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Partners in School: An Implementation Strategy to Promote Alignment of Evidence-Based Practices across Home and School for Children with Autism Spectrum Disorder

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Abstract

Purpose: When parents and teachers align their practices across home and school, it may optimize services for children with autism spectrum disorder (ASD). *Partners in School* is a multi-faceted implementation strategy designed to improve ASD services in schools. The goal is to increase parents' and teachers' use of evidence-based practices (EBPs) and to align those EBPs across settings.

Methods: We piloted *Partners in School* with 49 parent-teacher dyads to assess administration and the factors associated with reported fidelity to the model. Specifically, we measured the number of intervention steps both parents and teachers completed (reported alignment) and the characteristics associated with intervention alignment. *Partners in School* involves parent-teacher participation in a pre-consultation interview, an in-person consultation meeting, active implementation of the same EBPs in their respective settings, and a post-consultation interview. Parents and teachers also completed surveys pre- and post-consultation.

Results: On average, parents and teachers completed approximately five EBP steps on their own in their respective settings (i.e., at home or at school). Of these five steps, parents and teachers both completed three of the same EBPs steps, on average. Different factors were related to reported alignment for parents versus teachers; however, A similarity noted for both parents and teachers was that communication variables were associated with reported alignment.

Conclusions: Our findings indicate the important role of communication in aligning stakeholders for ASD service delivery models.

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Keywords

evidenced-based practices; autism; parent-teacher relationships; communication; implementation science; service delivery; autism services

Children with autism spectrum disorder (ASD) often insist on sameness (American Psychiatric Association [APA], 2013). Aligning intervention practices across home and school can reduce stress in these children and help them acquire skills more quickly across settings (Azad, Marcus, Sheridan, & Mandell, 2018). However, parent and teacher practices rarely are aligned because parents and teachers often don't agree on what the presenting problem is (Azad & Mandell, 2016) or the best way to address it consistently across settings (Azad et al., 2016). This paper is a preliminary study of an innovative implementation strategy titled *Partners in School*, designed to address the dual implementation challenges and improve school-based ASD services. The goal of *Partners in School* is to increase parents' and teachers' use of evidence-based practices (EBPs) and to align those EBPs across settings.

ASD, Insistence on Sameness, and Difficulties with Generalization

ASD is a neurodevelopmental disorder affecting 1 in 54 children (Maenner, Shaw, & Baio, 2020). It is defined by persistent deficits in social communication and social interaction, and restrictive and repetitive patterns of behavior, interest or activities (CDC, 2018a & b). In the diagnostic category of restrictive and repetitive patterns of behavior, the DSM-5 makes specific reference to an "insistence on sameness" and "inflexible adherence to routines" (APA, 2013). Therefore, by definition, children with ASD may display rigidity, inflexibility, and resistance (i.e., stress) to change. Many children with ASD insist on routines, schedules, etc. to be the same (e.g., transitioning from preferred to non-preferred activities), and display behavioral dysregulation when things are different (e.g., have tantrums when asked to transition without a timer at home, if that antecedent intervention is used at school). These symptoms are likely to impair functioning at home and at school, given that these are the environments where children spend most of their time.

EBPs for ASD have been identified in the literature. Some common elements across different interventions include arranging the environment, child-initiated teaching, consequent strategies (e.g., natural reinforcement), antecedent strategies (e.g., prompting), and modeling (Schreibman et al., 2015). Parents' and teachers' use of these EBPs to address the multiple challenges facing children with ASD, and the extent to which these EBPs are aligned, can have profound implications for children's generalizations of skills. Prior research has shown that children with ASD struggle to generalize skills to different people (Ganz, et al., 2012) and settings (Rao, Beidel, & Murray, 2008). In schools, social skills interventions implemented for students with ASD have low to very low generalization effects, respectively (Bellini, Peters, & Brenner, 2007). It is likely that if parents implemented the same EBPs as teachers, children with ASD would have more opportunity to generalize their skills.

The Dual Implementation Challenges

Given their pivotal roles, there has been increasing interest in promoting the use of EBPs by parents *or* teachers (Rue & Knox, 2013; Sam, Cox, Savage, Waters, & Odom, 2019). Unfortunately, this has proven to be a major implementation challenge. Translating EBPs into the community is an extremely slow process, often resulting in fragmented implementation (Kasari & Smith, 2013; Stahmer, et al., 2015). Some estimate that it takes 17 years to move research into practice settings, including home and school settings (Balas & Boren, 2000).

Several studies examine teachers' use of EBPs (Lawton & Kasari, 2012; Mandell et al., 2013; Shernoff & Kratochwill, 2007). For example, in one community-based study, Mandell and colleagues (2013) provided extensive training and coaching to support teachers in implementing EBPs in autism support elementary classrooms. There was considerable implementation variability even among teachers who received substantial training. Additional community-based investigations have found that teachers who received training used different types of EBPs at different times, and with different levels of success (Stahmer, et al., 2015; Suhrheinrich, et al. 2013). The literature suggests that teachers often do not implement EBPs because of the interventions itself, finding it incompatible with classroom structure, and often requiring unavailable time and resources (Long et al., 2016). However, quality of implementation is related to child outcomes. For example, in a study with school-aged children with ASD receiving publicly funded mental health services, Brookman-Frazee and colleagues (2019) showed that therapist fidelity (related to session structure and continuity across sessions) was associated with reductions in challenging behavior in children.

Other studies have examined the effects of parent-implemented intervention models, and the barriers associated with their success. In a recent study, parents were trained to effectively deliver an antecedent strategy - video prompts - on an iPad to their children (ages 12–17 years old) with ASD learning daily living skills (DLS). After receiving behavioral skills training through didactic instruction, modeling, and rehearsal/feedback, parents were successful in their delivery of training procedures and their children made progress in DLS (Cruz-Torres, Duffy, Brady, Bennett, & Goldstein, 2020). However, parents report barriers in implementing EBPs at home, including the complexity and intensity of the required training, and the time demands (Stahmer & Pellecchia, 2015). In a university-based trial, Carr and Lord (2016) used 24 sessions to train parents on strategies for promoting children's (ages 18–42 months) social and communication skills. Their study had a 62% attrition rate. Some of the barriers reported included strain on the family's schedule and time commitment. For school-age children, Hampshire and Allred (2018) reported that a parent-implemented, technology-mediated approach led to gains in math homework self-management skills for middle school-aged adolescents with ASD. However, the authors also noted that time was a major barrier for parents to implement such interventions at home.

Collectively, these studies suggest that it is extremely challenging to promote the effective use of EBPs in the school or home setting. Most research has examined implementation exclusively in one setting – either the home *or* school. We suggest that it is not only

important for parents and teachers to use EBPs in their own setting, but it is also crucial that those EBPs are aligned across settings. However, there are no studies to our knowledge that have examined characteristics that are associated with parent-teacher alignment of EBPs for children with ASD. The idea of "alignment" has been investigated in the assessment literature, as it relates to parent-teacher agreement (or lack thereof) of children's ASD symptomology. For example, Stratis and Lecavalier (2017) found that parental broader autism phenotype traits predicted parent-teacher agreement on children's behavior problems and social skills. Munzer et al. (2018) found several characteristics to be associated with lower parent-teacher concordance of child behavior problems for children with ASD, including sex of the child (female), race/ethnicity of the child (Black or Hispanic), older parent age, lower education, more depressive symptoms, and greater self-efficacy. These studies suggest that parent and teacher characteristics impact the extent to which they agree about children's symptomology.

The implementation science literature also has shown that provider-level characteristics (e.g., parent or teacher factors) impact various aspects of EBP implementation. For example, Moore and Symon (2011) showed that parents' perceived effectiveness, confidence in the intervention, and acceptance of their child were related to adherence to a parent behavioral intervention curriculum for children with ASD. Furthermore, in an evaluation of the Evidence-Based Practice Attitude Scale (EBPAS), the researchers noted that female providers reported greater EBP acceptance and better perceived fit with patient needs. Having more experience also was associated with a higher sense of competence (Aarons et al., 2010).

Given that parent and teacher characteristics are associated with concordance of assessment ratings and implementation outcomes, it is likely that parent and teacher characteristics also will impact EBP alignment across settings. We extend this thinking to dyadic characteristics. For example, dyadic characteristics – such as aspects of relationship quality, including joining (i.e., partnership orientation) and communication – may impact the extent to which parents and teachers are aligned in their practices across home and school, respectively. Although there are no studies to our knowledge that examine the impact of dyadic characteristics on alignment, studies have shown the importance of dyadic characteristics for student success (Mautone, Marcelle, Tresco, & Power, 2015). For example, Minke and colleagues showed that having shared perceptions of relationship quality between parents and teachers is important for understanding reports of child behavior (Minke et al., 2014). Positive parent-teacher relationships has been linked to more parental engagement and self-efficacy (Kim, Sheridan, Kwon, & Koziol, 2013; Minke et al., 2014), as well as trust of teachers (Santiago, Garbacz, Beattie, & Moore, 2016) and litigation with schools (Burke & Goldman, 2015). It is possible that these correlates of positive parent-teacher relationship quality also impact alignment across home and school.

When parents and teachers consistently implement the same EBPs, it is likely to expedite positive outcomes and the generalizability of new skills in children (Azad et al., 2018). Given that children with ASD insist on sameness (APA, 2013), misalignment across settings may be particularly distressing for them. In the short term, discontinuity of experiences across home and school may impact children's behavioral regulation. If children with ASD

continuously experience different practices across home and school, they may have difficulty generalizing skills, ultimately impacting their development and well-being (Daley, Munk, & Carlson, 2011).

Implementation Strategies

Implementation scientists have cataloged many strategies to facilitate the uptake, implementation, and sustainment of EBPs by parents and practitioners (Mazza et al., 2013; Powell et al., 2012). Powell and colleagues (2015) compiled a list of 73 implementation strategies and Cook, Lyon, Locke, Waltz, and Powell (2019) modified these strategies to be applicable in schools (and added two more), resulting in 75 school-based implementation strategies. Some of these strategies include, but are not limited to, *auditing and providing feedback about implementation, developing an implementation plan*, and *using instruments to monitor practice*. These discrete implementation strategies have been combined to develop multifaceted implementation strategies, such as the Translating Evidence-Based Intervention for ASD: Multi-Level Implementation Strategy (TEAM) model (Brookman-Frazee & Stahmer, 2018; Lyon et al., 2019).

Although implementation strategies are being developed to ensure access to, and implementation of, EBPs in community-based settings, few approaches address alignment of those EBPs across settings where children receive most of their ASD services. We developed *Partners in School* by combining several implementation strategies to improve parent or teacher reported fidelity, as well as parent and teacher reported alignment across home and school. This paper presents two implementation outcomes from a pilot test of *Partners in School*. We investigated (1) the number and proportion of intervention steps parents *or* teachers completed (reported intervention fidelity); (2) the number of intervention steps both parents *and* teachers completed (reported intervention alignment); and (3) characteristics associated with intervention alignment between parents and teachers.

Methods

Participants

There were 75 participants (26 teachers and 49 parents) from an urban, public school district. Teachers had between one and three participating parents in his or her classroom. There were 49 parent-teacher dyads; a dyad was defined as one teacher and one parent from his or her classroom receiving consultation on one student with ASD. Participating parents primarily identified as African American/Black (36.7%) or White (30.6%). A quarter of parents identified as Hispanic/Latino, 4.1% as Asian, and 4% as Other. Most parents were mothers (93.9%) and averaged 38.1 years old (SD = 7.8). Approximately 60.4% of parents were not married and 67.3% were enrolled in Medicaid. Three quarters (73.5%) reported an annual income of less than $45,000, 67.4% had a high school/vocational degree or less, and 44.9% were unemployed.

The parents were receiving consultation about one target child with ASD. The majority of children were males (69.4%). They were, on average, 7.3 years of age (SD = 1.6). All children were in self-contained special education classrooms for students with ASD,

described as “autism support classrooms” in the present district. The range of grades included kindergarten through fifth grade classrooms. Approximately 71.4% of the students were kindergarten, first, or second grades. The average age of ASD diagnosis was 32 months (SD = 12.6). Most children (93.9%) were receiving school-based services, including speech therapy (85.4%), occupational therapy (66.7%), autism-specific therapies (e.g., applied behavioral analysis services; 22.4%), social skills training (8.2%), and physical therapy (2%). Almost all (95.7%) households consisted of biological parents; participating children had one (26.5%), two (40.8%), three (22.4%) four (8.2%), or five (2%) brothers and/or sisters.

Of the 26 participating teachers, 92.3% were female who averaged 36.6 years of age (SD=9.7). The teachers reported, on average, teaching in special education classrooms for 9.3 years (SD=5.9) and in autism support classrooms for 5.6 years (SD=3.1). Approximately 57.9% of the teachers taught in the younger grade range, which included kindergarten, first, second, and third grade. Most teachers identified as being White (80.9%). Approximately 11.5% of the teachers identified as being African American/Black, 3.8% identified as being Hispanic/Latino, and 3.8% identified as being Asian.

Procedure

Recruitment.—The university’s institutional review board approved the study. The school district’s office of research services also approved the protocol. The first author recruited autism support teachers both in person and over email. Teachers who attended an in-service training day hosted by the university were invited to participate. Additionally, the first author sent emails to autism support teachers who had previously participated in related research. Through these recruitment efforts, 31 teachers from 27 schools expressed initial interest and consented to participate. Four teachers were unable to participate because they did not have interested or eligible parents in their classrooms. One teacher was dropped because she did not keep her first phone interview.

After teachers consented, the research team sent home study information to approximately 235 students in their classrooms. The eligibility criteria for parents were: (a) participants must be a parent or legal guardian of a child with ASD, (b) child with ASD must be in kindergarten through fifth grade, and (c) parent or legal guardian must be English speaking. Ninety parents returned completed packets, including 20 who were not interested in participating, 10 who could not be contacted (i.e. invalid phone number), and three who had changed school districts. Four parents who returned completed packets did not speak English as their primary language and were therefore ineligible. Two other parents dropped out of the study due to litigation with the school district, and two parents dropped because they could not schedule the first phone interview. The first author contacted all consented parents and teachers to explain study activities, answer questions, and schedule the first portion of the consultation.

Partners in School* implementation strategy.—Partners in School* has three main participants: a teacher, a parent, and a consultant, who work collaboratively to identify a mutual student concern and develop a mutually agreed upon plan to address that concern.

The consultant facilitates parents' and teachers' implementation of that plan at home and at school, respectively. *Partners in School* was developed based on the literature in school consultation (Bergen & Kratochwill, 1990; Christenson & Sheridan, 2001; Erchul & Martens, 2002; Sheridan, Clarke, & Burt, 2008; Sheridan & Kratochwill, 2007), business negotiation (Adair & Brett, 2005; Bazerman, Curhan, Moore, & Valley, 2000; Daniels, Walker, & Emborg, 2012; Olekalns & Smith, 2000; Shell & Moussa, 2007) health communication (Britt, Hudson, & Blampied, 2004; Cameron, 2009; Orbe & Allen, 2008; Roter, Hall, & Aoki, 2002; Siminoff & Step, 2005), and implementation science (Cook et al., 2019; Lyon et al., 2019; Waltz, Powell, Fernández, Abadie, & Damschroder, 2019)

Partners in School is adapted from Sheridan and Kratochwill's (2007) Conjoint Behavioral Consultation (CBC) method. The adaption process used a community-partnered approach (Collins et al., 2018; Pellecchia et al., 2018) to merge the research evidence from the fields highlighted above with direct input from stakeholders. *Partners in School* was developed in line with the Consolidated Framework for Implementation Research (Damschroder et al., 2009). More specifically, we surveyed, interviewed, and observed parents, teachers, and administrators in public schools serving children with ASD to gain insight on barriers and facilitators related to intervention characteristics and the inner setting, as well as the characteristics of individuals, that would lead to more effective implementation.

Several implementation strategies are combined in the *Partners in School* model. Strategies were used from seven out of the nine implementation categories identified by Cook et al. (2019). These strategies include developing a detailed implementation plan (under *use evaluative and iterative strategies*), engaging in problem-solving (under *provide interactive assistance*), tailoring strategies to specific needs (under *adapt and tailor to context*), obtaining formal commitments (under *develop stakeholder interrelationships*), distributing materials (under *train and educate stakeholders*), integrating reminder systems (under *support implementers*), and engaging and preparing families to be active participants (under *engage consumers*). The *Partners in School* model is a multifaceted problem-solving consultation process composed of four stages: (1) a pre-consultation phone interview, (2) an in-person parent-teacher consultation meeting, (3) active parent and teacher implementation, and (d) a post-consultation phone interview.

Pre-consultation stage.—During model development, parents noted transportation to school as a major barrier to working with teachers. They also wanted to use multiple modes of communication (Azad et al., 2020). The pre-consultation interviews therefore were designed to be conducted by phone. The parent pre-consultation occurred during week one and the teacher pre-consultation occurred during week two of the *Partners in School* model. Each meeting was didactic (consultant-parent or consultant-teacher). The pre-consultation phone interview had three goals: (1) build a relationship with teachers or parents, (b) help teachers or parents understand and consider the other person's role, and (c) gather information about the child that would guide the in-person consultation.

The pre-consultation had five distinct parts. First, parents or teachers were asked to identify a strength in the other person (i.e. "Tell me what you think the child's teacher is doing really well."). Next, parents or teachers were asked to identify an aspect of the other person's role

that is difficult (i.e. “Tell me what you think is hard about teaching children with ASD and teaching your child in particular.”). Third, parents or teachers were asked to identify the child’s preferences (i.e. “Tell me three things that are motivating for this child.”). Fourth, parents or teachers were presented with eight possible concerns for their child and asked if they endorsed the concerns. Fifth, they were asked to rank order their top three concerns, as well as rate the frequency and severity of each concern. The eight concerns were generated from data collected during model development, when parents and teachers reported their main concerns for children with ASD. The following eight concerns were targeted: (a) staying on task (29.3%), (b) expressing needs (29.3%), (c) rigidity/difficulty with change (14.6%), (d) aggression (14.6%), (e) completing assignments (7.3%), and (f) following directions (4.9%).

In-person parent-teacher consultation stage.—Following the completion of both pre-consultation phone interviews, the parent, the teacher, and the consultant met for an in-person meeting (i.e. triadic). The goals of the consultation meeting were to: (1) review the information that was collected during the pre-consultations, (b) work together to develop an implementation plan consisting of **EBP** strategies to be conducted by parents at home and by teachers at school, and (c) construct a communication plan for teachers and parents to monitor intervention progress. The in-person meeting occurred during week three of the *Partners in School* model. At the in-person meeting, parents and teachers reviewed notes from what they reported at their individual pre-consultations. For example, they were asked to report on their top three concerns for the child with ASD. The target concern for the consultation was the overlapping concern identified by both parents and teachers. If there were no overlapping concerns, the consultant used qualitative data from the pre-consultation interviews to help parents and teachers identify a mutual concern. After the target concern was identified and defined, goals were developed for home and school.

Parents and teachers were asked to give more specific information about the target concern. They were asked to provide details about what normally occurs before or after the target concern. To help select tailored EBPs, parents and teachers were asked about strategies that were used to mitigate the target concern at home and/or at school, respectively. Any facilitators or barriers to using strategies also were discussed. An implementation plan was developed using parent and teacher feedback on the antecedents, consequences, and strategies used, as well as the consultant’s knowledge of EBPs for children with ASD. For example, a parent and teacher could contribute to different parts of the implementation plan, with the parent suggesting successful reinforcers (as a consequent strategy) and the teacher suggesting effective reminder systems (as an antecedent strategy). The consultant provided all necessary materials to facilitate implementation. On occasion, if the consultant needed to purchase items, implementation was delayed by one or two days.

The consultant also helped the parent and teacher design a reminder system (i.e. “check-in”) to monitor implementation efforts. Parents and teachers were told they could use any method of communication to check in (i.e. phone calls, emails, etc.). The check-ins were designed to be initiated by the teacher to the parent using three semi-structured questions.

Implementation stage.—The implementation plan was outlined and monitored using home-school notes. The home-school notes consisted of three main parts. The first section listed the child's name, the date, the target concern, and the home/school goals. The second section listed EBP steps for both parents and teachers, and a rating of how difficult each EBP step was to complete. This section was split into two areas, one for home and one for school, allowing both parents and teachers to monitor implementation and alignment. Parents and teachers indicated which of the EBP steps they completed, and how difficult the step was, on the daily basis. The third section was for tracking the child's progress towards their home/school goals. This section also had a place for both a parent and teacher signature, to denote their daily commitments.

Parents and teachers were asked to complete the form each day or night, sign it, and then send it back to the other party. The consultant provided 15 home-school notes for three weeks of implementation. The EBPs steps used have been well-established from the ASD intervention research (Schreibman et al., 2015; Wong et al., 2015), but tailored to meet the specific needs of children with ASD in the present study. They targeted ASD- specific symptomology (e.g., behavioral inflexibility), with EBPs shown to be effective for this population (e.g., visual schedules, social narratives, etc.). The EBPs selected were drawn from the 27 EBPs in the National Professional Development Center on Autism Spectrum Disorder, 2014. For example, all plans included a schedule of positive reinforcement and visual supports (Knight, Sartini, & Spriggs, 2015; MacNaul & Neely, 2017), but the type of reinforcers and the content of the visual supports were based on parent and teacher feedback. Example EBPs include antecedent strategies (e.g., reminders and timers), cognitive reframing, structured choices, task analyses, communication supports, replacement behaviors, prompting, redirection, academic modifications, self-monitoring tools, etc. (Azad et al., 2020).

Parents and teachers implemented the same plan in their respective settings. Both reported on whether they completed each of the EBP steps at home or school on the daily basis. At the end of week one and week two, the consultant sent a reminder email to the teacher about checking in with the parent. Teachers were provided with three semi-structured questions to discuss both parties' implementation efforts. The consultant picked up all of the home-school notes at the end of the third, and final, week of the implementation.

Post-consultation stage.—The consultant interviewed parents and teachers post-consultation. The goals of this interview were to: (1) discuss the student outcomes, (2) discuss the implementation outcomes, (3) develop strategies for maintaining progress or revising the plan, and (4) obtain feedback on the entire *Partners in School* model. The student's progress towards home and school goals was graphed based on the data collected on the home-school notes. The post-consultation interview had four components. First, parents or teachers assessed the frequency and severity of the same top three concerns that they listed during the pre-consultation. Second, the consultant presented parents or teachers with the student outcome data. Barriers and facilitators to implementation, including the reminder system, were discussed. Third, the consultant discussed next steps for implementation in each setting. Fourth, parents or teachers discussed their experience with

the *Partners in School* model as a whole. The post-consultation interview was conducted approximately four weeks after the parent-teacher consultation meeting.

The consultant for *Partners in School* was a female, doctoral-level psychologist with training in school psychology. The extent to which the consultant adhered to the *Partners in School* protocol was captured through the use of a checklist. Two independent raters examined 20% of the audiotapes to establish reliability, and then coded the remaining tapes individually. The consultant adhered to 98% of the *Partners in School* protocol.

Data collection.—After the pre-consultation phone interview (30 minutes), pre-consultation surveys were distributed to parents and teachers. The parents and teachers brought the completed surveys to the in-person consultation meetings, which lasted about 45 minutes. Home-school notes were completed daily for 15 days. Following the post-consultation phone interview (30 minutes), the post-consultation surveys were distributed to parents and teachers.

Measures

Demographic forms.—Personal identifying information was collected on participating parents and teachers using a demographic form. The teacher demographic form is a 19-item form with both multiple-choice and open-ended questions about gender, age, ethnicity, race, years of experience, number of students in the classroom with and without an autism diagnosis, highest level of education, and any additional certifications in specialized areas. The parent version of the demographic form had 39 items and asked multiple-choice and open-ended questions pertaining to gender, age, ethnicity, race, primary language, occupation, income, education level, and types of government assistance received. Parents reported on the child's age of diagnosis, school placement, and services received in and out of school. The age, sex, and presence of any developmental concerns for siblings also were recorded.

Parent-teacher relationship scale.—The Parent-Teacher Relationship Scale-Second Edition (PTRS-II; Vickers & Minke, 1995; parent and teacher versions), is a 24-item measure about the degree of connectedness between teacher and parent pairs. The PTRS-II uses a Likert scale to ask parents and teachers the extent to which different statements apply to their relationship with the other person. The Likert scale ranges from 1 = almost never to 5 = almost always. The items yield two subscales – Joining and Communication-To-Other. The Joining subscale is comprised of items related to affiliation and support, dependability and availability, shared expectations and beliefs about each other and the child, and communication from the other. The Communication-To-Other subscale was composed of items related to sharing of emotion and sharing of information. Consistent with prior studies (Azad et al., 2020), we used these two subscales as general communication indicators. Higher scores on the PTRS-II indicates a higher quality relationship. The PTRS-II was collected twice, pre- and post-consultation. For the present study, Cronbach's alpha for parent PTRS-II was .91 (pre) and .88 (post). For teachers, Cronbach's alpha on the PTRS-II was .85 (pre) and .85 (post).

Participation in problem solving.—The Participation in Problem Solving Scale (PPSS: Sheridan, Ryoo, Garbacz, Kunz, & Chumney, 2013; parent and teacher versions) is composed of two sections that focus on Communication about ASD or Communication about Problem Solving. The PPSS was modified slightly for the current study (with the developer's approval) to be applicable to parents and teachers of children with ASD. The first section of the PPSS consists of five dichotomous (yes/no) questions pertaining to ASD specific challenges and solutions for addressing those challenges. This section was designed to address Communication about ASD. An example item is, "During the last three months, did you communicate with your child's teacher about your child's social skills?"

The second section focuses on the extent to which parents and teachers engaged in problem solving. There were eight items related to problem solving communication within the context of a "recent concern they brought up with the other person (i.e. parent or teacher)." A 6-point Likert scale was used that ranged from 1 = disagree very strongly to 6 = agree very strongly. An example item is, "I gathered specific information to measure my child's progress." The two subscales used from this measure were Communication about ASD and Communication about Problems-Solving. The former is a more specific type of communication (i.e., about ASD compared to the general Joining and Communication-To-Other subscales described above). The latter is about the process of communicating – the extent to which parents and teachers engaged in the process of problem-solving. The PPSS was collected twice, pre- and post-consultation. For the present study, Cronbach's alpha for parent PPSS was .83 (pre) and .81 (post). For teachers, Cronbach's alpha on the PPSS was .90 (pre) and .88 (post).

Home-school notes.—Parents and teachers were asked to record if they completed each of the designated EBP steps on the daily home-school notes form. The form measured reported intervention fidelity by examining intervention dosage, or the number of EBP steps parents or teachers reported completing at home *or* school, respectively. Reported intervention alignment was computed as the number of EBP steps completed by both parents *and* teachers at home *and* school, respectively. Fifteen home-school notes were collected from each parent-teacher dyad to correspond to the three weeks of implementation.

Data Analysis

To assess reported intervention fidelity, we computed the percentage and the number of intervention steps completed by either parents or teachers. We present percentages to understand fidelity; however, we proceed with number of steps for ease of interpretability. Our second research question was about intervention alignment, which we measured as the number of EBP steps both parents and teachers completed.

Our third research question was about the characteristics associated with intervention alignment. We used linear regressions, separately for parents or teachers, and examined both the unadjusted and adjusted associations. In the unadjusted analyses, models only included one independent variable as the sole predictor of intervention alignment in order to examine bi-variate relationships. In the adjusted models, we included all independent variables as predictors to understand their associations together with the dependent variable. Given that

there was a nesting structure in our data (i.e., multiple parents with the same teacher), we computed the interclass correlation coefficient (ICC= .44). The moderate ICC suggests that the experience of dyads within classrooms was somewhat different from the experience of dyads across classrooms. To account for this teacher effect, our analyses were conducted using Complex Samples in SPSS. Complex Samples uses generalized estimating equations (GEE) to adjust standard errors to account for the non-independence created by clustering (Huang, 2016; Siller & Tompkins, 2006).

For models pertaining to parents, the independent variables were education, annual income, race, number of steps completed in the implementation plan, difference score on Joining, difference score on Communication-To-Other, difference score on Communication about ASD, and difference score on Communication about Problem Solving. For models pertaining to teachers, the independent variables were years teaching in autism support classrooms, race, number of steps completed in the implementation plan, difference score on Joining, difference score on Communication-To-Other, difference score on Communication about ASD, and difference score on Communication about Problem Solving. Difference scores were calculated as the change between pre- and post- consultation periods for each independent variable collected twice. A positive difference score indicated that there was gain observed on that variable from pre- to post-consultation (e.g., Joining improved from pre- to post- consultation). The dependent variable for both parent and teacher models was reported alignment or the number of EBP steps completed by both parents and teachers.

Results

For parents, the average percentage of intervention steps completed was 69% (range 50–85%). In other words, parents reported completing 4.9 (SD = 1.3) EBP steps at home. For teachers, the average number of intervention steps completed was 67.6% (range 57–75%). Teachers reported completing 4.8 (SD = 1.4) EBP steps at school. The range of EBP steps required for the implementation plan varied between three and eight steps. The number of overlapping steps both parents and teachers completed was 3.4 (SD = 1.9).

No variables were significantly associated with alignment in the unadjusted analyses. In the adjusted analyses, five parent variables were significantly associated with alignment. First, we observed more alignment in parents with higher education (i.e., who completed some college or more; B = .972, p = .008). Second, we observed less alignment in parents who reported their annual income as more than 45K (B = −2.708, p = .002). Third, the more EBP steps parents reported completing at home, the more aligned they were with teachers (B = 1.211, p< .001). Fourth, parent-reported Joining (i.e., a partnership orientation) was significantly related to their reported alignment (B = .175, p = .003). Fifth, parent-reported Communication-To-Other (i.e., teachers) was significantly related to reported alignment (B = .358, p = .012). In other words, the extent to which parents reported a positive gain in Joining and Communication-To-Other from pre- to post-consultation was associated with the extent to which they were aligned with teachers (i.e., more positive gain was associated with more alignment).

For teachers, we also found no statistically significant unadjusted associations with alignment. In the adjusted analysis, teacher-reported Communication about Problem Solving was associated with their reported alignment, (B = .566, p = .017). A similarity noted for both parents and teachers was that communication variables (i.e., Communication-To-Other and Communication about Problem Solving, respectively) were associated with reported alignment.

Discussion

Partners in School is an implementation strategy to facilitate the collaborative use of EBPs by parents and teachers, and thus, improve ASD services in schools. The goal of *Partners in School* is to ensure that children with ASD experience the same EBPs across home and school. In this pilot study, we examined the average number of intervention steps parents *or* teachers completed (reported fidelity), as well as the average number of intervention steps completed by both parents *and* teachers (reported alignment). We also were interested in the characteristics associated with reported intervention alignment between parents and teachers.

Our findings indicated that parents and teachers reported completing approximately five EBP steps at home on average (69% or 4.9 steps on average) or school (68% or 4.8 steps on average), out of a range of three (minimum) to eight (maximum) steps required. These findings suggest that by focusing on 3–8 tailored EBPs, a consultation method can achieve relatively high fidelity (e.g., 68–69%) with parents and teachers in a short period of time. Unfortunately, ASD interventions are often complex, multi-step approaches, and even *perceived* implementation challenges can make successful implementation even harder (Locke et al., 2019).

Of the five EBP steps parents and teachers reported implementing on average, approximately 3.4 EBP steps were aligned (i.e., completed by both parents and teachers on average). It is important to note that, as part of the model, parent-teacher dyads were presented with all of the same EBP steps and were directed to implement all of the same steps. If stakeholders are asked to implement multi-step interventions, teachers may choose to do three steps that are different from the three steps implemented by parents at home, resulting in discontinuity of experiences for children.

Parents who reported a higher education had more intervention alignment with teachers. Parents with more education may be more informed about EBPs and the value of implementing them consistently with teachers. Our finding is consistent with the accumulating evidence that parents with more education often are more involved with their children's education (Oswald, Zaidi, Cheatham, & Diggs Brody, 2018). This study contributes to the literature by elucidating that parent education is associated with a specific aspect of parental involvement – aligning with teachers in implementing the same EBPs at home.

We were surprised to find that higher parental income was associated with less intervention alignment. Perhaps parents with more income had more resources, and therefore, may be receiving advice about intervention options from multiple sources, thus limiting their

alignment with teachers. However, it is important to note that only a fourth of our sample reported a high-income (i.e., more than 45K), therefore, only a handful of parents likely were driving this finding. Our findings are consistent with the broader implementation science literature which shows that socio-economic factors may affect EBP implementation (Carr et al., 2016; Robertson, Sobeck, Wynkoop, & Schwartz, 2017). We also found that the number of EBP steps completed by parents at home was associated with the extent to which they (i.e., parents) were aligned with teachers. Therefore, parents can be encouraged to be actively involved in their children's education by implementing the same interventions as teachers because this will result in continuity of experiences for children.

We also found that parents who reported higher quality relationships with their child's teacher had more intervention alignment with them. In our study, the parent-teacher relationship measure involved two elements – Joining and Communication-To-Other (Vickers and Minke, 1995). Both of these aspects of the relationship were significantly related to intervention alignment for parents. The Joining aspect was defined by affiliation and support, dependability and availability, shared expectations and beliefs about each other and the child, and communication from the other. Parents who reported gains in these aspects of their relationship with the child's teacher may feel "on the same page" with them, and therefore, can more easily synchronize their implementation. However, if parents are unable to "join" or partner with teachers in the education of their children, it is unlikely that they will be able to synchronize their implementation efforts across home and school. These results are consistent with research that suggests that parents are more likely to be involved with their child's education at home, when they feel like they are being engaged by the teacher (Kim, Sheridan, Kwon, & Koziol, 2013).

Furthermore, Communication-To-Other also was associated with intervention alignment for parents. This aspect of the parent-teacher relationship was defined as sharing of emotion and information. It is likely that parents who reported gains in sharing emotions and information were exchanging this information as it relates to their experiences in *Partners in School*, thus resulting in more alignment across home and school. Research in general education has shown that parents who reported more communication with the teacher were more likely to be in a positive, aligned relationship with them (Minke, Sheridan, Kim, Ryo, & Koziol, 2014).

For teachers, we found that Communication about Problem Solving was associated with intervention alignment with parents. For teachers, global relationship quality may not be as important to alignment as communicating specifically about a mutual concern and steps to address that concern (i.e., problem-solving). Prior studies have shown that parents and teachers struggle to collaboratively problem solve their primary concerns about children with ASD (Azad, Kim, Marcus, & Mandell, 2016; Azad and Mandell, 2015). However, high-quality communication, particularly communication that involves problem solving, has been linked to improvements in teacher-reported outcomes for children with ASD (Azad et al., 2018).

Our findings provide some insight as to why studies consistently report that parents (Cadogan & McCrimmon, 2013; Penny & Schwartz, 2018) or teachers (Mandell et al.,

2013; Stahmer et al., 2015) implement interventions with low fidelity. More specifically, improving parent-teacher relationship quality, with a particular focus on communication, may be one way to bolster EBP implementation, and subsequently, alignment across home and school. Given that the implementation science literature shows that provider-level characteristics impact EBP fidelity in one setting (Aarons et al., 2010; Carr et al., 2016; Wright et al., 2019), it is not surprising that this study showed that dyadic characteristics influence EBP alignment across settings.

There are several limitations to note. First, we used a post design to examine associations between our variables given that *Partners in School* is an early-stage implementation strategy. We are unable to draw conclusive statements about the reported associations without a control group or baseline data. A more rigorous control-group design with pre- and post-data would lend a better reference for interpreting implementation outcomes. Second, this study only used parent- and teacher-reported data. We did not corroborate our findings on reported intervention fidelity or alignment with direct observations or qualitative analyses of parents' and teachers' feedback on the barriers and facilitators to implementation. Third, the small sample size limited the complexity of our analyses. For example, we could not examine the complex relationship between education and income because crosstabs of these variables indicated very small cells. We were only powered to test for large effects. Fourth, we only examined one aspect of reported intervention fidelity/alignment – dosage or the extent to which parents and teachers reported conducting the EBP steps at home or school, respectively. An important future direction may be to explore predictors of fidelity percentages or the quality of implementation. It is likely that the quality of implementation also impacts alignment, and children's continuity of experiences across settings. Fifth, the present study did not examine organizational characteristics and/or provider attitudes/experiences, which have been shown to impact implementation fidelity, and therefore, likely to affect implementation alignment. For example, McNeill (2019) reported that teachers in self-contained classrooms reported using EBPs more than teachers in inclusive or resource classrooms.

Despite these limitations, the findings from the present study have important implications for ensuring that children with ASD can access the same EBPs at home and at school. Our findings suggest that it is imperative to translate complex ASD interventions into manageable steps for parents and teachers. However, it is important to interpret these results within the context of the present study. The intervention period was only three weeks. Additionally, parents and teachers were only asked to complete between three to eight EBP steps. The time period and steps required for the current study are notably shorter and less intensive than comprehensive ASD intervention packages.

Our results also illuminate the critical role of stakeholder communication in service delivery models. For parents, Communication-To-Other and Communication-From-Other (one aspect of Joining) was related to reported intervention alignment. Teachers who reported more Communication about Problem Solving from pre- to post- consultation also were more aligned with parents. These predictors have implications for joint implementation in urban public schools. In such resource-deficit settings, school staff may consider prioritizing rapport building, especially the communication aspects, with parents and training on

problem solving for teachers. Effective parent-teacher communication may serve as the mechanism of change by which parents and teachers can implement the same EBPs across home and school. In future studies, it will be imperative to examine the extent to which alignment plays a mediating role between parent-teacher communication and child outcomes. Improving communication between parents and teachers may strengthen the dosage, intensity, and impact of autism services, and ultimately, outcomes for children with ASD.

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Table 1

Characteristics of Parents and Teachers in Partners in School

Variable	Mean (SD) or percentage
Parent characteristics (N = 49)	
Fathers	6.1%
Mothers	93.9%
Age in years	38.1 (7.8)
Caucasian/White	30.6%
African American/Black	36.7%
Asian	4.1%
Hispanic/Latino	24.5%
Middle Eastern	2.0%
American Indian/ Alaska Native	2.0%
High school/ vocational school or less	67.4%
Annual income less than 45K	73.5%
Receiving Medicaid	67.3%
Unemployed	44.9%
Not married	60.4%
EBP steps completed	4.9 (1.3)
Child Characteristics (N = 49)	
Male	69.4%
Female	30.6%
Age in years	7.3 (1.6)
Kindergarten, first and second grades	71.4%
Third, fourth and fifth grades	28.6%
Average age of ASD diagnosis in months	32 (12.6)
Receiving school-based services	93.9%
Lives with biological parents	95.7%
Teacher characteristics (N = 26)	
Male	7.7%
Female	92.3%
Age in years	36.6 (9.7)
Caucasian/White	80.9%
African American/Black	11.5%
Asian	3.8%
Hispanic/Latino	3.8%
Kindergarten – third grade	57.9%
Frist grade – third grade	11.5%
Second grade – fifth grade	30.6%
Years teaching in special education	9.3 (5.9)
Years teaching in autism support classrooms	5.6 (3.1)
EBP steps completed	4.8 (1.4)

Table 2

Variables Associated with Alignment for Parents

Variable	Adjusted	
	B	***p***
Parent Education (HS/VS or less OR some college or more)	.972	.008**
Family Income (45K or less OR over 45K)	−2.708	.002**
Parents' Race (not white or white)	1.278	.091
Number of steps completed in the implementation plan	1.211	.000***
Difference in joining	.175	.003**
Difference in communication to the other person	.358	.012*
Difference in communication about ASD	.371	.087
Difference in communication about problem-solving	.074	.078

Note. HS = High school. VS = Vocational school.

* p < .05

** p < .01

*** p < .001

Table 3

Variables Associated with Alignment for Teachers

Variable	Adjusted	
	B	***p***
Years teaching in autism support classrooms	.060	.225
Teachers' Race (not white or white)	2.502	.182
Number of steps completed in the implementation plan	.576	.056
Difference in joining	.019	.647
Difference in communication to the other person	.044	.823
Difference in communication about ASD	.002	.979
Difference in communication about problem-solving	.566	.017*

* $p < .05$