from practitioners. In addition to comments about context dependence (n = 60), relative importance of stakeholders (n = 210), and survey feedback (n = 25), comments also fell into two major categories that will be discussed below: considerations when selecting goals (n = 164) and acceptability of specific goals (n = 104).

Considerations when selecting goals. In selecting goals, 65 respondents (66.2% of whom identified as autistic) reported that stakeholders should choose goals that celebrate autistic culture and/or do not require the child to mask their autistic characteristics (defined by one autistic adult as “making the child seem more neurotypical”). For example, one autistic adult wrote, “Goals that are only oriented towards making the children less 'visibly' autistic should be the lowest priority.” Respondents reported several goals that fell into this “masking” category and should be avoided, including increasing eye contact, increasing sensory tolerance, and decreasing stereotypy. One autistic adult wrote, “I feel like diversity should be celebrated, and things like hand flapping or not using eye contact shouldn't be 'punished', redirected, or looked down upon.” A third autistic adult wrote, “I am against 'training' autistic children to act like they are neurotypical, e.g., sitting in a group if obviously they are doing their own thing.” Several respondents also wrote about the importance of educating non-autistic classmates on autistic characteristics and diversity acceptance.

Thirty-two respondents (46.9% of whom identified as autistic) reported that health and safety should be a consideration when selecting goals. Primarily, respondents reported that they would target goals that they would not otherwise target (e.g., increasing compliance, reducing stereotypy) if failing to target these would impact the health or safety of the child or others.

Eighteen respondents (77.8% of whom identified as autistic) reported that sensory needs should be a consideration when selecting goals. Respondents reported that certain goals may be physically painful for autistic children or reduce their ability to self-regulate. For example, one autistic practitioner wrote, “If health is not in danger, always take into consideration the child's opinion for goals that go into sensory issues (loud sounds, toothbrushing, eye contact, stereotypy, eating foods), because those goals might hurt more than you think and the child might not be ready to work on that, because he already has a lot of things to cope with.” Fewer respondents (n = 16, 37.5% of whom identified as autistic) reported that there are limited contexts in which it is appropriate to target stereotypy or sensory tolerance, including when there is a health or safety risk, or when aversive contexts are unavoidable.

Eighteen respondents (72.2% of whom identified as autistic) reported that stakeholders should consider targeting goals that assist autistic children in navigating a world designed for neurotypical people. For example, one autistic practitioner wrote, “No autistic person should be taught to hide their autistic traits, but do need help in learning coping skills because the real world is not fair and they will have to deal with a lot.” These comments

typically focused on teaching the "social codes" of neurotypical culture and coping mechanisms to tolerate a world that was not primarily built by or for autistic individuals.

Acceptability of specific goals.

Forty respondents (45% of whom identified as autistic) discussed the importance of targeting communication. Twenty-nine respondents (55.2% of whom identified as autistic) discussed the importance of targeting skills that increasing autonomy, independence, and self-determination. Fifteen respondents (80% of whom identified as autistic) discussed the importance of teaching emotional regulation skills. Twelve respondents (25% of whom identified as autistics) discussed the complexities of targeting compliance. Overall, respondents noted that compliance should not be targeted for the sake of it, but rather when necessary for safety or other reasons (e.g., to prevent elopement into dangerous spaces). For example, one autistic parent wrote, "It is VERY important that my kids learn to stay within a designated area for safety reasons (e.g., with a parent, on a playground, not wandering into the road or away from supervision). But staying on a carpet for circle time isn't a safety issue, it's a compliance issue." Fewer respondents discussed the importance of targeting challenging behavior (n = 12) or social skills (n = 8).

Learning Contexts

Respondents submitted 187 comments about learning contexts; this included 84 comments from autistic adults, 44 from parents, and 103 from practitioners. In addition to comments about context dependence (n = 88), relative importance of stakeholders (n = 69), and survey feedback (n = 25), comments also fell into two major categories that will be discussed below: considerations when selecting learning contexts (n = 29) and acceptability of specific learning contexts (n = 62).

Considerations when selecting learning contexts. Nine respondents (44.4% of whom identified as autistic) discussed the importance of designing learning contexts in ways that promote autistic culture and avoid neurotypical norms. Nine respondents (66.7% of whom identified as autistic) indicated that children should not spend long amounts of time in non-ideal learning contexts. For example, an autistic practitioner wrote, "We do need to recognize societal/economic pressures that make it necessary for children to be in care of others while parents work, but high hours at high intensity are not appropriate." Five respondents (80% of whom identified as autistic) discussed the importance of "letting children be children," or designing learning contexts in ways that allow autistic children to have typical childhoods (e.g., maximizing time spent in play, minimizing time spent doing desk work or worksheets). Fewer respondents discussed the importance of considering sensory needs (n = 1), psychological needs (n = 1), health and safety (n = 1), and autistic-specific supports (n = 1) when designing learning contexts.

Acceptability of specific learning contexts.

Twenty-eight responses were on the topic of inclusive vs. self-contained environments. Comments primarily discussed inclusion as positive (n = 11). Interestingly, autistic adults were less likely to talk about positives (36.4% of their comments) than parents and practitioners (55% of their comments). On positives of inclusion, one practitioner wrote, "I believe that inclusive education is important because modeling is such a big part of learning. Kids can learn from peers and peers can learn to be kind to those with disabilities in an inclusive setting." Despite its benefits, respondents also pointed out current challenges (n = 9). For example, one autistic practitioner wrote, "Inclusion is ideal, but many 'inclusive' environments are set up in ways that are too stressful for young autistic children including too many people in a classroom making too much noise, and too much adult-led time with classroom expectations that are easier for neurotypical kids to meet." Another autistic parent-practitioner wrote, "In an ideal world, every classroom would be fully inclusive and inviting of disabled children/children with disabilities. Unfortunately, our current systems don't allow for this. Classrooms are still very much ableist, and educators are beholden to homogenous learning methods such as Common Core and standardized testing." Remaining responses discussed the negatives (n = 4), positives (n = 2), and challenges (n = 1) of self-contained contexts, as well as the negatives of inclusive contexts (n = 1).

Twenty-five responses were on the topic of adult- vs. child-led contexts for learning. Comments primarily discussed child-led contexts as positive (n = 10), but that it may have challenges (n = 5). For example, one autistic adult wrote, "I think that autistic children learn really well with child-led learning, but I also think that effective child-led learning requires a very good teacher and a very low student to teacher ratio." Another autistic adult wrote, "There has to be a balance between child-led and adult-led. Some children would choose to sit in front of a screen eating chocolate all day (which sounds awesome) but doing that daily would not be in the best interest of the child." Remaining responses discussed the positives (n = 3), negatives (n = 2), and challenges (n = 1) of adult-led contexts, the negatives of child-led contexts (n = 1), and the importance of balancing adult-led and child-led instruction (n = 3).

Nine responses were on the topic of group vs. one-on-one contexts for learning, including the positives of group learning (n = 4), as well as the positives (n = 2), negatives (n = 2), and challenges (n = 1) of one-on-one

learning. When discussing challenges and drawbacks to inclusive and group learning, respondents discussed differing sensory needs as a factor to consider. One autistic adult wrote, “Sometimes, integration into inclusive classrooms is right for the child. Sometimes it's not, but it's done because professionals think that's the right thing to do. Some children find it too unpredictable, overstimulating, and too challenging.”

Procedures

Respondents submitted 163 comments about procedures; this included 81 comments from autistic adults, 28 from parents, and 86 from practitioners. In addition to comments about context dependence (n = 43), relative importance of stakeholders (n = 43), and survey feedback (n = 19), comments also fell into two major categories that will be discussed below: considerations when selecting procedures (n = 147) and acceptability of specific procedures (n = 79).

Considerations when selecting procedures.

Forty-two respondents (69.0% of whom identified as autistic) indicated the importance of considering the child’s emotional and psychological needs when selecting procedures. For example, one autistic adult wrote, “Trauma needs to be taken into consideration with behaviours that challenge. When in fight flight or freeze mode, their prefrontal cortex is not in control to think out their actions. Restricting access to reinforcement or persisting with a task that may have triggered their amygdala, for a child in survival mode, some behavioural strategies would be very unethical and cruel. However, if trauma is not an issue, then the typical behavioural strategies mentioned above in the survey would be great.” Similarly, one autistic adult wrote, “Always be thinking about the ‘hidden curriculum’: are you teaching the material, or are you teaching compliance? Is this procedure requiring a child to mask signs of distress? Will this compromise the trust the child has in me? Does this procedure make them feel heard, validated, and valued—even if they can't get the thing they want?”

Nineteen respondents (42.1% of whom identified as autistic) indicated the importance of considering health and safety when selecting procedures. Most commonly, respondents noted that they would choose procedures they might not otherwise use, if someone’s health or safety were under threat. For example, one autistic practitioner wrote, “A lot of my answers depend on how dysregulated a child is and whether or not there are safety concerns.”

Eighteen respondents (55.5% of whom identified as autistic) indicated that stakeholders should consider the purpose served by challenging behavior when selecting procedures. Respondents commonly shared that challenging behavior might indicate sensory overwhelm or emotional dysreglation, that practitioners must use discretion to understand when this is happening, and should not persist with interventions in these cases. For example, one autistic adult wrote, “I think it helps to pinpoint why the child is behaving negatively. If they feel overwhelmed (on the verge of a panic attack, meltdown, shutdown, etc.) then they should be allowed to remove themselves from the situation until they are calm, but understand the task must be completed and why (as well as guidance if they find it difficult). However, some children can use challenging behaviour to avoid doing something boring, and they must understand that sometimes we have to do things that bore us but are important, and they cannot use this behaviour to get out of completing tasks.” Another autistic adult wrote, “All these points are completely beside the point and meaningless without understanding WHY the child behaves in a challenging way. Wants-based challenging behaviour (i.e. hitting another child to get a preferred toy) isn't okay and needs intervention. But behaviour that's designed to make something stop MUST be respected. I was forced to stay in sensorially painful, humiliating and terrifying situations as a child and now I have CPTSD on top of everything else.”

Eleven respondents (54.5% of whom identified as autistic) indicated that stakeholders should consider limited circumstances under which challenging behavior should be reinforced. Responses were similar to those considering functionality, in that respondents reported that it may be appropriate to reinforce challenging behavior in cases of emotional dysregulation or distress. For example, one autistic practitioner wrote, “[If the child is] already escalated and won't be calm anytime soon or does not yet have the communication skills, it is more appropriate to give what they are needing right away and practice communicating or calming down later.” Similarly, a practitioner wrote, “In general, if the child is distressed, I may reinforce the behavior by providing access/escape once, and then try to determine better prevention strategies to try/skills to teach and avoid additional instances of challenging behavior when possible.”

Remaining comments were similar to considerations for selecting goals and learning contexts, including considering the child’s sensory needs (n = 9), choosing procedures that maximize autonomy and promote consent (n = 8), choosing procedures that respect autistic characteristics and avoid neurotypical norms (n = 6), making choices that are developmentally appropriate (n = 6), promoting skills needed to navigating a world designed for neurotypical people (n = 3), and allowing autistic children to have a “typical childhood” (n = 1). Additionally, 10 comments discussed miscellaneous challenges in addressing challenging behavior in typical early childhood settings.

Acceptability of specific procedures. Thirty-two responses were on the topic of extinction (53.1% from autistic respondents), and primarily discussed the negatives of extinction procedures (n = 23), with fewer comments discussing the challenges (n = 5) or positives (n = 4) of extinction procedures. Most respondents wrote about the unacceptability of using escape extinction procedures that limit bodily autonomy. For example, an autistic practitioner wrote, "Procedures used should be trauma informed. When challenging behaviors occur, emphasis should be on co-regulation/de-escalation whereas procedures such as planned ignoring, hand over hand, restraints, and withholding often escalate the situation." Similarly, one practitioner wrote, "With regard to physical guidance/prompting it is extremely important to note this is only acceptable when the child requires assistance, not as a compliance tool…. If they resist at all it should be ended." Another practitioner wrote, "In most quality, early learning contexts, there are very few tasks that should be considered non-negotiable. As a BCBA I really wish my training emphasized the child's perspective more than the adult's [perspective] so that I didn't feel the need to use so much escape extinction and other harmful, rigid procedures in my early years." When discussing challenges, respondents primarily cited that these procedures may be necessary sometimes, particularly for health or safety reasons. For example, one practitioner wrote, "I don't feel comfortable doing hand-over-hand or blocking children from leaving an area; it would definitely be the last resort. I have had to physically prompt children to wash their hands, which has been necessary during COVID-19 times."

Twenty-two responses were on the topic of restraint and seclusion (59.1% from autistic respondents), with most comments discussing the negatives of these procedures (n = 14), and fewer discussing the challenges (n = 4) or positives (n = 4) of these procedures. Most respondents indicated that restraint and seclusion were inappropriate to use, unless they were for the immediate physical safety of the child or others. For example, an autistic practitioner wrote, "Restraint or response blocking should only be used to prevent harm or safety concerns, especially with self-injurious behavior." Another autistic adult wrote, "I don't think it's ever, ever, ever okay to physically trap someone somewhere, unless it's for their immediate physical safety." Similarly, one practitioner wrote, "I do not think that at any point it is ok to physically restrain a child (neuro-atypical or otherwise) in order to complete a task, but I can understand the possibility of needing to do so to keep them safe."

Fourteen respondents (85.7% of whom identified as autistic) discussed the importance of teaching communication, self-regulation strategies, and other alternatives to challenging behavior. For example, one autistic practitioner wrote, "Often modeling appropriate communication and sensory strategies can aid in reducing these behaviors, as there almost always is a reason they're exhibiting these 'behaviors' and resolving the differences or breakdowns in communication or sensory [needs] for the child will resolve these."

Eleven respondents (54.5% of whom identified as autistic) discussed the use of contrived reinforcement, with most participants indicating negatives of these procedures (n = 7), and fewer indicated positives (n = 2) or challenges (n = 2). For example, one autistic adult wrote, "Reward systems can cause people to compare themselves to others, potentially resulting in feelings of inadequacy and self-hatred." Another autistic practitioner wrote, "Rewards and punishments decrease intrinsic motivation and are harmful in the long term even if they appear effective in the short term. Food rewards are especially dangerous given the prevalence of eating disorders in autistic people."

Fewer respondents discussed the importance of incorporating antecedent interventions (n = 8), as well as the negatives (n = 5) and challenges (n = 1) of using punishment procedures.

Discussion

Respondents spoke more about context dependence than any other topic, with 191 comments related to context dependence in some way (31.4% of all comments). Comments about context dependence were most often from practitioners (55.7% of related comments), likely because practitioners regularly serve children with a wide range of strengths, needs, and challenges. Respondents consistently reported that the child's individual characteristics and context should be a primary driver in educational decision-making. Respondents also reported that context dependence led to difficulty completing the survey, in that the acceptability of goals, learning contexts, and procedures may vary greatly depending on the individual child. As such, we have interpreted our results conservatively, limiting discussion to practices deemed strongly acceptable or unacceptable. We encourage readers to consider the stakeholder perspectives shared here as one limited factor to help inform educational decision-making, in conjunction many other contextual variables that impact these choices.

Additional themes emerged across sections for goals, learning contexts, and procedures. First, respondents consistently reported that the child was the most important stakeholder in determining goals, learning contexts, and procedures; that is, the child's perspectives are the most important when making educational decisions. Second, respondents (particularly autistic adults) noted that educational decisions should celebrate autistic culture and accommodate for autistic characteristics (e.g., engaging in stereotypy, avoiding eye contact, avoiding sensory overwhelm). Third, respondents indicated that sensory, psychological, and emotional needs should be prioritized in

educational decision-making, both teaching skills that promote self-regulation and adapting the environment to ensure that the child is able to regulate their nervous system.

Goals

Across stakeholder groups, respondents reported high social validity ratings for goals that promote communication and autonomy, and cite these practices as socially acceptable ways to reduce challenging behavior. All three stakeholder groups rated nine of the same ten goals as highest priority, which all fell into three categories—promoting communication (i.e., refusing non-preferred things, communicating using multiple modalities, communication with a device, identifying emotions), increasing autonomy (i.e., self-help skills, navigating routines), and decreasing challenging behavior (i.e., decreasing self-injurious behavior, decreasing aggression). Goals and the procedures used to address them were related, with procedures that limited bodily autonomy rated poorly (see "Procedures" below). These results indicate that stakeholders believe learning contexts should be designed in ways that promote autonomy, as well as teach the child how to more effectively self-determine.

Across stakeholder groups, respondents reported low social validity ratings for goals and procedures that promote masking. Across quantitative and qualitative results, autistic adults in particular promoted a shift away from practices that require children to hide autistic traits or appear more neurotypical. For example, in ranking goals, the bottom five goals ranked by autistic adults are all aimed at ecological congruence with neurotypical peers—tolerating loud sounds, staying seated (e.g., at circle and meal times), learning certain times and places to engage in stereotypy, increasing eye contact, and decreasing stereotypy overall. Conversely, autistic adults rated many antecedent interventions with high social validity, including those that would cause autistic children to look different from their peers (see "Procedures" below). In their comments, respondents consistently indicated that the sensory and psychological needs of the child should take priority, rather than the desires of adult stakeholders that the child appear neurotypical or fit in with their peers.

Learning Contexts

Results indicated that appropriate learning environments are highly context dependent, given the needs of the individual child. For nearly all possible learning contexts, respondents across stakeholder groups reported that contexts were sometimes or often acceptable. These results indicate that most learning contexts may be appropriate for some children, except for relatively extreme contexts. These results indicate that stakeholders should make these determinations based primarily based on the child's particular needs and preferences.

There were a few exceptions, as stakeholders across groups agreed that long (>41 hrs) or short (0 hrs) amounts of time in ideal learning environments, and/or spending the entire day in adult-led learning was unacceptable. Surprisingly, autistic adults rated self-contained settings and one-on-one contexts as more socially acceptable than practitioners or parents. In the survey comments, autistic adults noted that inclusive and group contexts may be overstimulating or overwhelming for some autistic children.

Procedures

Across stakeholder groups, respondents wrote more about the negative aspects of extinction (particularly escape extinction), restraint, and seclusion than any other procedures. Similarly, in the quantitative data, extinction procedures received the lowest social validity ratings across stakeholder groups, particularly attention extinction (i.e., withholding attention while they are engaging in challenging behavior) and tangible extinction (i.e., withholding toy/activity while engaging in challenging behavior, putting away toy or blocking access to activity permanently). For escape extinction, respondents provided the lowest social validity ratings for procedures that directly restricted bodily autonomy (i.e., physically prompting the child to finish activity, keeping the child within a non-preferred contained area with or without others, using restrictive seating). However, other less restrictive procedures which are typically paired with escape extinction (e.g., giving 'first-then' reminders, non-physically prompting activity completion, using token boards for activity completion) were give higher acceptability ratings. These results seem to indicate that attention extinction, tangible extinction, and escape extinction procedures that restrict bodily autonomy are all considered least acceptable ways of responding to challenging behavior. Conversely, these results indicate that less physically intrusive forms of escape extinction may have some social validity; thus, practitioners should consider both functionality of the child's challenging behavior *and* topography of the implementer's response.

Conversely, stakeholder groups reported highest social validity ratings for antecedent interventions, with a higher percentage of *always* and *often acceptable* ratings than for any other category (79.2 – 83.3% by stakeholder group). Although relatively few comments discussed the importance of antecedent interventions (n = 9), more respondents wrote about meeting the child's emotional and psychological needs (n = 42) than any other procedural consideration. Stakeholders can consider use of antecedent strategies to promote emotional and psychological regulation, in that they may prevent behavioral escalation and associated stress.

Limitations and Recommendations for Future Research

A non-trivial proportion of respondents (n = 85, 12.9%) identified with multiple stakeholder groups. These data are not surprising, given that respondents with multiple connections to autism and ECSE may be particularly motivated to participate in related research. In key ways, we believe that high prevalence of respondents with intersectional identities is a strength of the study. Autistic parents and practitioners are uniquely qualified to understand both experience of being autistic and the realities and challenges of providing care to young children. Thus, their perspectives provide additional insight into what is both socially acceptable to autistic adults, as well as feasible to incorporate into home or educational settings. Despite the overall strength of inclusive intersectional perspectives, we recognize that this may have decreased between-group differences, in that (a) data from respondents with intersectional identities were included in all qualifying stakeholder groups, and (b) respondents with intersectional identities may skew the median of all groups in which they participate. For example, autistic parents may respond more similarly to autistic adults than the average parent, and more similarly to parents than the average autistic adult. Further, we recognize that the percentage of respondents with intersectional identities may be higher than is present in the general population.

Another limitation of the study is that we did not recruit autistic adults or parents of young autistic children to participate in survey development. It is a particular concern that autistic adults did not participate in the survey design, given concerns that surveys without autistic validation could decrease accessibility or yield less accurate results (Nicolaidis et al., 2020). To counteract this limitation, we incorporated autistic feedback into our recruitment procedures (see "Survey Development" above), collected and reported survey design feedback from the open-ended items (see "Qualitative Review" above), and also plan to incorporate a peer review process from a panel of autistic ECSE practitioners. Although these steps allow (or will allow) for formative evaluation of our recruitment and data analysis procedures, we were limited to summative evaluation of survey development. We recommend that future researchers incorporate autistic perspectives in every aspect of research on autistic individuals, including survey design, recruitment procedures, data analysis, and drafted publication. We recommend that researchers partner with autistic researchers and recruit formative feedback from the broader autistic community whenever possible.

Another limitation of the study was our use of social media platforms to recruit participants. For ECSE practitioners, these recruitment methods may have led to an over-representation of neurodiversity-affirming and reform-oriented views, which may have yielded decreased differences between stakeholder groups as compared to the general population. Although the first author intentionally avoided recruiting respondents in groups focused on educational reform in which she actively participated, recruitment flyers were often shared with these groups anyway by acquaintances and colleagues. Further, the first author's own reform-oriented past research (e.g., Chazin et al., 2021) may have attracted respondents familiar with her work who hold similar views. Similarly, with autistic adults, those who participate in autistic-oriented communities may be more likely to share perspectives with one another that are not held universally by all autistic adults, particularly those who do not identify as self-advocates.

Finally, these results are necessarily limited to respondents with the language and literacy skills to complete a multi-component, 15-25 min survey. Although steps were taken to increase survey accessibility (e.g., simplifying language and sentence structure), this survey was still likely inaccessible to some autistic adults with greater disability-related challenges. For example, 69.5% of autistic respondents indicated that they received an autism diagnosis or began self-identifying as autistic as adults (i.e., ages 18 or older). Although these data do not account for reduced access to assessment measures when respondents were children, these data may still indicate that the survey results do not adequately represent the views of autistic adults across the full spectrum of perspectives, challenges, and experiences. We encourage researchers to intentionally seek out perspectives of autistic individuals with greater disability-related challenges. For example, researchers might intentionally employ recruitment methods to access perspectives from autistic adults who do not have computer or Internet access, such as recruiting within group homes and/or through support groups for parents and practitioners who care for individuals requiring greater support. Researchers might also employ data collection measures that do not require advanced literacy or language skills. For example, they might conduct interviews or focus groups, in which participants are not required to read and can more readily engage in augmentative and alternative methods of communication.

Additional Recommendations for Researchers

Across stakeholder groups, respondents reported that the child's perspectives should be the highest priority in all aspects of education decision-making, including setting goals, creating learning contexts, and choosing procedures. However, children are rarely consulted as part of these decision-making processes, particularly in the published research literature, with the exception of measures of preference for intervention procedures (see below). Further, few recommendations exist to guide practitioners in incorporating child perspectives in choosing goals, learning contexts, and procedures. More research is needed to guide practitioners in incorporating perspectives of young autistic children, particularly those who may be unable to verbally communicate their preferences. To help

bridge this gap, researchers can continue to develop objective social validity measures for research participants. For example, the enhanced choice model (Rajaraman et al., 2022) uses a concurrent operant assessment to allow learners to "vote with their bodies," moving to different parts of the room to opt in and out of intervention. Time spent in intervention can serve as a measure of social acceptability, according to the learner. Similarly, concurrent chains preference assessments allow children to choose between multiple procedures (Chazin & Ledford, 2021; Owen et al., 2021). Further research is needed on how to implement these and other social validity measures, particularly with children with complex communication needs, mobility limitations, and other disability-related challenges. Further research is also needed in developing methods for assessing social acceptability of designing goals and learning contexts, according to young autistic children who are directly impacted by these decisions.

Survey results indicate that, although the autistic community is diverse, trends and commonalities exist across autistic respondents that may help guide educational decision-making. For example, these survey results provide some insight into autistic experience that may be used in guiding decision-making, allowing practitioners to better (a) understand the sensory, psychological, and emotional needs of autistic individuals, and (b) identify possible internalized ableism present in commonly-held goals for young autistic children (e.g., targeting stereotypy or tolerating loud sounds, when these do not pose threats to health or safety). Researchers should continue to conduct qualitative research with autistic adults (e.g., surveys, interviews, focus groups), to better understand autistic perspectives, and better inform the ways we make educational decisions for young autistic children.

Recommendations for Practitioners

First, respondents consistently reported that the child should be the primary stakeholder, and that their perspectives should be prioritized in all aspects of educational decision-making. To ensure that the child is "in the driver's seat" of these decisions to the extent possible, practitioners should honor indicators of assent/dissent, build on strengths, follow the child's interests, and intentionally teach skills related to self-advocacy and autonomy. Second, respondents emphasized the importance of respecting autistic characteristics and culture in all aspects of decision-making, particularly in setting goals. Practitioners can avoid developing goals that require children to mask autistic characteristics (e.g., reducing stereotypy, increasing eye contact, increasing sensory tolerance), instead focusing on teaching peers to celebrate neurodiversity and autistic culture. Third, respondents reported that practitioners should strive to meet sensory, emotional, and psychological needs whenever making educational choices on the child's behalf. This may include providing accommodations to prevent sensory overwhelm (e.g., headphones, fidget toys), avoiding goals and procedures that cause psychological distress (e.g., restraint, seclusion), responding promptly to emotional dysregulation and distress, and teaching emotional regulation skills. Finally, practitioners should consider incorporating practices with consistently high social acceptability ratings, and avoiding practices with consistently low social acceptability ratings, whenever appropriate. Goals that promote communication and autonomy were considered most appropriate to target, while goals that promote masking of autistic characteristics were considered least appropriate to target. Learning contexts with fully adult-led learning, or very short or long amounts of time in ideal learning contexts were rated unacceptable. Procedures that included antecedent interventions were consistently rated as highly acceptable. Some consequent procedures were consistently rated as unacceptable, including attention extinction, tangible extinction, and forms of escape extinction that restricted bodily autonomy (e.g., restraint, physical prompting). When considering these recommendations, respondents consistently reported that decisions will vary according to the child's unique context and characteristics. Practitioners should engage in collaborative decision-making with all relevant stakeholders (particularly the child), and use all relevant variables to inform decisions that will best serve the child.

Chapter 2: Improving Social Validity and Decreasing Restrictiveness of Established Behavioral Interventions for Preschoolers in Classroom Settings

Over recent years, the field of applied behavior analysis (ABA) has trended toward increased focus on improving the ethics and social validity of behavior analytic interventions. For example, at the largest annual convention for behavior analysts, held by the Association for Behavior Analysis International, the number of events with keywords "social validity" and "ethics" have tripled and sextupled in the last 15 years, respectively, while events related to "reinforcement" and "extinction" have remained relatively unchanged (see Table 7). Similarly, while there were four or fewer events each year related to compassion from 2004-2019, there were 36 events in 2022. Further, there are a growing number of groups calling out problematic behavior analytic practices (e.g., Sandoval-Norton & Shkedy, 2019; Wilkenfeld & McCarthy, 2020), including those led by autistic adults (e.g., Autistic Self-Advocacy Network) and there is a concurrent push from within the field for more compassionate practice (e.g., LeBlanc et al., 2019, Rohrer et al., 2021; Taylor et al., 2019). Similarly, parents of children seeking behavioral health services reported that they would prefer a warm, empathetic practitioner with less effective treatment over a cold, distant practitioner with a more effective treatment (Chadwell et al., 2019), indicating that consumers of behavior analytic services may value treatment acceptability over treatment efficacy, to some degree. In response to this mutifaceted call for a compassionate shift, behavior analysts have been more carefully examining long-held practices to determine whether they are least restrictive (e.g., Chazin et al., 2021), ethical (e.g., Kelly et al., 2020; Pokorski & Barton, 2020), and acceptable to the direct consumers of behavior analytic services (e.g., Lugo et al., 2019; Owen et al., 2021; Pisman & Luczynski, 2020). In cases where interventions are found lacking, researchers are assessing adaptations (e.g., Trump et al., 2020) and alternatives (e.g., Rajaraman et al., in press) to standard practices.

Functional communication training (FCT) and schedule thinning are two such long-standing behavior analytic practices that may be due for an "ethical upgrade" in some situations. Although these practices effectively lead to behavior change when implemented with high fidelity and under the right conditions (Gerow et al., 2018; Hagopian et al., 2011), there are potential ethical and acceptability issues related to each of these practices. Both practices typically incorporate extinction contingent on challenging behavior (Gerow et al., 2018; Hagopian et al., 2011). Use of extinction may result in collateral effects, such as extinction bursts and extinction-induced aggression (Lerman et al., 1999), which could be interpreted as participant indication that procedures are unacceptable. Further, when schedule thinning incorporates extinction contingent on both functional communication and challenging behavior during "compliance training," the consumer loses the ability to effectively self-advocate and self-determine, both necessary to effectively assent to treatment. Finally, while there are no limitations on the contexts in which these interventions may be implemented, they are often implemented in the context of "desk work" with short inter-trial intervals, not only for older children (e.g., Casey & Merical, 2006; Davis et al., 2012), but also for preschool-aged children (e.g., Harding et al, 2006; Tsami & Lerman, 2020; Wacker et al., 2013). Although these contexts may be typical for older children, it may be more socially appropriate to use naturalistic, play-based interventions (e.g., those for which trials are embedded into play with long inter-trial intervals) with preschool-aged children, who are predominant recipients of behavior analytic services and who were the focus of this study.

This study aims to adapt FCT and schedule thinning in ways that could address ethical and social validity concerns. In the introduction below, I will describe (a) typical procedures for FCT and schedule thinning, (b) ethical and social acceptability issues related to these standard procedures, and (c) how we planned to address these issues with our proposed procedural adaptations.

Functional Communication Training

Functional communication training (FCT) is a differential reinforcement procedure intended to increase appropriate communication and decrease challenging behavior (Cooper et al., 2020). In the 35 years since FCT was first introduced (Carr & Durand, 1985), researchers have established FCT as effective for individuals of all ages (Tiger et al., 2008), with a wide range of disabilities (Gerow et al., 2018), engaging in a variety of challenging behaviors (Hagopian et al., 2011). Prior to implementing FCT, the practitioner identifies the variable or variables maintaining challenging behavior via a functional analysis (e.g., Lambert et al., 2012; Prykanowski et al., 2021) or functional behavior assessment (e.g., Dunlap et al., 2006; Dwyer et al., 2012; Muharib et al., 2021). After identifying the function-based reinforcer, the practitioner uses concurrent schedules (e.g., of reinforcement, extinction, or punishment) in order to differentially reinforce functional communication in favor of challenging behavior. Typically, the implementer (a) provides the function-based reinforcer contingent on the functional communication response (FCR), and (b) withholds the function-based reinforcer contingent on challenging behavior (i.e., places challenging behavior on extinction). The vast majority of FCT studies include an extinction component. For example, in a literature review of 215 studies that included FCT to reduce challenging behavior, 95% of participants were exposed to extinction contingent on challenging behavior (Gerow et al., 2018).

Even when extinction is possible or allowable, it might not be in the best interest of the individual receiving FCT, nor in the best interest of therapy in general. Extinction requires that the implementer pair themselves with an aversive context (e.g., presenting aversive tasks, withholding preferred items), while simultaneously removing a previously effective communication method (i.e., challenging behavior). By repeatedly pairing the aversive stimulus with the implementer, the implementer may become a conditioned punisher (Catania, 2013), counteracting recommendations that the implementer pair themselves with reinforcement to develop rapport (Lugo et al, 2017). The use of escape extinction may be particularly problematic, as it requires that the implementer continue to present aversive stimuli following indication of dissent from the learner. Some research indicates that children with disabilities may prefer interventions without escape extinction (Owen et al., 2021). Since children with disabilities are often the direct consumers of behavioral interventions, it is especially critical to develop intervention procedures they find acceptable.

Physical prompting is often used within FCT, either to ensure that the participant engages in the FCR (e.g., Quigley et al., 2020; Lambert et al., 2020) or, for escape-maintained behavior, to prompt through completion of task directions (e.g., Schieltz et al., 2011; Wacker et al., 2013). Although there are contexts in which use of physical prompting may be appropriate (e.g., when the learner does not resist physical prompts and less intrusive prompts do not consistently evoke correct responding), physical prompting may constitute a restrictive procedure when the implementer limits the learner's ability the move and act independently (U.K. Department of Health, 2015). Practitioners, caregivers, and learners have rated restrictive procedures with low social acceptability (Elliot, 1998; Luiselli et al., 2015), making use of these procedures less socially valid than alternatives that offer more bodily autonomy. Further, use of these kinds of restrictive procedures may increase risk of unintentional mistreatment of the learner, including risk of physical harm, particularly if the individual struggles against the use of physical prompts.

A limited number of studies have assessed the effects of FCT without extinction (e.g., Athens & Vollmer, 2010; Davis et al., 2012; Kahng et al., 2000, Kunnavatana et al., 2018), and results across studies indicate it is generally effective for increasing functional communication and decreasing challenging behavior. However, most were conducted within the context of "desk work" with short inter-trial intervals, contexts which have low social acceptability for use with young children. Although FCT procedures with partial extinction embedded within play have been shown to be effective (e.g., Rajaraman et al., 2022; Staubitz et al., 2022), we were unable to identify any studies assessing FCT without extinction embedded into play. Thus, more research is needed assessing the efficacy of embedded FCT without extinction.

Schedule Thinning

Although FCT has a strong evidence base indicating efficacy for increasing functional communication and decreasing challenging behavior, requesting following FCT may persist at rates that are higher than can practically be reinforced by endogenous implementers (e.g., teachers, parents) in authentic settings (e.g., schools, homes). Further, requesting may persist in situations where reinforcement is not available. Schedule thinning refers to the process of gradually increasing criteria for accessing reinforcement. For escape-maintained behavior, implementers may use *demand fading* (also called instructional fading), in which the implementer increases the number or difficulty of task directions to complete prior to receiving reinforcement (Gerow et al., 2020). For attention- and tangible-maintained behavior, implementers may use *delay fading*, in which case the implementer increases the length of time to wait prior to reinforcing functional communication (Stevenson et al., 2016).

During typical schedule thinning, neither functional communication nor challenging behavior results in access to function-based reinforcement prior to completion of the task direction(s) or wait interval (Hagopian et al., 2011). Effectively, all behavior except for compliance is placed on extinction prior to compliance or waiting. This presents many of the same issues related to the use of FCT with extinction—the implementer must pair themselves with aversive stimuli, ignore dissenting behavior, and in some cases, use restrictive procedures to ensure that the learner complies with the task direction. Additionally, demand fading with extinction can be especially problematic, as the only means of escaping an aversive stimulus is to comply. Individuals with disabilities, who are typically the recipients of demand fading interventions, are at increased risk of physical and sexual assault, compared to their non-disabled peers (Jones et al., 2012). Thus, it is critical that implementers honor dissent, and teach learners that they have the right to say no at any point during behavioral interventions. To date, no studies have assessed reinforcing functional communication during the delay or demand portion of a fading trial.

Research Questions

This purpose of this study is to assess adaptations of FCT and schedule thinning that address the shortcomings of traditional procedures. In our adaptations of these procedures, we (a) did not include extinction contingent on challenging behavior or functional communication, (b) used the least intrusive prompting procedures

required for intervention efficacy, and (c) embedded trials within a play context, with long inter-trial intervals. We implemented these procedures to answer the following research questions:

1. Is embedded FCT without extinction effective for increasing functional communication and decreasing pre-cursor and challenging behavior for young children?
2. Is embedded schedule thinning without extinction effective for increasing delay tolerance and maintaining low levels of pre-cursor and challenging behavior for young children?
3. After engaging with the implementer in embedded FCT and schedule thinning without extinction, do young children's preferences change between playing with the implementer or playing alone?

Given the embedded schedule thinning without extinction was not an effective intervention for the two participants who received it, we added a fourth research question, to assess a secondary modification:

4. Is embedded schedule thinning without escape extinction effective for increasing delay tolerance and maintaining low levels of pre-cursor and challenging behavior for young children?

Because this study was multi-phase and each phase was complex, we have divided the paper by phase. Below, we first outline a general method that applies to all phases of the study. Next, we discuss the method and results of each phase of the study in a self-contained section: (1) screening and initial assessment, (2) trial-based functional analysis, (3) functional communication training, (4) schedule thinning, and (5) generalization. We also include a self-contained section on the concurrent chains preference assessment, a social validity measure that was used throughout all phases of the study for two participants. Finally, we discuss conclusions across all phases of the study.

General Method

Participants

To be included in the study, participants had to be between 24 and 72 months at the start of the study, and were required to have fewer than 50 expressive words, per the teacher-completed MacArthur-Bates Communicative Development Inventories. They were also required to have challenging behavior that (a) occurred hourly or daily, (b) could be evoked within a play setting in the presence of adult (i.e., outside the presence of peers or siblings), and (c) was theorized to be maintained by access to social attention, preferred items/activities, and/or escape from non-preferred items/activities. That is, participants with strictly automatically-maintained behavior were excluded. Stereotypy was not be considered as a challenging behavior, even if it was theorized to have socially-mediated functions. Children with and without disabilities were invited to participate, and participants were not be excluded based on gender, ethnicity, or diagnosis.

To recruit participants, we shared these inclusion criteria with an occupational therapist and physical therapist in a university-based inclusive preschool, and requested their referrals for classrooms that may contain children who met these criteria. We spoke with teachers in each of three classrooms, and sent consent forms home to the three children who met criteria who teachers identified as having the greatest need for intervention. To confirm eligibility after receiving caregiver consent, we conducted the Functional Analysis Screening Tool (FAST; Iwata et al., 2013) with the participant's teacher as an initial screening tool, and then confirmed the maintaining variable(s) for pre-cursor and challenging behavior with a functional assessment.

This study included three child participants. Addie was a 48-month-old White female diagnosed with Autism Spectrum Disorder. She communicated using a DynaVox® to mand and tact emotions, primarily with single icons and two-icon combinations. She also manded using combinations of vocal approximations and signs (e.g., no, help, all done, more), as well as other non-verbal gestures (e.g., hand leading, reaching). She engaged primarily in tactile and cause-and-effect play (e.g., stacking Legos®, dropping ball down ball racer, playing with sand in sensory table). She typically played alone, though she would sometimes engage in parallel play with peers. She received speech-language therapy, occupational therapy, and physical therapy within the inclusive preschool, and additionally received ABA therapy through an outside provider. Addie's lead teacher reported that she did not participate in group activities, typically eloping from the activities, or engaging in pushing or high-pitched screaming if led toward a group activity or required to stay. Although she was fairly proficient at manding with her DynaVox®, her teacher reported that she never independently used it to request breaks.

Benji was a 48-month-old Black male diagnosed with a medical diagnosis of Autism Spectrum Disorder and mixed receptive-expressive language disorder, and an educational diagnosis of developmental delay. He communicated exclusively with non-verbal gestures (e.g., reaching, hand leading) and challenging behavior (e.g., crying, flopping hitting). His teacher reported that his teaching team spent six months teaching him the sign for "more"; however, he did not use this sign during the duration of the study. He engaged primarily in tactile and cause-and-effect play (e.g., dropping balls down ramps, lining up objects, watching spinners or tops). He engaged almost exclusively in solitary play, moving away from peers if they approached. He received speech language therapy, occupational therapy, and physical therapy within the inclusive preschool, and did not receive additional

serves through outside providers. Benji's therapist reported that Benji would engage in challenging behavior when required to leave a preferred activity or give up a preferred toy. She reported that he would start by yelling and stomping, but would escalate to hitting, dropping to the floor, and hitting his face with his fist.

Caleb was an 37-month-old White male for did not have formal diagnoses. However, his teachers identified developmental differences and results for his MB-CDI indicated expressive and receptive language delays. He communicated vocally in partial or full sentences, though his teacher reported she often had trouble understanding his speech. Although Caleb's MB-CDI results indicated that he did not meet study criteria (i.e., his expressive language was too advanced), the lead teacher and researchers agreed that due to the intensity and frequency of his challenging behavior, he should still be included in the study. He engaged primarily in pretend play (e.g., racing toy cars, building car garages out of MagnaTiles®), and typically played with adults or peers. He did not receive any additional services from preschool or outside providers. Caleb's lead teacher reported that Caleb frequently engaged in challenging behavior when preferred items were removed, teacher attention was not available, and/or he was required to go somewhere non-preferred. Transitioning from highly-preferred to low-preferred activities was especially challenging, and that transitioning to and staying on his cot during nap time was the most difficult part of the day. His teacher reported that he would engage in a variety of dangerous challenging behavior to escape his cot, including hitting the teacher, banging his head against the wall, throwing items within reach, and eloping from his cot. His teacher had tried to develop reinforcement systems, but reported that he did not engage in appropriate behavior often enough to access reinforcement. Instead, they implemented escape extinction, putting his cot in a niche of the classroom where it was surrounded by walls on three sides, and stationed an adult to block the exit.

Settings and Implementers

All sessions took place in a university-based inclusive preschool. For Addie, all sessions took place in a resource room, where Master's level graduate students led small group rotations for students who did not sleep during nap time. In addition to the first author, 3-5 children with and without disabilities were present, as well as 2-3 adults. For Benji, most sessions took place in his regular classroom. In addition to the researcher, 8-10 children with and without disabilities were present, as well as 2-3 adults. Additionally, two assessment sessions took place in a resource room, with two researchers present. For Caleb, the first six sessions and final eight sessions took place in the classroom during nap time. In addition to the researcher, 9-11 children with and without disabilities were present, as well as 1-2 adults, though most students were sleeping and very few engaged with Caleb during classroom sessions. Because assessment sessions were disruptive to sleeping students, sessions were moved to a resource room, with two researchers present. The resource room was empty except for a child-sized table and chair, as well as Caleb's cot and other study materials. We turned off the lights and illuminated sessions by a battery-bowered lantern to approximate conditions in the classroom during nap time.

Addie's assessment and primary intervention sessions were conducted by the first author, who was a Board-Certified Behavior Analyst and fourth-year doctoral student in Special Education. Addie's generalization sessions were conducted by first-year graduate students, who regularly served as instructors during the daily small groups. Benji's assessment and primary intervention sessions were conducted by the first author. Benji's generalization sessions were conducted by two second-year graduate students, who did not regularly serve as instructors for Benji, but planned to continue working one-on-one with him after the conclusion of the study. Caleb's assessment and primary intervention sessions were conducted by the first and third author. The third author was a first-year Master's level graduate student in Special Education. Caleb's generalization sessions were conducted by his lead teacher. Except for the first author, all graduate students were completing a Master's degree in Special Education or Child Studies, and concurrently pursuing certification in ABA.

The first author provided training for all additional implementers, prior to and during procedural implementation. Training included (a) verbally reviewing procedures prior to implementation, (b) *in vivo* prompting and feedback, systematically faded as implementers performed to fidelity, and (c) provision of post-session feedback and discussion. If procedural fidelity fell below 90%, the first author planned to provide training during mock sessions outside of typical session time. However, fidelity for additional implementers never fell below 90%.

Materials

All participants had a communication device available, including for Caleb, whose initial assessments indicated he would likely communicate vocally and follow model prompts. Communication devices were provided across participants such that we could physically prompt communication if other, less intrusive prompts failed. For Addie, we used a DynaVox® that was used regularly across settings. For Benji during initial FCT, we used a hardwood block (half unit; 7 x 7 cm), with a pictured affixed showing a illustrated boy playing with a spinner and the text "I want toys." We chose for a block instead of a laminated picture card, because laminated paper was a highly-preferred item, which Benji typically would incorporate into stereotypy. During modified FCT, we used a GoTalk® 20+ that was not being used when the study started, and was starting to be incorporated into mealtimes

once we added it. For the study, we prompted communication with a "want" icon with an accompanying illustration; for mealtimes, Benji was prompted to use an "open" icon. Caleb, we used 7 x 7 cm picture cards, with separate cards for requesting breaks, toys, and play, each with illustrated figures and accompanying text.

During the neutral and control segments of all phases of the study, participants had toys available that were reported by teachers to be highly-preferred. For Addie, this included Legos®, a Battat® Shapes and Sounds Sorter, a number puzzle, a ball racer, and a pin art toy. For Benji, this included a toy waffle, ball racer, ball ramp, toy cars, pretend play hats. For Caleb, this included a car ramp with toy cars, miniature Troll® figurines, Play-Doh® set, Poppa's Pizza Topple® game, and a Melissa and Doug® cake set. For all participants, new toys were rotated in if they became less engaged in toy play across two consecutive sessions.

For Addie, additional materials were present during the test segment, consistent with whatever small group activity was taking place, typically materials for story time (i.e., books) and art (e.g., colored pencils, dot markers, tape, construction paper). For Caleb, sessions took place on and around a child-sized cot. We also used twinkle lights for the first three sessions, and a lantern for all subsequent sessions, in order to illuminate the room. For the concurrent operant preference assessment for Benji and Caleb, we used two 10x6 cm laminated photographs: one of the participant playing by themselves, and another of them playing with the first author.

Dependent Variables

All data were collected via video using ProCoderDV (Tapp, 2003). Across all participants, we collected frequency data on unprompted functional communication responses (FCR), prompted FCR, pre-cursor behavior (PCB), and challenging behavior (CB). These behaviors were operationally definitely individually for each participant (see Table 8). For each participant, the FCR included both a vocal response (e.g., "Play with me") and a physical response (e.g., touching a "play" icon), such that functional communication could be prompted. Additionally, as we added new FCRs for Caleb (i.e., requesting breaks, toys, and/or attention) as the intervention progressed, we coded these separately. For Caleb, the first three sessions of schedule thinning were 15 min, and all subsequent sessions were 50 min. As such, for schedule thinning only, we calculated rate/hr for all behaviors.

For Addie and Caleb, schedule thinning goals were designed such that they remain in a designated area (i.e., in group for Addie, on cot for Caleb) for increasing amounts of time. As such, we measured the total duration the participant was in the designated area for each session. We calculated [time in designated area] / [total session time] * 100, to measure percentage of time spent in the designated area.

For Addie and Benji, schedule thinning goals were designed such that they tolerate a delay to reinforcement for a specific measure of time. For both Addie and Benji, we calculated frequency with which delay tolerance occurred, out of a possible five trials. For Benji, we also measured latency to reinforcement from initial reinforcement denial. We graphed data from which we made decisions about phase changes and mastery crtieria; for Addie, we graphed frequency with which delay tolerance occurred, and for Benji, we graphed latency to reinforcement.

Interobserver Agreement

Interobserver agreement (IOA) was collected by an independent observer for 37.5% of sessions, which included a minimum of 33% of sessions across each condition, participant, implementer, and dependent variable. We collected IOA for all dependent variables, plus the start of neutral, control, and test segments, to ensure that data from other dependent variables were attributed to the correct segment. For unprompted FCR, prompted FCR, pre-cursor behavior, challenging behavior, start of time in designated area (Addie and Caleb), start of time in non-designated area (Addie and Caleb), we calculated an agreement when both observers independently coded an instance of behavior within the same 3 s window. That is, if the primary observer coded unprompted FCR occurring at time code 2.0 seconds and the secondary observer coded that it happened at time code 4.0 seconds, this was coded as one agreement. However, if the secondary observer coded that it occurred at time code 5.1 seconds, this was coded as two disagreements. If both coders agreed that no instances of an applicable dependent variable occurred within the session, this was coded as one agreement. We calculated overall IOA for each session using the formula [total agreements / total agreements + disagreements] * 100.

Average IOA across all sessions was 94.4% (78.2–100%). Average IOA by participant was 96.5% for Addie (95.1 - 100%), 94.9% for Benji (78.2 - 100%; 2 of 12 sessions below 80%), and 92.7% for Caleb (78.9-100%; 1 of 28 sessions below 80%).

Procedural Fidelity

Procedural fidelity was collected by an independent observer for 38.1% of sessions, which included a minimum of 33% of sessions across each condition, participant, and implementer. Procedural fidelity data collection systems were created for each condition prior to the start of the study; adapted systems were created as needed, in response to intervention modifications. Across all participants and conditions, the independent coder observed via video, and collected data using a tally-per-occurrence form. We calculated procedural fidelity for each session with

the formula [actions implemented correctly / actions of steps implemented correctly and incorrectly] * 100. For actions that could be performed more than once (e.g., responding each time the participant engaged in functional communication), each instance of correct or incorrect implementer behavior was tallied.

Average procedural fidelity across all sessions was 98.4% (90.7 – 100%). Average procedural fidelity by participant was 98.6% for Addie (93.9 – 100%), 98.2% for Benji (90.7 – 100%), and 97.3% for Caleb (92.7 – 100%).

Screening and Initial Assessment

For Addie and Caleb, all screening and assessments were completed with their lead teachers. Benji was in the process of transitioning classrooms when he joined the study. As such, we interviewed a researcher who worked with Caleb daily, including through the classroom transition.

Procedures

MacArthur-Bates Communicative Development Inventories (MB-CDI)

The MB-CDI is a caregiver-completed, norm-referenced questionnaire that measures receptive and expressive language development, as well as use of communicative actions and gestures. Based on teacher report of participant language use, we conducted the *MB-CDI: Words and Gestures*. This iteration of the MB-CDI is norm-referenced for young children ages 6 to 18 months, though it is also used with older children with language delays. The purpose of this assessment was to better understand each participant's communication skills, as well as determine whether they met inclusion criteria for the study.

Functional Analysis Screening Tool (FAST)

The FAST is a questionnaire conducted by the clinician with one or more caregivers, designed to be used as an indirect functional assessment method. That is, the FAST captures information about challenging behavior, as well as the events that occur antecedent and consequent to challenging behavior. This information helps the clinician to operationally define the challenging behavior, as well as determine which events co-occur with challenging behavior, in order to form a hypothesis about the function of challenging behavior. It consists of 8 open-ended questions and 16 yes/no questions. Results are reported by behavioral function, with scores ranging from 0-4 for four categories: social (attention/preferred items), social (escape from tasks/activities), automatic (sensory stimulation), and automatic (pain attenuation). We conducted the FAST with each participant's teacher as an initial screening tool. If the participant met inclusion criteria based on the results of the FAST, we moved onto initial assessment.

Open-Ended Functional Assessment Interview (FAI)

The open-ended FAI is a semi-structured interview conducted by the clinician with one or more caregivers (FAI; see Appendix B; Hanley et al., 2012). Like the FAST, the open-ended FAI is an indirect functional assessment method, used to operationally define pre-cursor and challenging behavior, as well as hypothesize a behavioral function. It consists of 20 open-ended questions, including questions about demographic background (n = 1), language abilities (n = 1), play skills and reinforcers (n = 2), and pre-cursor and challenging behavior (n = 16).

We used the FAST and open-ended FAI to operationally define each participant's challenging behavior(s), and any pre-cursor behaviors that reliably occurred prior to challenging behavior. For all participants, multiple challenging behaviors were reported that were likely maintained by the same variables (e.g., the child hits, kicks, and yells to access adult attention); in these cases, all topographies were included in the operational definition.

We also used the FAST and open-ended FAI to determine the reinforcer maintaining challenging behavior. This could include access to adult attention, access to tangibles (e.g., objects like toy cars, activities like ordering/arranging items), or escape from non-preferred stimuli (e.g., task directions, circle time). The reinforcer could also be synthesized, in that it could address multiple functions concurrently (e.g., escape to tangibles). Once confirmed to reinforce pre-cursor and/or challenging behavior via a functional analysis, the reinforcer was manipulated throughout experimental conditions as a means of teaching functional communication and increasing delay tolerance.

Semi-Structured Interview

We also conducted a self-designed, semi-structured interview with the teacher, in order to gather additional information necessary for designing subsequent assessment and intervention. This interview consisted of of 18 additional questions, including questions about preferred items and activities (n = 6), the ability to follow prompts (n = 5), and the skill areas identified as most important to the teacher (n = 7). Information from this interview was used to select preferred items and activities to be incorporated into play, as well as the controlling prompt to be used throughout intervention.

Preferred Items and Activities. Within the semi-structured interview, we collaborated with the teacher to determine the play context likely to be motivating and engaging for the participant.

Controlling Prompt. Within the semi-structured interview, we collaborated with the teacher to select a controlling prompt for the participant. They selected the controlling prompt that was least intrusive and likely to consistently evoke the correct response. For example, if the teacher reported that the participant consistently followed a point, we would choose a gestural prompt. If the caregiver reported that the participant did not consistently follow a verbal or gestural prompt, we chose a physical prompt. However, if the participant engaged in challenging behavior contingent on physical prompting within a session, the implementer planned to use an alternate prompt for the remainder of the session. If the participant engaged in challenging behavior contingent on physical prompting for three consecutive sessions, we planned to use an alternate prompt across all remaining sessions. If no traditional prompt besides physical prompting consistently evoked correct responding in these cases, we planned to use a "reverse prompt," in which the implementer touched the communication icon to the participant's finger (Turner et al., 2020). However, no participants were resistant to physical prompting, so alternative prompting was never needed.

Results

For Addie, the MB-CDI indicated she produced 4 words expressively and understood 342 words receptively (out of 396 possible words). The FAST indicated that pre-cursor and challenging behavior were likely evoked by escape from non-preferred activities to preferred items and activities, and this hypothesis was substantiated by the open-ended FAI.

For Benji, the MB-CDI indicated that he produced 0 words expressively and understood 23 words receptively (out of 396 possible words). The FAST indicated that pre-cursor and challenging behavior were likely evoked by escape from non-preferred activities to preferred items/activities. However, the open-ended FAI indicated that access to preferred items was the most likely function of challenging behavior, and did not indicate escape was a behavioral function. As such, we only assessed access to preferred items/activities in the subsequent functional analysis. The researcher we interviewed typically worked with Benji in one-on-one contexts, where Benji did not engage in behaviors hypothesized to be motivated by escape. Later observations in the classroom indicated that in group contexts, Benji did engaged in challenging behavior to escape small and large group activities.

For Caleb, the MB-CDI indicated that he produced 107 words expressively and understood 157 words receptively (out of 396 possible words). The FAST indicated that pre-cursor and challenging behavior were likely evoked by escape from non-preferred activities to preferred items/activities and adult attention, and this hypothesis was substantiated by the open-ended FAI.

We used the results of these assessments to operationally define pre-cursor behavior, challenging behavior, and FCR, which are described in Table 8. We also used the results of these assessments to determine preferred items/activities and controlling prompts, which are described in in Table 9. Because Addie and Caleb both had a prompt that semi-reliably evoked correct responding (i.e., a model prompt), we opted to use system of least prompts, with a model non-controlling prompt and full physical controlling prompt. For Benji, a full physical prompt was reported to be the only prompt that reliably or semi-reliably evoked the correct behavior. As such, we opted to use constant time delay for Benji, with a full physical controlling prompt. When Benji's teaching team reported this felt too restrictive, we opted to change to system of least prompts, with a gestural non-controlling prompt, model non-controlling prompt, and full physical controlling prompt.

Phase 1: Trial-Based Functional Analysis (TBFA; Baseline)

Unless otherwise noted, sessions across this and subsequent phases of the study were 15-20 min and included five trials; each trial contained a control, test, and neutral segment. The control and neutral segments were consistent across all conditions (i.e., baseline, FCT, and schedule thinning procedures); the test segment varied by condition. Sessions were conducted each weekday the participant was at school. Multiple back-to-back sessions were conducted for some participants; number of daily sessions were determined by teacher preference, child availability, and indicators of reinforcer satiation. For Addie, Benji, and Caleb, sessions were conducted once, twice, and three times per day, respectively.

Experimental Design

We used a multielement design, comparing pre-cursor and challenging behavior in the test segment and the control segments of each session.

Procedures

Each control segment was 1 min. Throughout the control segment, the implementer provided unrestricted access to preferred items (per teacher report) and attention reported to be preferred by the child (i.e., high-quality, continuous attention for a child who enjoys adult attention; withholding attention for a child who finds adult attention aversive). Except in cases where the child preferred a different type of attention or no attention, the implementer followed the child's lead in play, mirroring and mapping the child's play and language use. The implementer refrained from presenting task directions, which included asking questions about the child's play.

Each test segment was 1 min. The test segment began when the implementer removed the hypothesized reinforcer. If the hypothesized reinforcer included an escape from a non-preferred task or activity, the implementer provided a task direction, waited 5 s, provided a prompt, wait 5 s, and if necessary, repeated this sequence. If the child engaged in pre-cursor or challenging behavior, the implementer immediately returned the hypothesized reinforcer and removed any task directions. If there were any components of the control segment that were not part of the hypothesized reinforcer (e.g., adult attention, tangible items), these remained in place throughout the test segment. The implementer ignored all other behavior, including functional communication. If the participant engaged in a behavior that is not being assessed (e.g., automatically-maintained chin-pressing), the implementer ignored that behavior *unless* it was potentially dangerous or harmful. In these cases, the implementer planned to provide minimal attention to block or follow typical parental response, in order to keep the participant safe.

Each neutral segment was typically 1 min, though could be longer if the participant engaged in pre-cursor or challenging behavior carried over from the test segment. The neutral segment started 1 min after the start of the test segment, and was identical to the control segment. The purpose of the neutral segment was to ensure the participant had ceased to engage in challenging behavior carried over from the test segment, prior to starting the next control segment. The implementer began the next control segment after a minimum of 1 min, and after the participant had engaged in 0 instances of pre-cursor or challenging behavior for 30 s. See Table 9 for the specific contexts of the control, test, and neutral segments for each participant.

Due to the nature of the nonconcurrent baseline design, number of sessions was assigned via random number generator: three sessions for Addie (the third participant chronologically), six for Benji (the first participant chronologically), and nine for Caleb (the second participant chronologically). However, If the TBFA failed to identify a function-based reinforcer within three sessions, we planned to modify the reinforcer and re-test, or isolate and individually assess additional reinforcers in a follow-up assessment. In these cases, sessions that included a "failed reinforcer" were not included in the total number of sessions.

Modifications.

No modifications were made for Addie's sessions.

For Benji's sessions, modifications were made to minimize disruptions the study caused for his classroom. Benji's behavior during the first four sessions disrupted circle time routines, in that Benji sometimes shouted loudly and ran through the circle. The researchers and lead teacher collaboratively decided to move the sessions to a private resource room, to minimize classroom disturbance. However, toy removal did not evoke challenging behavior in the private room. The researchers and lead teacher collaboratively determined to return sessions to the classroom setting, and took additional steps to minimize classroom disruptions (e.g., using the research assistant who was filming to block access to running through circle time).

For Caleb's sessions, modifications were made to address a possible abolishing operation. Prior to the first TBFA session, twinkle lights were affixed to the wall next to Caleb's cot, so that the surrounding area would be adequately lit to capture Caleb's behavior via video. However, during test segments, Caleb became highly engaged with the twinkle lights. We theorized that these served as a tangible reinforcer, as well as an abolishing operation for escaping to adult attention and other preferred toys. Further, Caleb began playing with the plug and outlet, which had previously been protected by outlet covers, which presented safety concerns, and steps to mitigate safety concerns led to unintentional provision of adult attention. After three sessions, we removed the twinkle lights, and replaced them with a battery-powered lantern.

Results

Results are depicted in Figure 1. Across all three participants, data indicated clear differentiation between the test and control conditions, with no overlap between conditions. These data indicate a clear functional relation between the removal of the hypothesized reinforcer and occurrence of pre-cursor and challenging behavior.

Phase 2: Embedded Functional Communication Training (FCT)

Experimental Design

We utilized a non-concurrent multiple baseline design across participants, for which we included the TBFA as baseline condition.

Due to ethical concerns, we ruled out the possibility of using a reversal design. A reversal design would require that we reinforce challenging behavior and extinguish functional communication after we had already taught participants how to functionally request. This could (a) negatively impact the relationship between the implementer and participant, by eroding trust in the implementer, and (b) negatively impact the participant, by creating an unpredictable environment and removing access to an effective intervention, thus potentially causing emotional distress. Due to restrictions resulting from the coronavirus pandemic (i.e., attempting to limit implementer exposure to multiple participants simultaneously) and limited resources (i.e., insufficient person-power to run several sessions

across multiple participants daily), we ruled out the possibility of using a concurrent multiple baseline or probe design.

Although nonconcurrent designs have previously been considered to be less rigorous than concurrent designs, single case methodologists have recently reconsidered the conditions under which nonconcurrent designs may allow for strong internal validity (e.g., Ledford & Zimmerman, 2022; Slocum et al., 2022). This study presents conditions under which a nonconcurrent design was particularly rigorous. Importantly, we staggered number of sessions, number of days, and start date (i.e., calendar date) across participants. Addie spent 3 sessions across 3 days in baseline starting April 2022, Benji spent 8 sessions (6 in the finalized context) across 21 days in baseline starting August 2021, and Caleb spent 12 sessions (9 in the finalized context) across 6 days in baseline starting October 2021. By planning phase changes that were sufficiently offset in multiple ways, we reduced likelihood that maturation or a coincidental event (i.e., history) produced a change in behavior at the start of the intervention (i.e., FCT) condition.

Further, we recruited participants from three separate classrooms. Participants rarely had contact with one another, making history threats unlikely. Although Caleb and Addie participated in the same small group rotations where Addie's sessions took place, Caleb's study participation was complete before he joined small group rotations, study procedures for Caleb were not implemented during small groups while Addie was a study participant, and Addie rarely engaged with Caleb throughout her participation in the study. All of these safeguards make history threats unlikely.

Procedures

See Figure 2 for a flowchart diagram of FCT procedures. The control segment followed procedures described in the "TBFA" section above. At the start of the test segment, the implementer removed the reinforcer (for tangible- and attention-maintained behavior) and/or provided a task direction (for escape-maintained behavior). After a specified wait interval, the implementer provided a controlling prompt (e.g., gestural, physical) to engage in the FCR. If the participant engaged in the FCR, the implementer provided access to the reinforcer to start the next control segment. If the participant did not engage in the FCR, the implementer (a) waited 5 s, (b) provided a more intrusive prompt (if applicable) and waited 5 s, (c) demonstrated the FCR (e.g, tap the break icon and say "I want a break" out loud), and (d) provided access to the reinforcer. If at any point in this sequence the participant engaged in the FCR, the implementer immediately provided access to the reinforcer.

Contingent on pre-cursor behavior, the implementer (a) engaged in a verbal (e.g., "Tell me on your device!") and gestural prompt (e.g., pointing to icon), (b) continued to engage in the gestural prompt for a 5 s wait interval, (c) demonstrated the FCR, and (d) provided access to the reinforcer. In short, appropriate communication was modeled by the implementer, but not required of the participant in order to access reinforcement. If the child engaged in prompted FCR at any point in this sequence, the implementer immediately returned the reinforcer. Contingent on challenging behavior or a second instance of pre-cursor behavior, the implementer demonstrated the FCR and provided access to the reinforcer.

During initial sessions, the implementer prompted FCR following a 0 s delay (i.e., immediately after removing the reinforcer). Following three consecutive sessions with 5 instances of FCR (prompted or unprompted) and 0-1 instances of pre-cursor and challenging behavior, the initial wait interval for FCR was increased from 0 s to the terminal delay of 5 s. If the participant engaged in pre-cursor or challenging behavior for more than three instances across two consecutive sessions, the implementer resumed the 0-s initial wait interval for FCR. The criteria for mastering FCT was three consecutive sessions across two days with 5 instances of unprompted FCR and 0-1 instances of pre-cursor and challenging behavior.

Modifications

Across participants, no modifications were initially needed, in that all participants reached mastery criteria following procedures as described. However, during schedule thinning with Benji, his physical therapist approached our research team, reporting that challenging behavior had increased during their private sessions, particularly contingent on removal of preferred items. The physical therapist also reported that the communication block was too bulky to carry around in their highly-mobile sessions, and several teaching team members reported that full physical prompting and removing items from Benji's hands felt too restrictive. His educational team (including the first and second author, Benji's lead teacher, physical therapist, and speech-language pathologist) met to discuss solutions, and we re-started modified FCT based on collaboratively-designed procedures.

Within modified FCT, (a) we replaced the communication block with a GoTalk® as Benji's primary communication device, (b) we switched from using constant time delay (i.e., full physical controlling prompt) to using system of least prompts (i.e., gestural and model non-controlling prompts, full physical controlling prompt) to prompt FCR, (c) Benji was free to access anything in the room at any time, *except* for any item that the implementer was holding or playing with, and (d) in lieu of a trial-based format, we used a free operant format, in that trials

occurred whenever Benji indicated interest in what the implementer was holding. Sessions were shifted from two daily 15-min sessions to one daily 30-min session, in order to accommodate variable interest in novel items. During these sessions, the implementer brought out a new toy at least once every 3 min, to create at least 10 possible opportunities for requesting per session.

Results

Results are depicted in Figure 3. For Addie, pre-cursor and challenging behavior remained stable and high throughout baseline (4-5 instances), immediately decreased in intervention (0-2 instances), and remained stable at 0 instances across the final four sessions. For Benji, pre-cursor and challenging behavior also remained stable and high throughout baseline in (4-7 instances), with the exception of the two sessions in the resource room (3 instances). These behaviors were variable in intervention (0-9 instances), with an overall decrease in level below baseline levels. During modified FCT, pre-cursor and challenging behavior remained low, with 0-2 instances for most sessions, and one outlier of 11 instances. For Caleb, pre-cursor and challenging behavior showed a steadily increasing trend through baseline (2-8 instances), until stabilizing at 5-6 instances for the final four sessions. These behaviors remained steady and low (1-2 instances) throughout intervention. For Addie and Caleb, these data demonstrated a strong demonstration of effect, and for Benji, a weak demonstration of effect. Overall, these data indicate a moderate functional relation between the presence of the intervention and a decrease in pre-cursor and challenging behavior.

For Addie, FCR remained stable at 0 instances throughout baseline, and showed a gradual increasing trend in intervention, with 5 instances in the final two sessions. For Benji, FCR remained stable at 0 instances throughout baseline, and showed a delayed, gradual increasing trend, with 5-6 instances in the final three sessions. The delayed increase was expected; because Benji engaged in consistent pre-cursor behavior across early sessions, he was prompted to engage in FCR after a 0-s delay for seven intervention sessions, and he did not have the opportunity to independently request. Once the delay before prompting was increased, Benji quickly began demonstrated unprompted FCR. For Caleb, FCR remained stable at 0 instances throughout baseline, and showed a gradual increasing trend, with 5-7 instances in the final four sessions. These data indicate strong demonstrations of effect across participants, and a strong functional relation between the presence of the intervention and an increase in FCR.

Phase 3: Embedded Delay Tolerance

Experimental Design

Across participants, we used an A-B-C design, in which the TBFA served as the A phase, FCT as the B phase, and schedule thinning as the C phase. For Benji and Caleb, we used a changing criterion design across multiple C conditions. For Benji, latency to reinforcement served as the primary dependent variable. For Caleb, rate of FCR for toys served as the primary dependent variable. In order to meet recommended guidelines for changing criterion design, Caleb's intervention required more sessions than would be practical in a classroom context, which decreased social validity. As such, we did not include a changing criterion design in Addie's C condition, instead opting to assess whether similar schedule thinning procedures could be faded quickly.

Procedures

See Figure 4 for a flowchart diagram of schedule thinning procedures. The control segment followed procedures described in the "TBFA" section above. Two randomly selected trials during the test segment were designated as FCT trials, and procedures for these trials were identical to those of FCT (see Figure 2). The remaining three trials were designated as schedule thinning trials (see Figure 4). Like in FCT, these trials began with the implementer removing the reinforcer. If the participant engaged in prompted or unprompted FCR in the absence of pre-cursor or challenging behavior, the implementer presented the task direction to wait (e.g., "Wait please"), and started a countdown (i.e., finger and vocal countdown for wait intervals <15 s, countdown on a phone timer for wait intervals >15 s). If the participant repeated the FCR (i.e., persistent communication) or waited for the specified interval without pre-cursor or challenging behavior (i.e., delay tolerance), the implementer returned the reinforcer. If the participant engaged in pre-cursor or challenging behavior at any point in the trial, procedures were identical to those of FCT. That is, the implementer prompted or demonstrated FCR (as appropriate), and returned the reinforcer. In short, multiple behaviors led to accessing the reinforcer, including delay tolerance and persistent communication.

Following three consecutive days of five instances of delay tolerance, we increased the delay tolerance wait interval. Following two consecutive days with fewer than three instances of delay tolerance, we planned to revert back to the previous delay tolerance wait interval.

Modifications

Addie. Because schedule thinning was ineffective for both Benji and Caleb, we did not implement the procedures as described with Addie. We instead opted for a variation of the intervention that led to successful behavior changes for Caleb.

For Addie, we maintained a trial-based approach to treatment, and all five trials were dedicated to schedule thinning (as opposed to three of five trials, within initial procedures). At the start of the test trial, the implementer moved toys out of reach and gave the task direction, "Time for [small group activity]." If Addie did not move toward the green carpet (where small group activities took place) within 5 s, the implementer used hand guiding. Once on the green carpet, the implementer set a timer on her phone for the specified wait interval, and showed it to Addie if she indicated interest in the timer (e.g., reaching for the phone). If Addie engaged in the FCR during the wait interval, the implementer reminded her, "You can ask for a break when the timer beeps." If Addie started to move toward the edge of the carpet, the implementer showed her the timer and reminded her how much time was left. If Addie eloped from the carpet *during* the wait interval, she was permitted to take a break off the carpet (i.e., no escape extinction), but preferred toys were moved out of reach (i.e., tangible extinction). If she returned to the carpet within 7 s, the test segment was resumed. If she remained off the carpet for more than 7 s, the test segment was considered ended, and the next neutral segment was started without access to toys. If Addie eloped from the carpet without requesting *after* the wait interval, she was prompted to engage in the FCR. If Addie engaged in a prompted or unprompted FCR after the wait interval, whether on or off the carpet, she was given access to the toys off the carpet.

Benji. During the initial intervention, Benji began engaging in persistent communication (i.e., requesting twice) in order to receive his toy back, at which point delay tolerance sharply decreased. In our first modification, we added non-contingent tangible reinforcement following toy removal. That is, when we took away a preferred toy, we offered a new item (e.g., classroom play materials) to play with during the wait interval. Although this resulted in an increase in delay tolerance, Benji's waiting still did not meet criteria for the changing criterion design. We noticed that during the trials Benji waited the longest, he moved the non-contingent reinforcers to their assigned place in the classroom (i.e., putting away the toy). Therefore, in our second modification, we gave Benji a task direction for one mastered task (e.g., putting away a toy, matching a shape to a shape sorter), and continued to prompt FCR following pre-cursor and challenging behavior, and reinforce persistent FCR, both prompted and unprompted.

Caleb. During the initial intervention, we added differential reinforcement for delay tolerance. That is, we allowed Caleb to choose one toy from a toy bucket contingent on staying on his cot for the specified delay tolerance wait interval. We included differential reinforcement to address Caleb's persistent requests for additional toys during baseline and FCT; during these phases, he often expressed boredom and frustration with the toys available to him. However, this resulted in an accidental use of extinction, in that Caleb could only access the toy bucket following schedule thinning trials. As a result, Caleb engaged in high levels of pre-cursor and challenging behavior when denied access to additional schedule thinning trials. As a result, we developed a two-phase modified schedule thinning intervention: first, we thinned a fixed interval schedule of reinforcement for accessing toys; then, we thinned a fixed interval schedule of reinforcement for accessing adult attention.

For schedule thinning for toys, sessions were increased to 50 min (from 15-20 min), and FCR for toys served as the primary dependent variable. Prior to the start of each session, Caleb was directed to his cot, and permitted to choose one toy from the bucket. For the first four sessions, no timer was used, and the implementer provided access to the toy bucket each time Caleb requested. The purpose for these sessions was to determine an appropriate initial interval for schedule thinning. For the fifth and subsequent sessions, the implementer set a timer for the specified wait interval at the start of the session. If Caleb engaged in an FCR for toys during the wait interval, the implementer reminded him, "You can ask for more toys when the timer beeps." If he asked multiple times within 30 s, the implementer quietly gestured to the timer. If Caleb engaged in an FCR for more toys after the wait interval, the implementer provided access to the toy bucket, said "You can choose one thing from the bucket," and reset the timer. If Caleb engaged in pre-cursor or challenging behavior at any point during the session, the implementer acknowledged his feelings (e.g., "It looks like you feel frustrated"). If Caleb partially eloped off his cot (i.e., two hands or two feet off the cot), the implementer reminded him, "We have to stay on our cot to play with our toys." If Caleb fully eloped off his cot (i.e., full body off cot), the implementer withdrew her attention and moved toys out of reach, except for any toys he was holding. If Caleb asked for a break or to use the restroom, he was permitted to leave his cot, though access to attention and toys was minimized while off cot. The implementer also paused the timer, such that he was not earning access to the toy bucket while off the cot. Throughout the session, the implementer provided high-quality attention, following Caleb's lead in play, mirroring and mapping his play and language use. Our final goal was that Caleb request new toys no more than once every 12 min, while continuing to engage in low rates of pre-cursor and challenging behavior.

For schedule thinning for adult attention, sessions remained at 50 min, and pre-cursor and challenging behavior served as the primary dependent variable. Prior to the start to each session, Caleb was directed to his cot, permitted to choose one toy from the bucket, and provided 2-3 min of high-quality attention. Following 2-3 min of

attention, the implementer said, "I need to go do some work," and began engaging in other tasks (e.g., sending e-mails on phone, attending to other students). For the first session, no timer was set, and the implementer provided an additional 2-3 min of attention each time he requested. The purpose for this session was to determine an appropriate initial interval for schedule thinning. For the second and subsequent sessions, the implementer set a timer when she removed her attention, and reminded him, "You can ask me to play again when the timer beeps." If Caleb engaged in an FCR for attention during the wait interval, the implementer reminded him, "You can ask me to play when the timer beeps." If he asked more than once in 30 s, the implementer silently gestured to the timer. All other procedures from the initial modification were in place, including use of a second, separate timer to request toys once every 12 min. Our final goal was that Caleb receive 2-3 min of attention once every 12 min, while continuing to engage in low rates of pre-cursor and challenging behavior. Once Caleb reached this goal, we combined timers, such that when the timer beeped, Caleb was able to ask for both toys and attention.

Results

Results are depicted in Figure 5. For Addie, pre-cursor and challenging behavior remained low throughout schedule thinning (0–3 instances), relatively consistent with data from the FCT condition. FCR was variable (3–7 instances for most sessions, with one outlier of 15 instances), though trend was relatively stable over time, and relatively consistent with data from the FCT condition. While data from the baseline and FCT condition demonstrated low, decreasing rates of time spent in group activities (5.9–21.9% of session), data from the schedule thinning condition demonstrated a gradual, increasing trend (12.6–60.8%), with more than 50% of the session spent in group activities for four of the final five sessions. These data show a demonstration of effect between implementation of schedule thinning and time spent in group activities. Because this intervention was not conducted in the context of an experimental design, these data do not constitute a functional relation.

For Benji, pre-cursor and challenging behavior remained variable through all three intervention variations (0-4 instances), though levels were relatively stable overall and lower than in the baseline condition. FCR remained stable at 5 instances for the first five sessions, and gradually increased over subsequent sessions (5-8 instances). During the initial session with a 5 s delay tolerance wait interval, Benji waited for 5.0 s. During the next nine sessions with a 3 s wait interval, Benji waited for a variable period of time (2.5–4.3 s) with a stable trend, with an average of 3.3 s. During the next four sessions with a 6-s delay tolerance wait interval, Benji waited for a variable period of time (2.3–7.1 s) with a sharply decreasing trend. For the first modification and a 6-s delay tolerance wait interval, Benji waited for a highly variable amount of time (3.8 – 7.2 s); no stable trend was achieved. For the second modification and a 6-s delay tolerance wait interval, Benji waited for a slightly decreasing duration over time (2.8 – 4.9 s), and consistently waited for less time than the criterion. Although we saw one demonstration of effect for a 3-s delay tolerance wait interval, the intervention was unsuccessful for increasing delay tolerance over longer wait intervals, even with modifications.

For Caleb, pre-cursor and challenging behavior were extremely high and unstable during initial schedule thinning (52, 20, and 68 instances/hr). After modifying the intervention, these behaviors dropped to a level substantially lower than baseline levels (0 – 12.2 instances/hr), and they remained consistently low through both modified intervention phases. FCR for breaks were also extremely high and unstable during initial schedule thinning (12, 28, and 20 instances/hr), and also dropped to near-zero levels through both modified intervention phases (0 – 2.4 instances/hr). During schedule thinning for toys, FCR for toys showed some variability, and typically fell close to criterion levels. These data indicated a weak functional relation between the modified intervention and FCR for toys. FCR for toys remained near criterion levels during the second phase of modified intervention. During schedule thinning for attention, FCR for attention was variable and high for the first five sessions (16.8 – 32.5 instances/hr), and dropped to stable, lower rates for the final three sessions (12.7, 12.3, and 10.8 instances/hr, respectively). While data from baseline, FCT, and initial schedule thinning indicated low, variable percentages of time on cot (0.8 – 34.0%), time on cot increased to close to 100% immediately after implementing modified schedule thinning, and remained consistently high through both modified intervention phases.

Phase 4: Generalization

Experimental Design

Generalization was conducted in a post-intervention context only, in the context of a single-phase single case design without experimental control.

Procedures

For all participants, the final, effective intervention (i.e., modified FCT for Benji, modified schedule thinning for Addie and Caleb) were taught to a generalization implementer who would be able to continue to the intervention after the conclusion of the study. For Addie and Caleb, these were implementers endogenous to their typical learning environments (i.e., small group instructors for Addie, lead teacher for Caleb). For Caleb, there was

an additional component of stimulus generalization, in that sessions were moved from a private resource room back to his regular classroom.

Modifications

For Addie, the neutral segment was eliminated in order to simplify procedural implementation. That is, implementers only needed to keep track of a 2-min control period (i.e., "break time"), followed by a 2-min test period (i.e., "group time").

For Caleb, procedures were effective when implemented by the lead teacher in the classroom. However, she reported that he was playing too loudly, and might wake other sleeping children. To address volume, we added a token board for the final three sessions. Twice during each of four delay tolerance wait intervals, Caleb's teacher provided a token and social praise for playing quietly by himself. If he played loudly the full wait interval, he did not receive tokens during that interval. If Caleb earned all eight tokens during the session, he and the lead teacher engaged in a highly-preferred activity together directly after nap (e.g., painting, dot markers).

Results

Results are depicted for Benji in Figure 3, and for Addie and Caleb in Figure 5. Across participants, pre-cursor and challenging behavior remained steady and low. For Addie, FCR remained steady at criterion levels. For Benji, data for FCR indicated a sharply increasing trend. For Caleb, FCR for breaks and play remained stable and low; FCR for toys was variable and low, generally near criterion levels. For Addie, time in group activities remained stable and high, with a slight increasing trend. For Caleb, time on cot slightly dropped in level after we transitioned to the classroom, though remained stable at around 90%. The reason for this level drop is that Caleb began using the restroom once per session, which had not been a readily-available option in the resource room. Caleb's teacher reported that taking independent bathroom breaks as needed was consistent with behavioral expectations for all students.

Concurrent Chains Preference Assessment (Social Validity)

Experimental Design and Analysis

For this assessment, we offered the participant a choice after each session, to play alone or play with the implementer. We graphed results in a cumulative record. For this assessment, we considered a shift from selecting playing alone to playing with the implementer to signify stronger social validity, in that this would indicate the implementer's presence became more preferred over time. Conversely, we considered a shift from selecting playing with the implementer to playing alone to signify weaker social validity, in that this would indicate that the implementer's presence became less preferred over time. For participants who did not shift preferences for playing alone or playing together, we did not consider assessment results to be a valid gauge of social validity.

Procedures

After each 15-min session, the participant was given a 3-min post-session to play in the way that they preferred. During the first two post-sessions, the implementer randomly assigned one post-session to play alone, and the other to play with the implementer. During the "play alone" post-session, the implementer showed the participant a photograph of the participant playing alone, and said, "You can play by yourself!" For the next 3 min, the implementer stood away from the participant, did not initiate social interactions, and responded minimally to participant bids for attention. During the "play with implementer" post-session, the implementer showed the participant a photograph of the participant and implementer playing together, and said, "We can play with together!" For the next 3 min, the implementer played with the participant, mirroring and mapping their play and language.

After each session after that, the implementer showed the participant both photographs and offered a choice: "You have three more minutes to play. Do you want to play by yourself or play together?" The implementer then provided the post-session selected by the participant. The order that the photographs were presented (visually and vocally) was alternated each session, in order to detect side bias. If the participant engaged in consistent side bias, the implementer began presenting the photographs vertically instead of horizontally.

Modifications

We did not conduct the assessment with Addie, because it was not successful with the other two participants. Benji began demonstrating a side bias (i.e., consistently selecting the photograph on the left), at which point, we switched to a vertical orientation. Caleb consistently selected playing by himself, but was then distressed when the implementer would not play with him. We believed that Caleb associated the phase "by myself" with doing something independently (e.g., "I tied my shoes all by myself!"), so we changed the phrasing of the post-session choice to, "Do you want to play <u>alone</u> or play together?" Once both Benji and Caleb consistently ceased to make choices, we reduced post-sessions to once per day (i.e., once every two sessions for Benji and once every three sessions for Caleb). After Benji and Caleb did not select a post-session condition for six consecutive sessions (i.e., ignored the cards for >60 s, engaged in pre-cursor behavior when presented with the cards), the assessment was discontinued for both participants.

Results

Results are depicted in Figure 6. Benji selected to play alone for every session but one in the baseline condition. During intervention, Benji began to alternate between playing alone and playing together. However, these data indicated he was engaging in a side bias. When presented with photographs in a vertical orientation, Benji primarily selected the alone condition again, until he ceased to make choices, primarily by ignoring the cards for >60 s.

Caleb also only selected to play alone for every session but one in the baseline condition. However, his choice was inconsistent with his behavior during the post-session, during which time he consistently expressed frustration that the implementer wouldn't play with him. During intervention, Caleb ceased to make choices, primarily by pushing the cards away and refusing to choose.

Discussion

TBFA

In designing the functional analysis, we made several modifications to improve the social validity of assessment, including using a trial-based format, making pair-wise comparisons, embedding trials infrequently during play, using synthesized reinforcement (when applicable), and reinforcing pre-cursor behavior. These modifications were designed in order to reduce time in assessment, decrease participant exposure to aversive conditions, and decrease participant distress (e.g., reinforcing pre-cursor behavior to minimize escalation). Results indicated that, functional analyses with these modifications consistently resulted in clear behavioral functions that informed effective subsequent interventions. Further, these functional analyses were successfully used in endogenous educational settings across participants, indicating practical application in preschool classrooms.

During Benji's TBFA, we temporarily moved sessions from his classroom to a private resource room, in order to decrease classroom disruptions. However, when we switched contexts, pre-cursor and challenging behavior dropped sharply. Once we returned to the classroom, these behaviors increased again. We believed the additional classroom stimuli (e.g., noise, proximity to peers) may have served as an establishing operation, increasing the value of preferred toys as reinforcers. For example, the addition of aversive stimuli may have increased the value of toy access as a means of self-soothing. These results indicate that behavioral functions can be complex, with multiple, unspecified aspects of the natural environmental context contributing to presence of challenging behavior. These results call into question the ecological validity of assessments conducted in sterile environments (i.e., clinic settings). Although assessments in a sterile environment may adequately identify and address challenging behavior occurring in that context, additional, unaddressed establishing operations may reduce the efficacy of these interventions when they are generalized to endogenous contexts. Thus, for some individuals, it may be especially critical to conduct initial assessments and implement subsequent interventions in the endogenous contexts where challenging behavior is occurring.

FCT

In designing FCT procedures, we made several modifications to improve social validity and decrease restrictiveness of the intervention, including embedding trials within play, using relatively few trials (five per session), eliminating all types of extinction, and using alternatives to physical prompting, when indicated. Results showed that FCT with these modifications was consistently effective at increasing functional communication and decreasing pre-cursor and challenging behavior across participants. These results add to existing literature (e.g., Chazin et al., 2021; Trump et al., 2020) indicating that extinction may not always be a strictly necessary component of effective FCT interventions. Further, these data indicate that for young children, FCT can be effectively, efficiently implemented with relatively few trials in socially valid play contexts, even with participants with substantial language delays. As such, massed trials in socially questionable contexts (e.g., many back-to-back trials during "desk work," giving small bites of food contingent on each request during meal times) are not necessary to produce meaningful changes in functional communication, pre-cursor behavior, and challenging behavior.

Following successful implementation of FCT with Benji, we were approached by his physical therapist, reporting that challenging behavior had increased during ancillary services, particularly contingent on removal of preferred items. We believed that this may have been an example of behavioral contrast. That is, in the research context, Benji was able to access his preferred toys immediately or after a brief delay, while in other contexts, he was required to complete tasks for a longer duration before retrieving his items. Although we had included Benji's lead teacher in designing and carrying out intervention, we had not considered including his larger educational team. However, once we incorporated his larger educational team in designing a modified FCT intervention, we were able to find solutions that did not result in behavioral contrast across settings. These results indicate the importance for collaboration across all stakeholders, in order to provide effective wraparound services.

Of similar note, we learned through our meeting with Benji's educational team that several team members considered removing items from a child's hand to be a restrictive procedure, which we had not previously

considered. This further underscores the importance of consulting the learner's larger educational team, to learn what is considered socially valid and least restrictive across stakeholders. As a result of our meeting with Benji's educational team, we made changes to our procedures across participants. For Addie, we typically waited to present task directions until she had finished a play task or put down the items she was playing with. For Benji, we ceased to remove toys from his hands. Instead, we provided free access to all toys in the classroom, and only required that he request toys the implementer holding. For Caleb, when he eloped off his cot, he was permitted to continue accessing any object he was holding, and we only removed access to additional toys in his vicinity. Across participants, these modifications were effective within their respective interventions, indicating that toy removal may be a restrictive procedure that may not be required for treatment efficacy.

Schedule Thinning

In designing schedule thinning, we made the same modifications as we did during FCT for improving social validity and decreasing restrictiveness. However, these procedures were ineffective for increasing delay tolerance for two participants. For Benji, we continued to modify treatment using alternatives to extinction, but did not find an effective treatment prior to discontinuing the study phase. For Caleb, we immediately included a partial extinction model, which included tangible and attention extinction, but did not include escape extinction. That is, Caleb could elope from his cot at any time, but could only access toys and attention and/or earn access to additional toys and attention by remaining on his cot. We used a similar partial extinction model with Addie, and across both participants, the partial extinction model was successful for increasing delay tolerance, as well as maintaining low levels of pre-cursor and challenging behavior. Although absence of *all* extinction did not yield meaningful behavior change, these results still indicate that schedule thinning procedures can be modified to eliminate *some* extinction procedures and still yield meaningful behavior change. In additional to excluding escape extinction, we also included embedding trials within play, using relatively few trials (five per session), and using alternatives to physical prompting, when indicated. Results indicated that schedule thinning with these modifications yielded therapeutic behavior changes.

These results also generalized in an endogenous setting (for Caleb) and when implemented by endogenous implementers (for Addie and Caleb), in that time in designated area remained high, FCR remained relatively stable, and pre-cursor and challenging behavior remained low. Further, procedures were implemented with high fidelity across instructors. These results indicate that these procedures can be successfully implemented in inclusive early childhood contexts. We did not conduct generalization session with Benji in schedule thinning, because we were unable to identify modifications to schedule thinning that resulted in increased delay tolerance.

Concurrent Chains Preference Assessment

Preference assessment results were inconclusive for both Benji and Caleb, indicating that a concurrent chains preference assessment may not be the most effective or appropriate approach for assessing behavioral intervention preference for young children. Alternatively, adaptations may be needed to improve likelihood of useful outcomes.

Although we were unable to reach experimentally-assessed conclusions about participant preference, anecdotally, it appeared that the intervention was enjoyable to all three participants. For example, when the implementer entered the resource room where Addie's sessions took place, Addie typically left her current activity in order to hand lead the implementer to the box of toys they used for intervention. For Benji, teachers reported that he typically dropped to the floor or engaged in yelling when required to transition to non-preferred contexts, particularly from highly-preferred contexts. However, for the majority of the sessions, Benji approached the implementer without negative affect, immediately upon entering the classroom from outdoor play (reported to be Benji's favorite daily activity). Caleb's teacher reported on several occasions that Caleb asked throughout the day about when he could play with the implementer. Several other teachers (both in Caleb's classroom and outside of it) made similar reports, seemingly indicating strong preference for the implementer and intervention. Further, participants engaged in low levels of pre-cursor behavior throughout intervention (except for initial schedule thinning for Caleb), and near-zero levels of challenging behavior throughout intervention (except for initial schedule thinning for Caleb). Addie engaged in 0 instances of challenging behavior across 28 intervention sessions, Benji engaged in 5 instances of challenging behavior across 52 intervention sessions, and Caleb engaged in 19 instances of challenging behavior across 65 sessions (11 instances were during initial schedule thinning). These results may indicate that distress was low for participants across intervention sessions, in that the intervention context never or rarely evoked escalated challenging behavior.

Limitations and Recommendations for Future Research

One limitation of this study was the lack of experimental control for most schedule thinning conditions. For Addie, although we successfully thinned reinforcement, schedule thinning took place in a single-phase design without experimental control. For Benji, although schedule thinning was conducted within the context of an

experimental design, he did not achieve successful outcomes. For Caleb, we were able to achieve experimental control during schedule thinning for toys. However, to achieve experimental control in the context of a changing criterion design, it was necessary to include a large number of sessions. This reduces social validity of the intervention, in that teachers and other stakeholders may be less likely to select slower, inefficient interventions over quicker, efficient ones. It is promising that when we removed the experimental design during schedule thinning for attention, we were able to fade the intervention relatively quickly without subsequent increases in pre-cursor behavior, challenging behavior, or time out of designated area. However, other factors may have contributed to the secondary intervention's success (e.g,. learning history), and as such, further research is still needed to determine the efficacy *and* efficiency of modified schedule thinning.

Another shortcoming of the study is that it was conducted during the COVID-19 pandemic, and classroom-wide quarantines frequently resulted in canceled sessions for Benji and Caleb. Benji additionally experienced frequent illness; between individual and classroom-wide absences, as well as scheduled holidays, his sessions were cancelled on more than 50% of week days. The long latency between sessions may have contributed to a delay in meeting mastery criteria, not only in calendar time, but also in number of sessions, as consistent and systematic implementation may improve intervention efficiency. As a counterexample, Addie reached mastery criteria across conditions relatively quickly, which correlates with Addie's low number of absences during the study period. However, other factors may have also contributed to Addie's rapid acquisition. For example, Addie received ABA therapy outside the study, and Addie had less exposure to ineffective intervention, since we used our cumulative knowledge in designing her intervention procedures. Further research is needed to experimentally determine the importance of consistent, systematic intervention implementation on intervention efficiency.

A final, crucial shortcoming of the study is that, although we included a direct measure of participant preference for the intervention context (i.e., the concurrent chains preference assessment), we were unable to yield meaningful results. Given the focus on social validity in this study, it is a critical concern that we were unable to make experimental determinations about participant preference. In a recent survey, 60.7% of autistic adults and 50.6% of parents of young autistic children reported that the child's perspective is the single most important in determining procedures for that child (Authors, in preparation). However, young children, particularly with language deficits and delays, are less able to rate social acceptability via traditional means (e.g., questionnaires, surveys). Further, ongoing measures are necessary for making formative changes to interventions, informed by learner preferences. Thus, it is important to design formative assessments that directly measure learner preference for or between procedures. Alternative to concurrent chains preference assessments, researchers and practitioners alike may consider use of concurrent operant analyses, in which the learner "votes with their body" on their preferences. For example, within the enhanced choice model, participants always have concurrently available options to participate in intervention, spend time in a no-intervention "hangout" area, or leave the session (Rajamaran et al., 2022). These data are graphed to assess social acceptability of procedures, per the direct consumer of the intervention. We recommend that researchers continue developing and testing direct assessments that measure participant preference of procedures, and to report these outcomes as social validity measures.

Additional Recommendations for Researchers

More than half of FCT studies take place in sterile clinical settings under rich schedules of reinforcement (Ghaemmaghami et al., 2021). Although these contexts typically result in tightly-controlled research studies with highly-publishable results, these studies become problematic when practitioners attempt to replicate them in classroom contexts. First, these tightly-controlled results create unrealistic expectations for classroom practitioners, in that they are typically not replicable in "messy" contexts with many confounding variables. Second, these procedures may not be acceptable to classroom practitioners, who typically do not have the ratios or resources to provide students ongoing rich schedules of reinforcement. Finally, these studies do not assess what procedures *are* most beneficial in these less tightly-controlled contexts. We recommend that researchers continue to research FCT and schedule thinning adaptations in endogenous contexts with endogenous implementers, in order for studies to be maximally useful for the intended end users of these interventions. However, "messy" contexts often yield "messy" results, which may be more difficult for researchers to publish. As such, we encourage editors and peer reviewers to shift reinforcement contingencies around publication considerations, explicitly valuing research in endogenous contexts, even at the expense of producing clean, tightly-controlled data. We believe that intentional shifts in these reinforcement contingencies would encourage researchers to conduct research in endogenous contexts, taking greater risks to understand what *really* works in authentic settings.

Results across FCT and schedule thinning phases indicate that for some children, modifications can be made to improve social validity, without sacrificing efficacy. However, relatively few studies to date assess these modifications to improve social validity and decrease restrictiveness, particularly for young children. Further research is needed to assess whether these results replicate across a variety of young children in classroom and other

endogenous contexts. Further research is also needed to assess socially valid modifications to other existing behavioral interventions (e.g., environmental arrangement, token economies) and/or novel behavioral interventions designed with social validity in mind (e.g., enhanced choice model).

Recommendations for Practitioners

In this study, several modifications were made to traditional FCT and schedule thinning to improve social acceptability and decrease restrictiveness. Results indicated that even with these modifications, interventions continued to result in meaningful outcomes for some participants. These modifications included embedding trials within play, eliminating all types of extinction (for FCT), eliminating escape extinction (for schedule thinning), and using alternatives to physical prompting, when indicated. Further, we included alternatives to removing preferred items from the hands of participants, even for behavior partially or wholly maintained by access to tangible items. Although FCT was effective with all three participants, schedule thinning was only effective with two participants, indicating that less restrictive alternatives may not be effective with all learners.

In order to improve social validity of FCT and schedule thinning in the classroom, we recommend that practitioners try these modifications, collect data on their efficacy, and make adaptations as needed. We recommend that practitioners use formative assessment and decision-making to determine the least restrictive intervention likely to be effective. We also recommend that whenever possible, practitioners start with least restrictive interventions, and only add more restrictive intervention components when data indicate they are necessary. Finally, we recommend that practitioners include formative assessments of learner preference, to ensure intervention procedures are acceptable to and preferred by the learner, who is the primary stakeholder in the intervention.

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Table 1

Participant Demographics

	Autistic Adults	Parents of Young Autistic Children*	ECE Practitioners
		n (%) or median (range)	
Median self-rating as autism advocate	Somewhat identify as an autism advocate	Somewhat identify as an autism advocate	Strongly identify as an autism advocate
Intersectional Identity			
Autistic adult	226 (100%)	26 (15.5%)	51 (14.2%)
Parent of young autistic child	26 (11.5%)	168 (100%)	26 (7.3%)
ECE professional	51 (22.6%)	26 (15.5%)	359 (100%)
Diagnostic Information			
Child's age	—	5 (2-7)**	—
Medical diagnosis	130 (57.5%)	146 (86.9%)	—
Self-diagnosis	109 (48.2%)	—	—
Educational diagnosis	8 (3.5%)	28 (16.7%)	—
Other	—	9 (5.4%)	—
Age of medical or educational diagnosis (if applicable)	24.1 (2 – 64)	—	—
Age of self-diagnosis (if applicable)	24.3 (3 – 55)	—	—
Services Provided or Received			
Mental health therapy	90 (39.8%)	68 (40.5%)	16 (4.5%)
Speech-language therapy	55 (24.3%)	112 (66.7%)	49 (13.6%)
Occupational therapy	27 (11.9%)	87 (51.2%)	9 (2.5%)
Physical therapy	19 (8.4%)	48 (28.6%)	1 (2.8%)
Applied behavior analysis	14 (6.2%)	54 (32.1%)	BCBA – 141 (39.3%) RBT – 50 (13.9%)
Feeding therapy	10 (4.4%)	25 (14.9%)	—
Other	20 (8.8%)	9 (5.4%)	38 (10.6%)
None	82 (36.3%)	3 (1.8%)	—
Early childhood teacher	—	—	102 (28.4%)
Early childhood paraprofessional	—	—	23 (6.4%)
Years Working with Young Autistic Children	—	—	7 (1 – 45)

Note: * Data for parents relates to information about parents' young autistic children; ** Parents of young autistic children ages 2-6 were invited to participate, and were asked to round their child's age to the nearest whole number; thus, for children 6.5 – 6.999 years old, parents could report age 7.

Table 2

Importance of Goals for Young Autistic Children, by Stakeholder Group

	Autistic Adults		Parents		Practitioners	
	Ranking	*Median Priority Rating*	*Ranking*	*Median Priority Rating*	*Ranking*	*Median Priority Rating*
Decreasing self-injurious behavior (e.g., head-banging, self-biting)	1	Very high	1	Very high	1	Very high
Refusing non-preferred things (e.g., saying 'stop' or 'no')	2	Very high	5	Somewhat high	4	Very high
Self-help skills (e.g., toothbrushing, toileting)	3	Somewhat high	3	Somewhat high	5	Very high
Communicating using multiple modalities (e.g., device, verbal, sign)	4	Somewhat high	2	Somewhat high	2	Very high
Decreasing aggression (e.g., hitting, kicking, biting)	5	Somewhat high	4	Somewhat high	3	Very high
Communicating with a device (for children who use minimal verbal language)	6	Somewhat high	8	Somewhat high	7	Somewhat high
Identifying emotions	7	Somewhat high	6	Somewhat high	10	Somewhat high
Navigating routines (e.g., morning routine at home, following school schedules)	8	Somewhat high	7	Somewhat high	6	Somewhat high
Eating foods that meet minimum nutritional needs	9	Somewhat high	18	Medium	12	Somewhat high
Social problem-solving	10	Medium	10	Medium	9	Somewhat high
Transitioning between activities	11	Medium	9	Medium	8	Somewhat high
Fine motor skills (e.g., using scissors, drawing shapes)	12	Medium	15	Medium	17	Medium
Gross motor skills (e.g., running, jumping, kicking balls)	13	Medium	11	Medium	14	Medium
Pre-academic skills (e.g., counting, naming colors and letters)	14	Medium	20	Medium	19	Medium
Cooperating/collaborating with adults (e.g., reaching compromise)	15	Medium	16	Medium	11	Somewhat high
Social conversation (e.g., greeting and responding to peers)	16	Medium	13	Medium	16	Medium

Following adult directions	17	Medium	12	Medium	13	Medium
Sharing toys and materials with others	18	Medium	14	Medium	18	Medium
Participating in group activities	19	Medium	19	Medium	15	Medium
Communicating verbally (for children who use minimal verbal language)	20	Medium	17	Medium	20	Medium
Manners (e.g., saying 'please' and 'thank you')	21	Medium	23	Medium	26	Somewhat low
Staying within designated areas (e.g., staying on circle time carpet during circle time)	22	Somewhat low	22	Medium	21	Medium
Eating new and/or different foods	23	Somewhat low	21	Medium	23	Somewhat low
Tolerating loud sounds (e.g., hair clippers, toilet flushing, hand dryer)	24	Somewhat low	24	Medium	22	Medium
Staying seated (e.g., at circle time and meal times)	25	Somewhat low	25	Medium	24	Somewhat low
Learning certain times and places to engage (and not engage) in stereotypy	26	Somewhat low	26	Medium	25	Somewhat low
Increasing eye contact	27	Very low	27	Medium	28	Very low
Decreasing stereotypy overall (e.g., hand flapping, loud humming)	28	Very low	28	Somewhat low	27	Very low

Table 3

Acceptability of Learning Contexts for Young Autistic Children, by Stakeholder Group

	Autistic Adults		Parents		Practitioners	
	Ranking	*Median Rating*	*Ranking*	*Median Rating*	*Ranking*	*Median Rating*
Time spent with peers vs. one-on-one						
Most of day spent with peers, smaller part of day spent one-on-one	1	Often	1	Often	1	Often
Day evenly split between one-on-one and with peers	2	Often	2	Often	3	Often
Most of day spent on-on-one, smaller part of day spent with peers	3	Sometimes	3	Sometimes	4	Sometimes
Entire day spent with peers	4	Sometimes	4	Sometimes	2	Often
Entire day spent one-on-one	5	Sometimes	5	Sometimes	5	Rarely
Time spent in inclusive vs. self-contained settings						
Most of day spent in inclusive settings, part of day spent in self-contained settings	1	Often	1	Often	1	Often
Day evenly split between self-contained and inclusive settings	2	Sometimes	2	Often	3	Often
Entire day spent in inclusive settings	3	Sometimes	3	Sometimes	2	Often
Most of day spent in self-contained settings, part of day spent in inclusive settings	4	Sometimes	4	Sometimes	4	Sometimes
Entire day spent in self-contained settings	5	Sometimes	5	Sometimes	1	Rarely
Time spent in adult- vs. child-led learning						
Most of day spent in child-led learning, part of day spent in adult-led learning	1	Often	1	Often	1	Often
Day split evenly between adult-led and child-led learning	2	Often	2	Often	2	Often
Entire day spent in child-led learning	3	Sometimes	3	Sometimes	3	Sometimes
Most of day spent in adult-led learning, part of day spent in child-led learning	4	Sometimes	4	Sometimes	4	Sometimes
Entire day spent in adult-led learning	5	Rarely	5	Sometimes	5	Rarely
Time spent in most acceptable learning contexts						

11-20 hrs	1	Sometimes	1	Often	1	Often
6-10 hrs	2	Sometimes	2	Often	2	Sometimes
20-30 hrs	3	Sometimes	3	Sometimes	3	Sometimes
1-5 hrs	4	Sometimes	4	Sometimes	4	Sometimes
30-40 hrs	5	Rarely	5	Sometimes	5	Sometimes
0 hrs (no instruction from ECSE practitioners)	6	Rarely	7	Rarely	7	Never
>41 hrs	7	Rarely	6	Rarely	6	Rarely

Table 4

Acceptability of Antecedent Interventions, by Stakeholder Group

	Autistic Adults		Parents		Practitioners	
	Ranking	*Median Rating*	*Ranking*	*Median Rating*	*Ranking*	*Median Rating*
Communication devices (e.g., picture cards or dedicated iPad app as a way of talking)	1	Always	3	Often	3	Always
Sunglasses (if room is bright)	2	Always	7	Often	7	Always
Teaching communication skills when child is calm	3	Always	2	Always	1	Always
Noise-cancelling headphones (if room is loud)	4	Always	5	Often	9	Always
Teaching emotional regulation skills when child is calm (e.g., practicing taking deep breaths)	5	Always	1	Always	2	Always
Alternative seating options (e.g., wiggle seats, stability ball chairs)	6	Always	14	Often	13	Always
Visual schedules (e.g., pictures of the circle time activities, in order)	7	Always	10	Often	5	Always
Fidget toys and/or stress balls	8	Always	11	Often	14	Always
Providing choices between appropriate options (e.g., order of activities, which song to sing)	9	Always	6	Often	4	Always
Area of classroom designed for emotional regulation (e.g., peace corner, calm down corner)	10	Always	8	Often	10	Always
Incorporating child's preferences into non-preferred activities (e.g., letting them hold a favorite toy during transitions)	11	Always	4	Often	11	Always
Scheduling breaks into difficult or non-preferred activities	12	Always	13	Often	6	Always
Chewies and/or chewelry	13	Always	18	Often	18	Often
Countdown warnings before transitions (e.g., 'One more minute until circle time')	14	Often	12	Often	8	Always
Giving several easy task directions before giving a hard task directions	15	Often	15	Often	17	Often
Reading a story about a challenging situation the child will be in later (i.e., Social Stories)	16	Often	9	Often	19	Often
Scheduling preferred activities for after non-preferred activities are complete	17	Often	19	Often	16	Often

Visual countdown timers to signal time before transition to non-preferred activity (e.g., TimeTimers)	18	Often	16	Often	11	Always
Visual countdown timers to signal time left in a non-preferred activity (e.g., TimeTimers)	19	Often	17	Often	15	Always
Area of classroom designed to be away from others (e.g., time out)	20	Sometimes	22	Sometimes	23	Sometimes
Providing tokens for participating in non-preferred activities, and providing access to preferred items or activities after earning all tokens	21	Rarely	21	Sometimes	20	Often
Providing small edible items (e.g., Goldfish) for participating in non-preferred activities	22	Rarely	20	Between Sometimes and Often	22	Sometimes
Implementing a class-wide system where children are rewarded for following behavior expectations (e.g., class-wide sticker charts)	23	Rarely	23	Sometimes	21	Sometimes
Implementing a class-wide system where children are 'called out' for NOT following behavior expectations (e.g., 'stoplight system' where children's pictures are moved from green to red)	24	Never	24	Rarely	24	Never

Table 5

Acceptability of Consequent Interventions for Young Autistic Children, by Stakeholder Group

	Autistic Adults		Parents		Practitioners	
	Ranking	*Median Rating*	*Ranking*	*Median Rating*	*Ranking*	*Median Rating*
Responses to challenging behavior maintained (at least in part) to access to attention						
Teaching the child strategies for regulating their emotions (e.g., showing them how to take deep breaths)	1	Always	1	Often	1	Always
Helping the child ask for a preferred form of attention, then giving it to them	2	Often	2	Often	2	Often
Labeling the child's emotions (e.g., 'It looks like you feel angry')	3	Often	3	Often	3	Often
Reminding the child of classroom expectations (e.g., 'We keep our hands to ourselves to stay safe')	4	Often	4	Often	4	Often
Immediately soothing the child (e.g., rubbing their back, telling them it's okay)	5	Sometimes	5	Often	5	Sometimes
Reprimanding (e.g., 'no hitting')	6	Sometimes	7	Sometimes	8	Rarely
Providing praise or extra attention to other children who are following expectations	7	Sometimes	6	Sometimes	6	Sometimes
Withholding attention while they are engaging in challenging behavior (i.e., planned ignoring)	8	Rarely	8	Sometimes	7	Sometimes
Responses to challenging behavior maintained (at least in part) to accessing preferred toys/activities						
Helping the child ask for the toy/activity, and then giving them access to it	1	Often	1	Often	1	Often
Giving the child access to a different toy or activity	2	Sometimes	2	Often	3	Sometimes
Waiting until the child stops engaging in challenging behavior, and then giving them access to the toy/activity	3	Sometimes	3	Sometimes	2	Sometimes
Immediately giving the child access to their favorite toy/activity	4	Sometimes	4	Sometimes	4	Rarely
Putting away the favorite toy or blocking access to the activity, so it is no longer available	5	Rarely	5	Sometimes	5	Rarely

Responses to challenging behavior maintained (at least in part) to escaping a non-preferred activity						
Helping the child ask for a break, then allowing them to leave the activity	1	Often	1	Often	1	Always
Giving a 'first-then' reminder (e.g., 'First finish tracing the letter, then you can go play')	2	Often	2	Often	2	Often
Non-physically prompting the child to finish the activity (e.g., providing verbal reminders or models until activity is complete)	3	Sometimes	5	Often	5	Often
Guiding the child back to the activity, if they leave	4	Sometimes	3	Often	3	Often
Providing tokens for completing parts of the activity, then letting the child leave the activity once all tokens have been earned	5	Sometimes	4	Often	4	Often
Immediately letting the child leave the non-preferred activity indefinitely	6	Sometimes	7	Sometimes	7	Rarely
Waiting until the child stops engaging in challenging behavior, then allowing them to leave the activity	7	Sometimes	8	Sometimes	6	Sometimes
Physically prompting the child to finish the activity (e.g., hand-over-hand guidance to finish a worksheet)	8	Rarely	6	Sometimes	9	Rarely
Keeping the child within a non-preferred contained area with others (e.g., blocking them from leaving circle time carpet)	9	Rarely	9	Sometimes	8	Rarely
Keeping the child within a non-preferred contained area by themselves (e.g., closing door in a speech therapy session)	10	Rarely	10	Sometimes	10	Rarely
Using restrictive seating such that the child can't leave the activity (e.g., seat belts, high chair)	11	Never	11	Rarely	11	Never

Table 6

Ranking in Response to the Question, "Whose Perspectives Matter Most When Determining Goals, Learning Contexts, and Procedures for Young Autistic Children?"

	Autistic Adults		Parents		Practitioners	
	Ranking	*Median Rating*	*Ranking*	*Median Rating*	*Ranking*	*Median Rating*
Goals						
The child	1	1	1	1	1	1
The child's parents	2	3	2	2	2	2
Autistic adults	3	3	4	4	5	4
The child's teacher	4	4	3	3	3	4
Other practitioners engaging with the child (e.g., SLP, BCBA)	5	4	5	5	4	4
Learning Contexts						
The child	1	1	1	1	1	1
The child's parents	2	3	2	2	2	2
The child's teacher	3	3	3	3	3	3
Autistic adults	4	4	5	4	5	4
Other practitioners engaging with the child (e.g., SLP, BCBA)	5	4	4	4	4	4
Procedures						
The child	1	1	1	1	1	1
The child's parents	2	3	2	2	2	2
Autistic adults	3	3	5	4	5	4
The child's teacher	4	4	3	3	3	3
Other practitioners engaging with the child (e.g., SLP, BCBA)	5	4	4	4	4	4

Note: 1 indicates highest priority and 5 indicates lowest priority.

Table 7

Event Frequency by Keyword at the Association for Behavior Analysis International Annual (ABAI) Convention

	Keyword				
Year	Ethics	Social Validity	Compassion	Reinforcement	Extinction
2004	7	27	0	307	66
2005	6	21	0	315	74
2006	7	28	0	314	67
2007	7	29	1	315	66
2008	5	34	3	311	78
2009	3	41	3	333	71
2010	11	40	4	317	87
2011	12	37	0	307	80
2012	16	31	3	299	76
2013	20	36	1	288	74
2014	22	54	4	352	78
2015	23	30	4	280	66
2016	38	46	3	347	96
2017	35	51	3	314	93
2018	41	66	3	356	97
2019	41	58	4	313	77
2020	44	78	10	316	66
2021	29	83	21	202	51
2022	51	107	36	260	75

Note: Data retrieved and amalgamated via keyword search from https://www.abainternational.org/events/archives.aspx

Table 8

Operational Definitions for Dependent Variables

Behavior	Addie	Benji	Caleb
Pre-cursor behavior	- Screaming/crying – vocalizing loudly with negative affect - Resisting physical prompts – Dropping to the floor or moving in the direction opposite of physical prompts	- Screaming/crying – vocalizing loudly with negative affect - Stomping – moving foot forcefully toward the ground two or more consecutive times - Resisting physical prompts – Dropping to the floor or moving in the direction opposite of physical prompts	- Screaming/crying – vocalizing loudly with negative affect - Grunting – growling or grunting with negative affect; requires secondary indicator of distress (non-example: pretending that lion figurine in growling) - Falling out – dropping to the floor - Partial elopement – two hands or two feet contacting the floor outside the cot perimeter; reaching for items off the cot excepted
Challenging behavior	- Aggression (pushing) – forceful movement of hands against another person's body	- SIB – forceful movement of hands toward head or other body part from distance of 6" or greater two or more consecutive times; forcefully hitting head against surface or object from distance of 6" or greater - Aggression (hitting, kicking) – forceful movement of hands or feet toward another individual (with contact or attempted)	- SIB – forceful movement of hands toward head or other body part from distance of 6" or greater; forcefully hitting head against surface or object from distance of 6" or greater - Aggression (hitting, kicking) – forceful movement of hands or feet toward another individual (with contact or attempted); pulling hair - Property destruction – Forceful movement of hands or feet toward an object (e.g., table); ripping paper or books; requires secondary indicator of distress - Full elopement – full body outside the cot perimeter, trips to bathroom after asking permission excepted
Functional communication response (FCR)	- Pressing "I need a break" icon on DynaVox	- Lifting and moving communication block in direction of implementer's hand or body	- Lifting and moving appropriate communication card in direction of implementer's hand or body

	- Vocal approximation for “all done” (i.e., “ahh duhh) - Signing “finished” in American Sign Language (i.e., palms facing in, then turning hands so they are facing out)	- Pressing “want” icon on GoTalk® with secondary indicator of interest (e.g., reaching toward item, looking at item)	- Vocalizing “Can I have a break?” or similar (for escape access); “I want more toys” or similar (for tangible access); or “Will you play with me?” or similar (for attention access)
Delay tolerance	- Engaging in no PCB or CB between arrival on green carpet and timer beeping	- Engaging in no PCB or CB between task direction “wait please” and return of preferred item	- N/A
In/Out of Designated Area	- In group – Body (any part) in contact with the green carpet - Out of group – No body part in contact with the green carpet for 7 s or longer	- N/A	- On cot – No more than one hand and one foot in contact with the ground outside the cot perimeter - Off cot – Two hands or two feet in contact with the ground outside the cot perimeter

Table 9

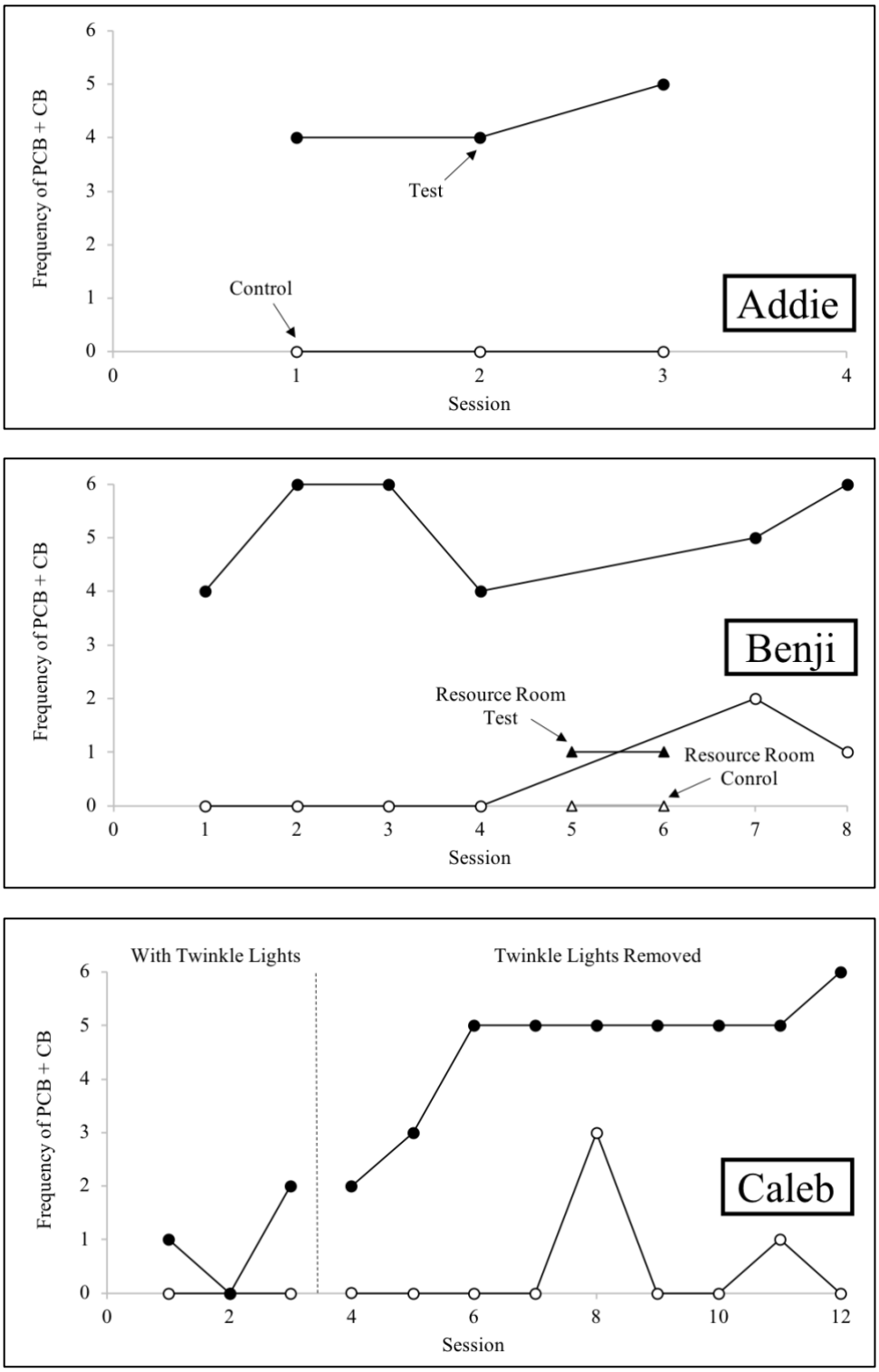
Specific Protocols for Each Participant Prior to Modifications

Protocol	Addie	Benji	Caleb
Neutral and control segments	- No task directions - No adult attention, except to respond to communication bids (e.g., making eye contact, signing "help") - Access to toys reported to be highly-preferred, including Legos®, Battat® Shapes and Sounds Sorter, number puzzle, ball racer, pin art toy; new toys were rotated in if Addie became less engaged in toy play across two or more consecutive sessions	- No task directions - No adult attention, except to respond to communication bids (e.g., making eye contact, bringing over a toy) - Access to toys reported to be highly-preferred, including a toy waffle, ball racer, ball ramp, toy cars, pretend play hats; toys were not rotated in, as Caleb had access to any toys present in the classroom - No task directions	- No task directions - High-quality, continuous adult attention, including following his lead in play, mirroring and mapping his play and language use - Access to toys reported to be highly-preferred (see "Materials"); new toys were rotated in if Caleb became less engaged in toy play across two or more consecutive sessions
Test segment	- Began with blocked access to additional toys, and task direction, "It's time for [activity]"; if Addie did not independently move toward green carpet (where small group activities took place) within 3 s, implementer used hand leading - Moderate attention without explicit task directions (e.g., praising appropriate behavior, offering optional choices between materials) - No access to highly-preferred toys on green carpet - Access to materials appropriate for small group activity (e.g., book for book reading; paper and colored pencils for art)	- Began with statement "my turn" and removal of preferred toy; blocked access to additional toys - No adult attention - No additional task directions	- Begin with blocked access to additional toys, and task direction, "Time for your cot"; if Caleb did not independently move toward his cot within 3 s, implementer used ongoing gestural prompts - No access to adult attention on cot - No access to highly-preferred toys on cot -

	- Close proximity to adults and peers		
	-	- N/A	- On cot – No more than one hand and one foot in contact with the ground outside the cot perimeter - Off cot – Two hands or two feet in contact with the ground outside the cot perimeter
FCR Prompting	System of least prompts: - Model non-controlling prompt - Full physical controlling prompt	For initial FCT and schedule thinning, constant time delay: - Full physical controlling prompt For modified FCT, system of least prompts: - Gestural non-controlling prompt - Model non-controlling prompt - Full physical controlling prompt	System of least prompts: - Model non-controlling prompt - Full physical controlling prompt

Figure 1

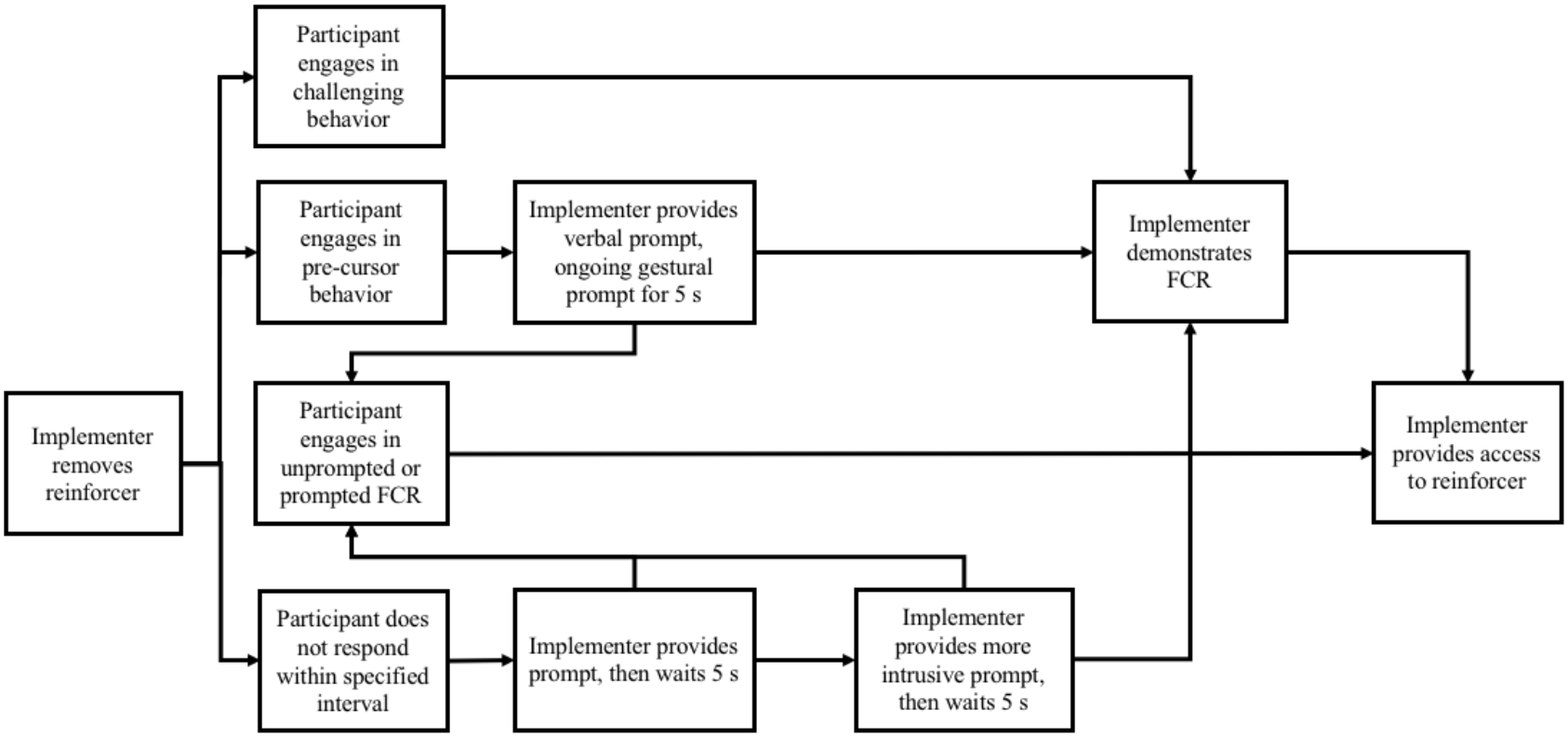
Results for Trial-Based Functional Analysis (TBFA) Across Participants



Note: CB = challenging behavior; PCB = pre-cursor behavior

Figure 2

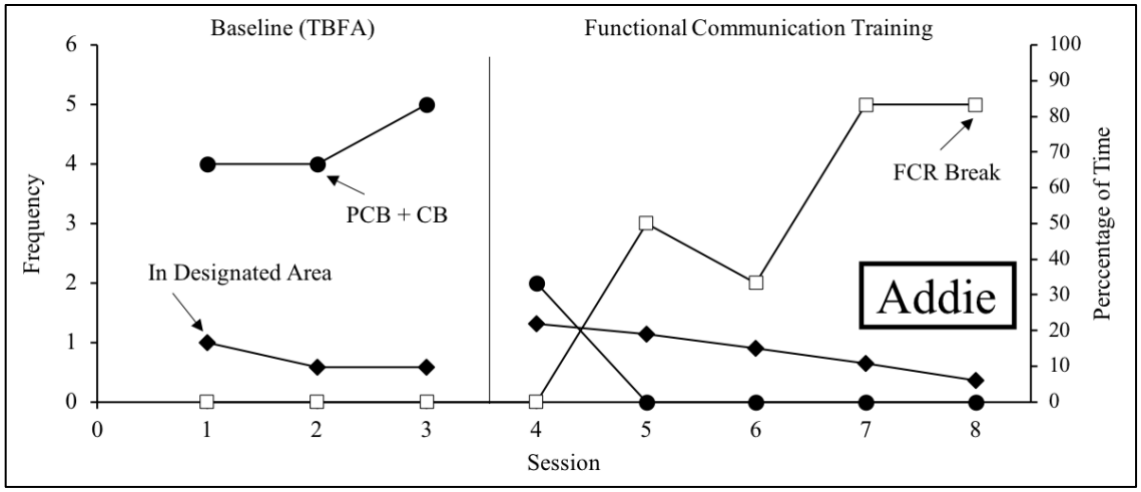
Procedural Flowchart for Functional Communication Training (FCT) Test Trials

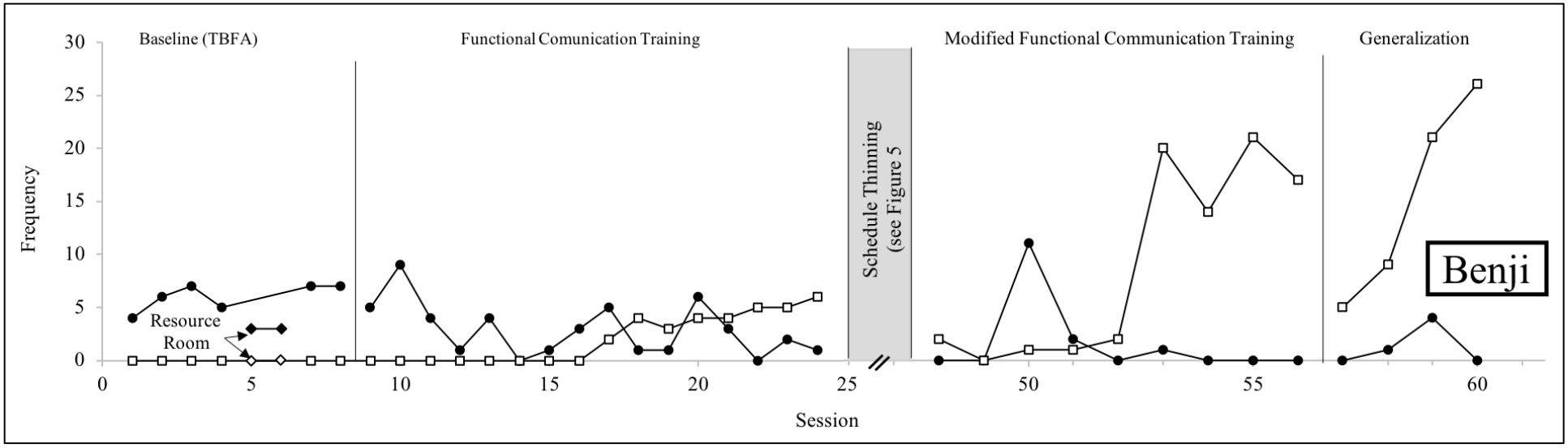


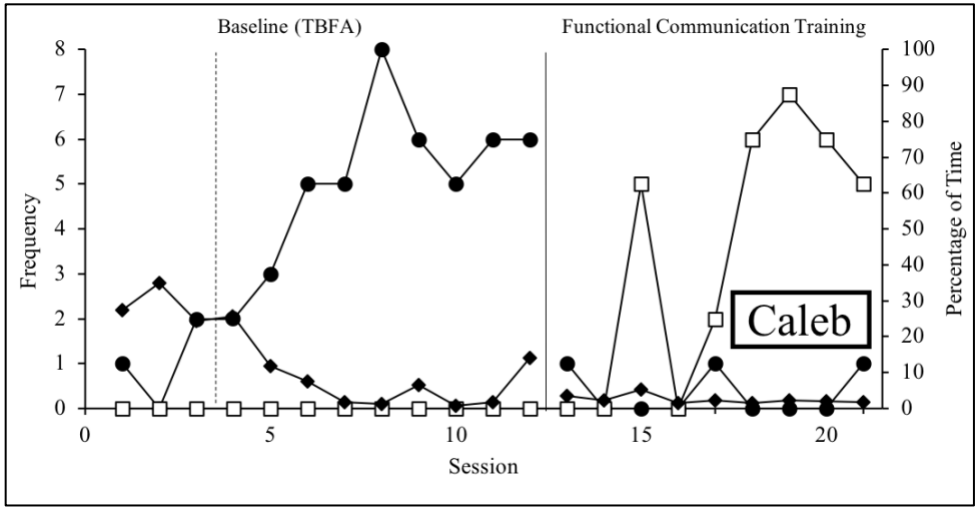
Note: FCR = functional communication response

Figure 3

Results for Functional Communication Training (FCT) Across Participants



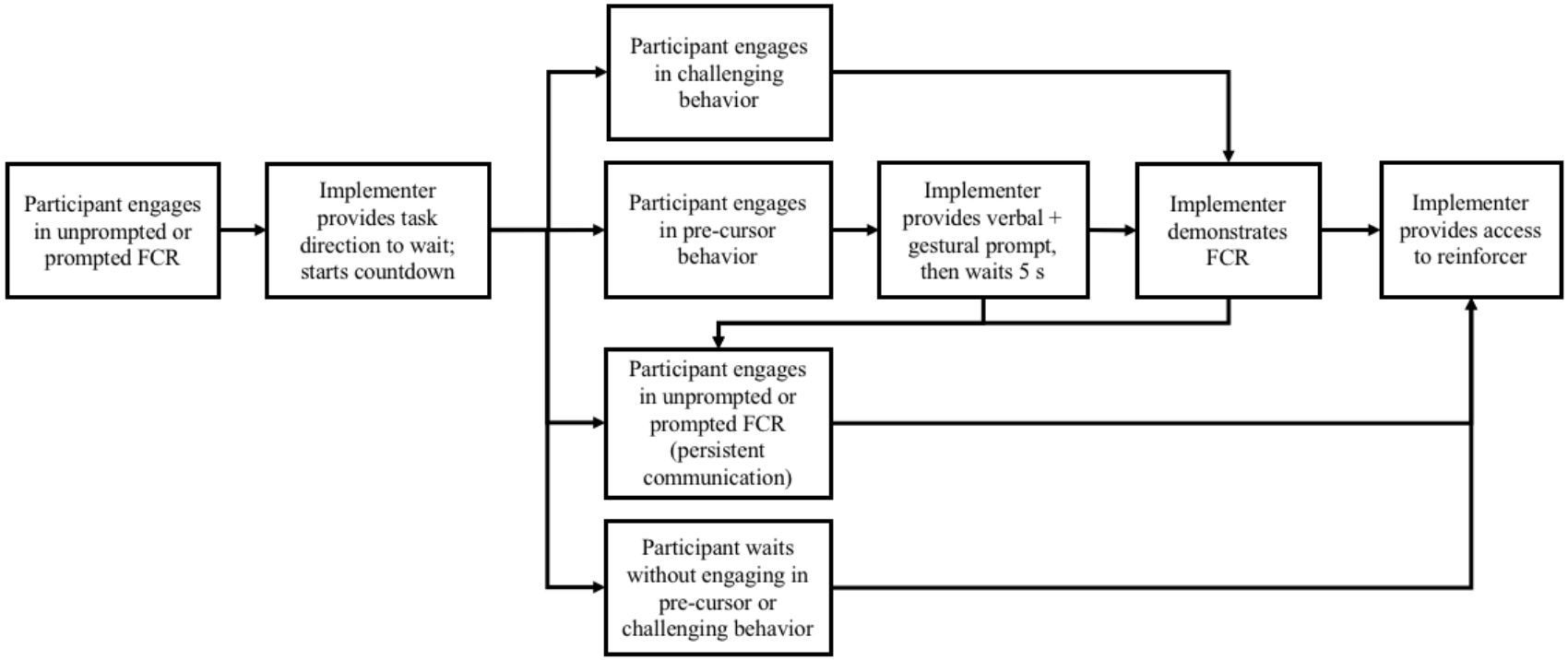




Note: CB = challenging behavior; FCR = functional communication response; PCB = pre-cursor behavior; TBFA = trial-based functional analysis

Figure 4

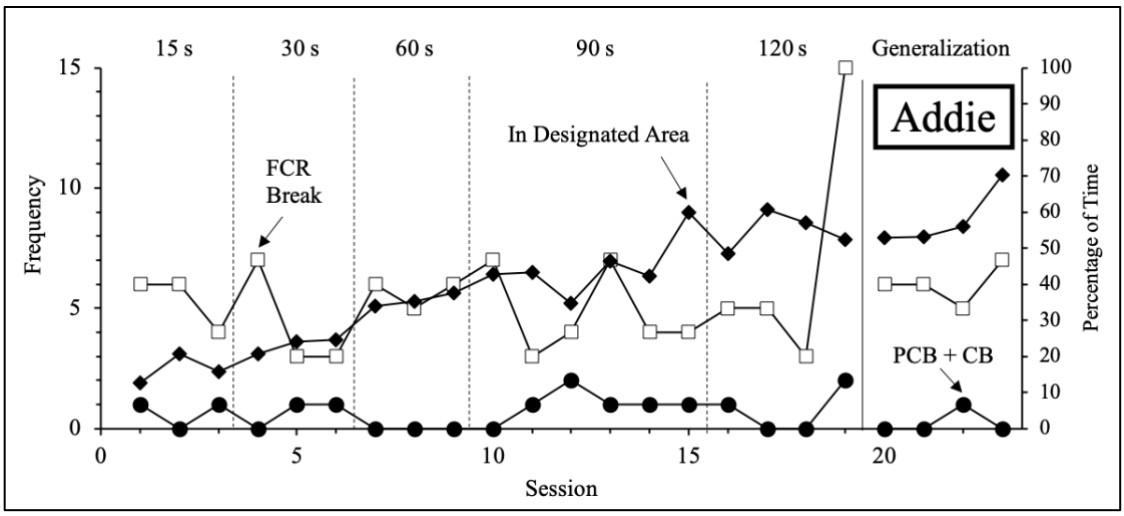
Procedural Flowchart for Schedule Thinning Trials

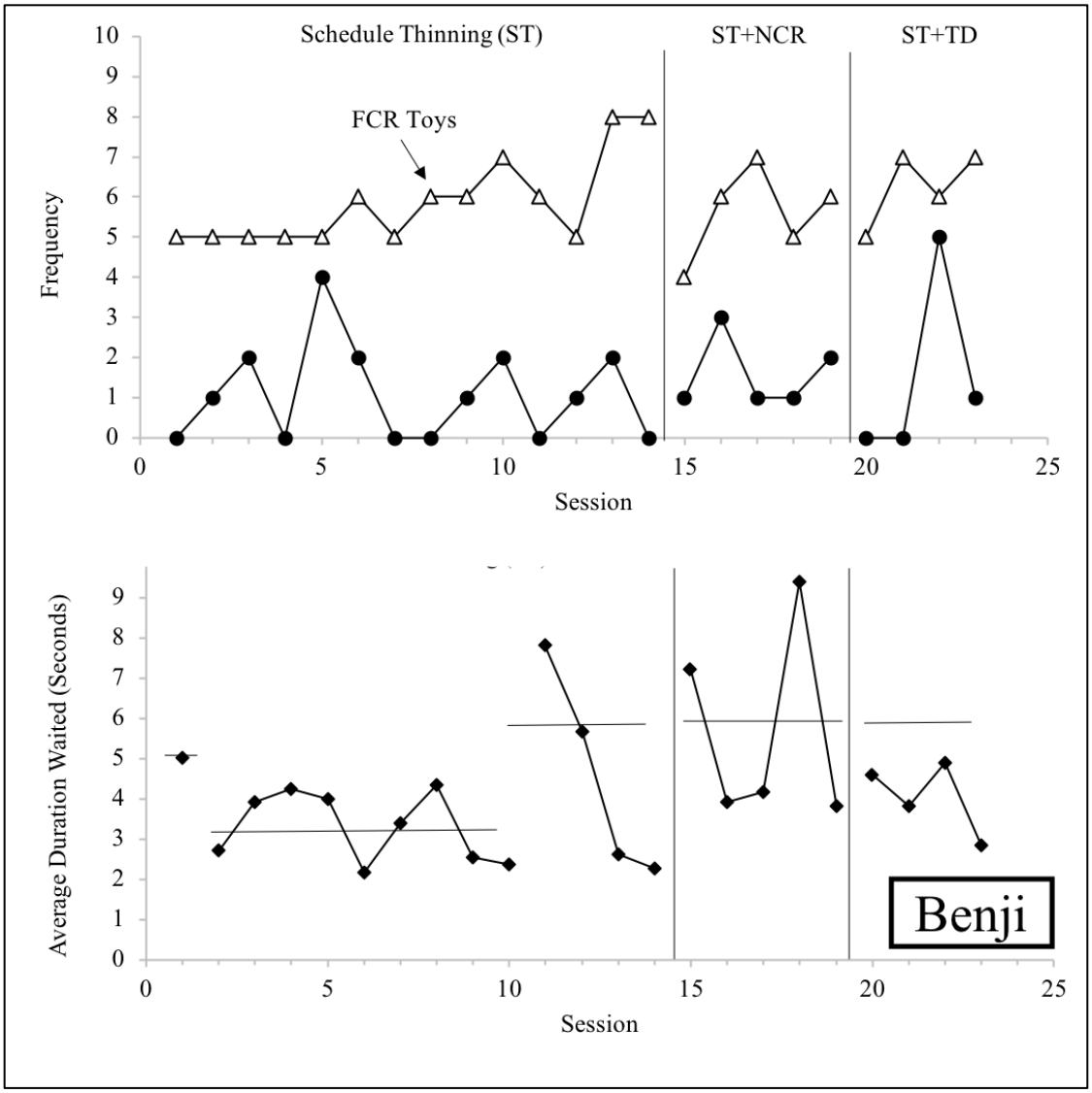


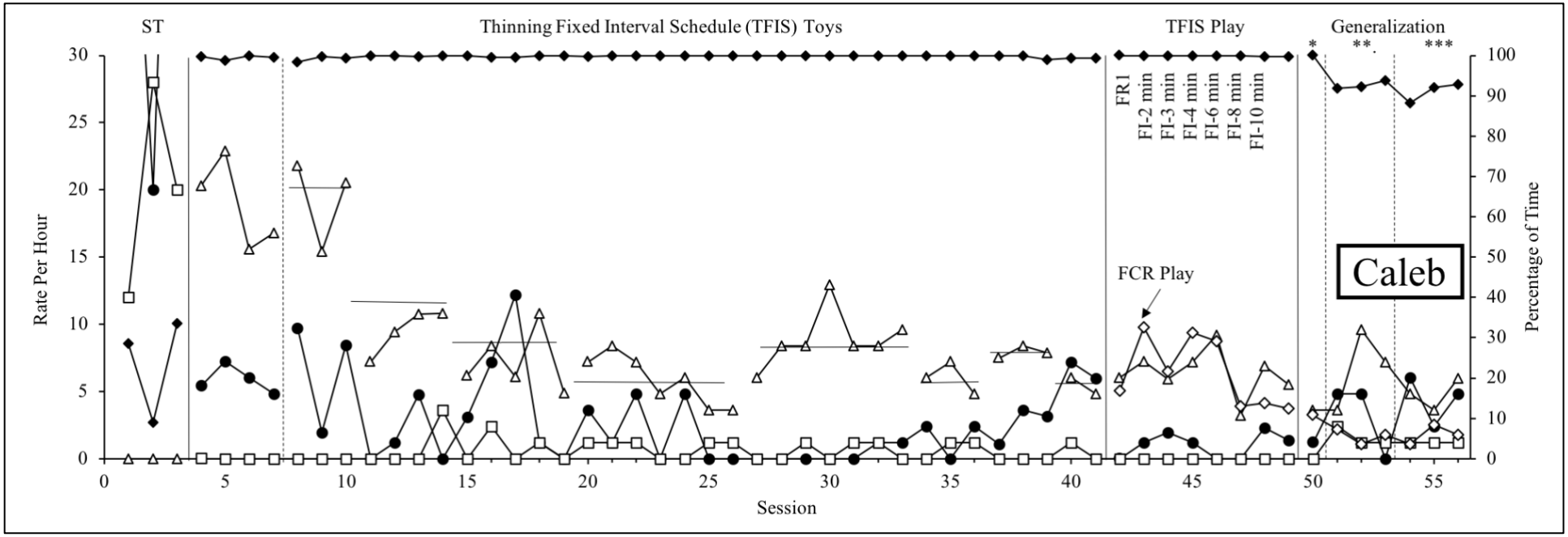
Note: FCR = functional communication response

Figure 5

Results for Schedule Thinning Across Participants







Note: CB = challenging behavior; FCR = functional communication response; PCB = pre-cursor behavior; TBFA = trial-based functional analysis; * = generalization to new setting (classroom); ** = generalization to new implementer (lead teacher); *** = added token board for quiet volume; for Caleb, PCB+CB exceeded maximum graph values for sessions 1 & 3 (n = 52, 68).

Figure 6

Results for Concurrent Chains Preference Assessment for Benji and Caleb