Preschool Teachers' Selection of Social Communication Interventions for Children with Autism: An Application of the Theory of Planned Behavior

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Abstract

Early Childhood Special Education (ECSE) teachers select practices to use to promote social communication development for their students with autism spectrum disorder (ASD). Understanding what evidence-based practices (EBPs) teachers select and why can inform the development of dissemination and implementation supports at the critical Adoption-Decision stage of implementation. The researchers used discrete choice analysis to examine and test the effects of teachers' beliefs (self-efficacy, attitude, subjective norms; Theory of Planned Behavior) about key EBPs on ECSE teachers' practice selections. To assess malleable determinants of practice selection, this study addressed these aims: (a) assess ECSE teachers' beliefs (attitudes, subjective norms, self-efficacy) about key EBPs, (b) describe which EBPs teachers selected, and (c) examine whether teachers' beliefs predicted practice selections. A web-based survey gathered responses from 222 ECSE teachers. Participants had the most favorable beliefs about naturalistic intervention and the least about discrete trial teaching and scripting. These beliefs aligned with the frequencies with which these practices were selected, and teachers' beliefs predicted which practices they selected. Together, these findings suggest that beliefs serve as determinants of ECSE teachers' practice selections that can be acted on to tailor pre-implementation supports and improve implementation from the start.

Introduction

For children with autism spectrum disorder (ASD), there is no "one-size-fits-all" approach to intervention. Instead, educators choose practices to teach critical skills and support functioning for each child (Lubas et al., 2016). Though there are a number of evidence-based practices (EBPs) for teachers to use, these practices are not translating to routine use in the preschool context (Dynia et al., 2020), limiting their potential to promote student achievement of desired social communication outcomes (Kaale et al., 2014). Research across child-serving sectors shows many EBPs are not adopted and implementation efforts often are unsuccessful in changing clinical outcomes, even when significant resources are invested (Damschroder et al., 2009; Powell et al., 2014). Explaining why education systems are not producing better outcomes despite a national emphasis on EBP use requires understanding the factors that influence teachers' insufficient uptake and use of EBPs (Proctor et al., 2011). Research on individual-level factors that influence teachers' decision-making regarding practice selection can uncover important insights into dissemination and implementation supports to improve the quality of instruction preschoolers with ASD receive. Teachers from preschool to twelfth grade report a number of factors that influence their instructional decision-making (i.e., professional judgment, student need; Knight et al., 2018). However, there has yet to be a specific investigation of teacher beliefs that may serve as antecedents to practice selection and use to promote social communication for preschoolers with ASD—an important research avenue considering prior evidence linking beliefs to practice use for teachers serving older students (Haney et al., 2002).

Evidence-Based Focused Intervention Practices to Support Social Communication

Although most students with autism have social communication needs (American Psychiatric Association, 2013) and teachers' report high prioritization of these skills, the

research-to-practice gap manifests in teachers' insufficient knowledge, confidence, and delivery of social communication practices (Brock et al., 2014; Dynia et al., 2020; Hendricks, 2011; Knight et al., 2018). Improving knowledge of available practices has included defining two types of EBPs, *comprehensive treatment models* and *focused intervention practices* (FIPS; National Professional Development Center on ASD [NPDC]), that can be used to meet federal mandates (Individuals with Disabilities Education Improvement Act [IDEIA], 2004; No Child Left Behind Act [NCLB], 2002) and improve social communication outcomes (Odom et al., 2010). FIPS are instructional practices or strategies designed to teach specific skills, rather than the broad array of skills addressed through comprehensive models (Odom, 2010). They may be single, foundational behavioral strategies such as, reinforcement and modeling, or multicomponent practices such as discrete trial teaching and peer-mediated intervention (Steinbrenner et al., 2020; Wong et al., 2015). For this study, we focus on FIPs for a few reasons. First, there are many FIPs available for teacher use; of the 27 FIPs identified in recent reviews, 25 have been identified to promote young children's (birth-five years old) social communication skills (Steinbrenner et al., 2020; Wong et al., 2015). Second, FIPs may be more easily adoptable as they are more discrete practices recognizable to a broader audience of teachers and do not require administrator approval or significant infrastructure to support (Wilson & Landa, 2019). Importantly, different FIPs may also represent different features known to relate to selection and use, such as their complexity, relative advantage, or trialability (Rogers, 2005) as perceived by a teacher. Given the lack of information relating to how teachers select these FIPs, innovative approaches are necessary to facilitate systematic examinations of how teachers' beliefs may impede or promote the use of FIPs as a step toward more rapid adoption of EBPs.

Focusing on Teachers' Decision-Making to Reduce the Implementation Gap

There is surprisingly little information regarding the important antecedents to adoption and implementation—such as the selection decision—despite teachers identifying practice selection for students with autism being a primary challenge in supporting students in achieving their goals (Brock et al., 2020). It is at this initial "adoption-decision" stage of the implementation process (Exploration, Adoption, Implementation, Sustainment; EPIS, Aarons et al., 2011) when a teacher makes a decision whether they will use a specific practice or not. Some teachers have endorsed that they consider individual student needs, professional judgement, and training experiences in their decision-making, but these responses were not practice-specific, limiting the connection to understanding why a specific practice may or may not be selected for use (Knight et al., 2018). From a contextual behavioral perspective (Hayes et al., 2012), the dynamic interaction between what practices teachers use for students, the context of use, students' responses to practices, and historical experience shapes a teacher's beliefs about practices, which recursively influence their future practice use and experiences. As Haney et al. (2002), describe, "beliefs lead to actions which, in turn, lead to the creation of new, reconstructed, or reaffirmed beliefs" (p. 181). Using innovative methods to explore and isolate individual factors, such as teachers' practice-specific beliefs, that influence practice selection decisions is an important line of research. Such investigations can support our understanding of which practices are likely to be adopted to inform efforts to address the longstanding research-to-practice gap and improve outcomes for young children with ASD.

Given the complexity of how beliefs are formed, the role beliefs play in decision making, and variability in teachers' practice implementation (Durlak & Dupre, 2008; Locke et al., 2019), theoretically grounded research is needed to understand the beliefs that influence the Adoption-Decision stage (Lynch et al., 2018). The well-established Theory of Planned Behavior (TPB;

Ajzen, 1991) describes specific antecedent constructs to behavior change that influence the likelihood of a person engaging in a given behavior. According to the TPB, a person's *behavioral intention* is the most proximal predictor of behavior change, and, when applied to this population, reflects whether or not a ECSE teacher would select a specific practice. The strength of behavioral intention is a robust predictor and mediator to adoption and implementation (Hagger & Luszczynska, 2014), particularly when an individual is prioritizing the selection of one practice over others (Ajzen, 1991). Behavioral intention has been correlated with teachers' implementation and found to vary across FIPs for students with ASD (Fishman et al., 2018). Behavioral intentions are influenced by specific beliefs, including perceived behavioral control (i.e., self-efficacy), attitude (i.e., value or outcome expectancy), and subjective norms (i.e., perceived collegial support) about a specific behavior. Though sometimes these beliefs are studied separately (Ruble et al., 2018), together, they account for a substantial portion of the variance in behavioral intentions (Davis et al., 2015). Further, there is evidence that these beliefs are malleable in response to intervention (Cook et al., 2015), practice-specific (Fishman et al., 2018), and associated with the EBP implementation in special education (Lyon et al., 2018). Nevertheless, theory-driven investigations of teacher beliefs as antecedents to practice selection remain rare within preschool special education (Fishman et al. 2018, Ruble et al., 2018).

Study Purpose

Early Childhood Special Education (ECSE) teachers' selection and use of EBPs is a critical aspect of effective early intervention services designed to promote social communication development for young children with ASD. As EBP selection and use is dependent on the decisions of individual teachers who provide intervention to young children with ASD, there is a need to understand factors that influence their decisions to select particular EBPs. Guided by the

TPB, exploring beliefs that may serve as mechanisms for selection, adoption, and full implementation and sustainment of EBPs (Cook et al., 2015; Lyon et al., 2019), may offer new insights into how to support teachers' selection and subsequent delivery of EBPs that aim to promote better outcomes for young children with ASD. Thus, the purpose of this study was to explore teachers' decision-making and beliefs about key EBPs guided by the following aims:

1. Describe which practices ECSE teachers select and use with young children with ASD
2. Assess teachers' beliefs (self-efficacy, attitude, subjective norms) about key EBPs
3. Examine whether teachers' beliefs about practices predict practice selection

Methods

Survey Administration

Recruitment. After approval from the University Institutional Review Board, we used a modified snowball sampling by contacting ECSE teachers, coordinators, faculty, and national organizations with information about the study (Nardi, 2014). All recruitment materials included information about the researchers, study, eligibility, incentives, participation requirements, and a request that participants distribute the information to ECSE teachers. The researcher provided the questionnaire via Qualtrics™. Following the receipt of frequent inauthentic responses (i.e., repeated IP addresses, incoherent, irrelevant responses to open-ended questions via internet bots, brief completion within a few minutes) in the first wave of recruitment, more bot protections were added (screener survey, honey pot questions, in/attention checks; Simone, 2019). Due to the nature of snowball sampling, an accurate response rate is not calculable. Wave one contributed 53 (of 300), and wave two contributed 171 (of 255 completed screeners) authentic and complete responses. The majority of participants completed the questionnaire in

approximately 30-40 minutes at a time and place of their choosing during the data collection period (February-March 2020). Participants received a $30 e-gift card for survey completion.

Participants. Participants included 222 licensed ECSE teachers who served at least one 3–5-year-old with ASD in a preschool setting during the 2019-2020 schoolyear and provided written consent within the questionnaire. The majority of participants provided optional general demographic information (see Table 1). No socioeconomic or age data were collected.

Table 1.

Participant Demographic Information

	Demographic Information	***n***	**%**		
Initial License Type	Deaf/Hard of Hearing	1	0.5		
	Early Childhood Special Education	155	69.8		
	Emotional/Behavioral Disorders	6	2.7		
	General Education	71	32		
	High Incidence	4	1.8		
	Learning Disabilities	11	5		
	Low Incidence	3	1.4		
	Moderate/Severe	19	8.6		
	Other	26	11.7		
Years Licensed & Working in Preschool		**Licensed**		**Preschool**	
		n	**%**	***n***	**%**
	<1 Year	17	7.7	19	8.6
	1-3 Years	35	15.8	41	18.5
	4-8 Years	62	27.9	65	29.3
	9-13 Years	44	19.8	47	21.2
	14-18 Years	26	11.7	21	9.5
	19-23 Years	19	8.6	17	7.7
	>23 Years	19	8.6	12	5.4

Note. $N = 222$

Participants from 27 states in six of the United States' seven regions responded to the survey (U.S. Census Bureau). The vast majority of participants identified their gender as female

(95%) and their race and ethnicity as White/Caucasian (89.6%), with all other groups being less than 3%, which is similar to the demographic make-up of kindergarten-12th grade educators (U.S. Department of Education, 2016). The majority of participants had at least an initial ECSE license, and 38% initially earned more than one license. Teachers held a variety of years of licensed experience (1 year = 7.7% to >24 = 8.6%) and in preschool special education classrooms (1 year = 8.6% to >23 = 5.4%). Most participants worked in both inclusive and self-contained settings (52.7%), while some only worked in a self-contained setting (25%; 75% in at least one inclusive setting).

Survey Development

This was the first study to use a discrete choice experiment and measure of teachers' beliefs about specific EBPs. The researchers, therefore, developed an original tool and modified an existing tool. The first author iteratively developed tools with field experts using item-writing guidelines (Evans et al., 2014; Haladyna & Rodriguez, 2013). To evaluate and establish construct validity, two former ECSE teachers participated in a "Think-Aloud" procedure. Participants read the questionnaire and then articulated their thoughts aloud as they answered the questions (Dillman et al., 2014). Researchers then reviewed this information and refined questionnaire items and administration procedures.

ASD Practice Selection Task

The ASD Practice Selection Task is an original discrete choice tool designed to simulate a decision-making scenario similar to what ECSE teachers experience in their instructional planning for a child with ASD. The task consisted of two parts; a) a vignette describing an autistic student who needs to develop a social communication skill, and b) questions asking the

participants to select a practice to teach the vignette child (see vignette and sample portion of questions in Figure 1).

[INSERT FIGURE 1]

The vignette was designed to capture reality, have vignette-participant congruence, and simulate a student with whom participating teachers may be familiar (Glasgow, 2013; Marsh et al., 2019). To reduce the opportunity for influence of racial and gender bias, we excluded information about the child's gender, name and race (Gilliam et al., 2016). To ensure standardization and relevance, the vignette included specific details about the target skill. Following the vignette, though teachers may be inclined to try multiple strategies at once or in close sequence, participants were asked which of an available set of practices they would use first and last. This approach allows the order in which a teacher would be likely to use a practice to serve as an indicator of their intention to implement any given practice. To provide an array of practices that would be viable for teacher use and exclude those that would be cost prohibitive for a teacher alone to select and use in schools, we used specific inclusion criteria. Therefore, a practice was included if it was a) intended for use in the educational setting (i.e., not medical), b) evidence-based for children 0-5 for social communication (Wong et al., 2015), c) targeted at one goal, d) focused solely on skill acquisition, e) did not require specific financial resources or certification. The following practices from an evidence review (Wong et al., 2015) met these criteria and were presented with a description in a randomized order across participants; a) naturalistic intervention (NI), b) peer-mediated intervention (PMI), c) social narratives (SN), d) discrete trial teaching (DTT) and, e) Scripting.

ASD Practice Intentions Scale (APIS).

The ASD Practice Intentions Scale was developed based on the IEP Data Collection Intention Scale (IDCIS; Rudolph, 2019). Grounded in the TPB, the IDCIS provides a reliable and valid (Rudolph, 2019) measure of ECSE teachers' beliefs about data collection practices. Following discussion with the IDCIS author, five versions of the APIS were created, one for each of the practices included in the Autism Practice Selection Task (DTT, naturalistic intervention, scripting, social narratives, peer-mediated intervention). Within each version, factors represented their practice specific beliefs; a) their belief in their ability to use the practice to achieve positive outcomes (self-efficacy), b) how positively they viewed the practice (attitude), and c) their perceived support from their colleagues and administrators to use the practice (subjective norms; Ajzen, 1991). ECSE teachers rated items on a 4-point rating scale, with higher ratings representing more favorable beliefs (Rudolph, 2019). For example, one item within the naturalistic intervention self-efficacy factor asks; "How confident, if at all, are you in your ability to determine naturally occurring reinforcers during routines/activities." Participants rated their confidence from not at all confident, to extremely confident. Participants completed the five APIS versions in a randomized order across participants.

Data Analytic Procedure

R Studio ™ and SPSS V. 25 (2017) were used to perform descriptive and statistical analyses. To address our first aim, we summarized the total and proportion of teachers selecting each of the practices to use first and last from the Autism Practice Selection Task. For our second aim, descriptive statistics in the form of mean ratings, range, and standard deviations were calculated to describe each belief factor (self-efficacy, attitude, social norms) and an Overall Beliefs rating (mean of factor ratings) for each practice. To address the third aim, we used

discrete choice analysis via multinomial logit modeling to test the effects of beliefs on selection and estimate the relative probability that a participant would select a practice given beliefs data. Two models evaluated whether beliefs predicted practice selection; one tested the predictive effects of beliefs on their practice selection to try first and to try last. We used the ggplot2 package in R (Wickham, 2016) to find that these models met the relevant assumptions; low collinearity between predictors, independence of the sample, and linearity (Train, 2009).

Missing data. The ASD Practice Selection Task included forced responses for all quantitative items, therefore no data were imputed. For the five APIS tools, random data were occasionally missing for up to two items per participant. In such cases (0.12% of items), to reduce bias and error, the mean was imputed for their response to the item within that factor and then assigned to the missing item (Enders, 2012; Nardi, 2014).

Results

Aim 1: Practice Selections

Results indicated that there was variability in the proportion of participants selecting a practice as their first or last choice, showing individual differences and preferences for practices (see Figure 3). Naturalistic intervention (NI; 34%) and scripting (31.5%) were the practices most often selected first, while discrete trial teaching (SN), social narratives (SN), and peer-mediated intervention (PMI) were least likely to be selected first (15%, 10.36%, and 8%, respectively). A multinomial logit base model revealed significant differences between rates of selecting a practice first. NI served as the reference group because it was the most often selected practice to try first. Participants were significantly less likely to select PMI ($\beta = -1.440.23$, $SE = 0.262$, $p < .001$), SN ($\beta = -1.195$, $SE = 0.237$, $p < .001$) and DTT ($\beta = -0.775$, $SE = 0.204$, $p < .001$) than they were NI. The relative probability of selecting a practice as first choice represented the

percentage decrease in probability of selecting that practice instead of NI. For example, teachers were 34.32% less likely to select DTT rather than Naturalistic Intervention first. For other practices, these were 8.10% for PMI, 10.36% for SN, and 31.51% for scripting.

With regard to participant responses about the practice they would select last, results indicated that DTT was associated with the highest probability of being selected last (38%) and scripting had the lowest probability of being selected last (8.56%). A multinomial logit base model revealed significant differences between participants' selection of the last choice. For this model, DTT served as the reference group because most participants indicated they would try it last. Participants were significantly less likely to select NI (*Relative Risk Ratio* = -1.099, *SE* = 0.218, $p < .001$), PMI (*RR* = -0.624, *SE* = 0.184, $p < .001$), scripting (*RR* = -1.486, *SE* = 0.254, $p < .001$), and SN (*RR* = -.602, *SE* = 0.183, $p < .001$) as their last choice rather than DTT. The relative probabilities of a teacher selecting a practice other than DTT as their last choice were: Scripting 8.56%, PMI 20.27%, SN 20.72%, and NI 37.84%. For example, there was a 37.84% decrease in the probability of selecting NI last relative to DTT.

It was also important to assess which of the available practices they would not choose to use for the child in the vignette. A considerable proportion of participants (40%, *n* = 91) indicated that they would not use one (*n* = 73) or more (*n* = 18) of the available practices. Of those participants, 23% indicated they would not use DTT, 15% PMI, 9.6% SN, and only few indicated they would not use NI (2.7%) or scripting (0.9%). Respondents were asked to qualitatively describe why they selected a specific practice first or last, which may shed light as to whether they indicated that they would not try a specific practice. Reasons for selecting DTT last included that it was too structured and unnatural, and they lacked familiarity. Teachers said they selected PMI last because it was not age appropriate and they lacked peers who could model

and follow the procedures. For SN, participants responded that it was not concrete enough for the vignette child's skills. For scripting, some teachers indicated they felt that scripts lacked meaning for students with ASD. Finally, for NI, teachers largely described lacking familiarity.

Aim 2: Teachers' Beliefs about Key EBPs

Figure 2 presents the means for each factor and Overall Beliefs rating by practice.

[INSERT FIGURE 2]

Self-Efficacy. ECSE teachers' self-efficacy ratings across practices showed the least variability of any factor (*M* = 2.908, range 2.8-3.17), yet there were significant differences between all practices except between the practices the highest (NI and SN; $V = 11178$) and lowest (PMII and DTT; $V = 12097$) ratings. Participants rated their self-efficacy in using SN and NI highest (*M* = 3.17, *SD* = 0.64, and *M* = 3.17, *SD* = 0.78, respectively), and lowest for scripting (*M* = 2.62, *SD* = 0.82) compared to all other practices.

Attitude. Out of all the belief factors, ECSE teachers' attitudes ratings were associated with the highest overall mean rating (*M* = 3.164). There was variability in participants' attitudes across practices (*Range* = 2.9-3.43), with significant differences between attitude ratings for each practice except for between DTT and Scripting. The highest mean attitude ratings were found for NI (*M* = 3.43, *SD* = 0.58), SN (*M* = 3.30, *SD* = 0.6) and PMI (*M* = 3.13, *SD* = 0.59) and lowest for DTT (*M* = 2.97, *SD* = 0.64) compared to all other practices.

Subjective Norms. The mean subjective norms rating across all practices was 2.71, indicating that this factor was the least favorable of all the beliefs factors across practices. Between practices, subjective norms about SN were rated the highest and DTT lowest (SN, *M* = 2.96, *SD* = 0.78; DTT, *M* = 2.43, *SD* = 0.92). There were statistically significant differences between subjective norms ratings of practices, except for practices falling in the categories with

the highest (NI and SN; $V = 6457$) and lowest (PMI and DTT; $V = 5514$) ratings, respectively.

Overall beliefs. The mean rating representing Overall Beliefs across all practices was 2.465, indicating on average, somewhat favorable beliefs about all of the practices. Participants' Overall Beliefs ratings were highest for NI (M = 3.34, SD = 0.59) and lowest for DTT (M = 2.73, SD = 0.58). Overall Beliefs about NI were significantly higher than all other practices (V = 20744, p <.001). Participants' beliefs about SN were also significantly higher than those for DTT (V = 5566, p <.001), Scripting (V = 18526, p <.001), and PMIs (V = 6400, p <.001).

[INSERT FIGURE 3]

Aim 3: Beliefs Predicting Practice Selection

Table 2 displays the results of multinomial logit models predicting which practice was selected to try first, and which was selected to try last.

Table 2.

Multinomial Logit Regression Results for Practice Selection

Selection of Practice to Try First	**Beliefs for Selected Practice**		**Beliefs for Naturalistic Intervention**	
	β	**SE**	β	**SE**
Discrete Trial Teaching	0.9526*	0.4020	-3.0977***	0.5598
Peer-Mediated Intervention	3.6137***	0.7403	-4.5111***	0.7183
Scripting	1.9906***	0.4244	-2.7307***	0.5284
Social Narratives	1.4588	0.5717	2.4507***	0.6049
Selection of Practice as Least Likely to Try			**Beliefs for Discrete Trial Teaching**	
	β	**SE**	β	**SE**
Naturalistic Intervention	-1.3887***	0.0498	0.6300	0.4450
Peer-Mediated Intervention	-0.5926	0.3165	0.6280	0.3275
Scripting	-1.6740***	0.4824	1.0292*	0.475
Social Narratives	-1.6347***	0.4095	0.804*	0.3542

Note. Naturalistic intervention served as the reference group for the multinomial logit models for predicting practices selected first, and discrete trial teaching served as the reference group for those predicting last choice. *= p <.05, **= p <.005, ***= p <.001

Prediction of Practice Selected to Try First. Multinomial logit modeling was used to evaluate whether beliefs predicted likelihood of practice selection. NI served as the reference group for all comparisons, as it was the practice most participants indicated that they would try first. Findings revealed that a participant's log odds of selecting DTT, PMI, or scripting to try first over NI significantly increased for every one-unit increase in belief ratings. In other words, as participants beliefs increased about a practice other than NI, there was an increased likelihood that participants would select that practice over NI (PMI: $\beta = 3.6137,\ SE = 0.7403,\ p < .001;\ scripting: \beta = 1.9906,\ SE = .04244,\ p < .001;\ DTT: \beta = 0.9526,\ SE = 0.4020,\ p < .05$). These findings suggested that ECSE teachers' beliefs about some practices predict whether those practices were likely selected to try first. The researchers also interpreted the effects of participants' beliefs about NI, the reference group, on selection. Across all practices, with every one unit decrease in the beliefs rating for NI, the log odds of selecting another practice over NI significantly increased (PMI: $\beta = -4.511,\ SE = 0.718,\ p < .001;\ Scripting: \beta = -3.098,\ SE = 0.528,\ p < .005;\ SN: \beta = -2.730,\ SE = 0.605,\ p < .001;\ DTT: \beta = -2.451,\ SE = 0.605,\ p < .001$). These patterns suggest that participants with more positive beliefs about NI were more likely to select NI than other available practices. Alternatively, as participants' beliefs about NI became less favorable, there was a greater likelihood a teacher would select a different practice for use.

Strength of effects. In multinomial logit modeling, one can interpret the strength of the effect by comparing the Beta values associated with each predictor. A participant's beliefs about PMI had the strongest effect ($\beta = 3.6137$) on their selection of PMI as compared to the effects of beliefs on other practice choices. This finding suggests how positively a participant feels about PMI may be more meaningful in predicting PMI or NI's selection than the beliefs about

other practices. Likewise, the effects of a teacher's beliefs about NI on selecting any practice other than NI were strongest for selecting PMI ($\beta = -4.5111$).

Prediction of Practice Selected as Last Choice. DTT was the reference group for all comparisons as the plurality of participants selected DTT last. Beliefs significantly predicted the selection of their last choice for scripting, NI, and SN. The log odds of a participant selecting one of these practices over DTT as their last choice decreased significantly for every one-unit increase in the associated beliefs. In other words, participants with more negative beliefs about SN, NI, or scripting were more likely to select that practice as their last choice than DTT ($Scripting: \beta = -1.6740,\ SE = 0.4824,\ p < .001;\ NI: \beta = -1.3887,\ SE = 0\ .0498,\ p < .001;\ SN: \beta = -1.6347,\ SE =\ 0.4095,\ p < .001$). These findings suggest that if ECSE teachers hold negative beliefs about some practices, they are less likely to select them for use.

Comparing the effects of beliefs about DTT on selection of last choice revealed that a participant's beliefs about DTT only predicted whether they would select scripting or SN practice over DTT. With every one unit increase in an ECSE teachers' beliefs about DTT (i.e., more positive beliefs), the log odds of selecting scripting ($\beta = 1.022,\ SE =\ 0.475, p < .05$) or SN ($\beta = 0.804,\ SE =\ 0.354, p < .05$) instead of DTT as their last choice significantly decreased. These findings suggest that, of the array of practice choices, if a teacher holds the most negative beliefs about DTT, they will likely select DTT as their last choice. As beliefs about DTT improve, they are more likely to select some other practices as last.

Strength of Effects. A participant's beliefs about scripting had the strongest effects ($\beta = -1.6741,\ SE = 0.4823$) on their selection of scripting as last choice compared to the effects of beliefs about other practices. This finding suggests that how negatively a participant feels about scripting may be more meaningful in predicting their selection of scripting or DTT than their

beliefs about other practices. Likewise, a teacher's beliefs about DTT had the strongest effects on selecting scripting rather than DTT last ($\beta = 1.0219,\ SE = 0.4750$).

Discussion and Implications for Implementation Practice and Research

Although intervention science has produced numerous EBPs for use by ECSE teachers (Purper et al., 2016; Wong et al., 2015), there is inconsistent adoption and use to promote meaningful improvements in outcomes for children with ASD (Brock et al., 2020). This study attempted to address existing voids in the research by examining individual-level determinants of ECSE teachers' practice selection (i.e., beliefs) to advance understanding of how to facilitate successful dissemination and implementation of effective practices. Using discrete choice analysis, this study examined the association between individual teachers' practice selections and malleable beliefs that serve as potential targets for tailored dissemination and implementation supports (Lyon et al., 2019). The significant variability in teachers' beliefs and the association between beliefs and practice selection provided evidence of the need to focus on individual-level factors during the adoption-decision stage of implementation to support teacher selection and use of effective practices for children with ASD. In particular, teachers' beliefs are likely to serve as important antecedents to behavior change, which are shaped by prior knowledge, experience, and contextualized use of those practices (Haney et al., 2002; Hayes et al., 2012).

Participants were presented with five evidence-based practices for use to address the social communication needs of a young student with ASD. Each of these practices is grounded in behavioral principles (Wong et al., 2015) and represents a suitable option for addressing the skills identified for the student in the vignette. However, there were differences across the practices on certain features, such as Naturalistic Intervention (NI) and DTT, highlighting the importance of teachers' beliefs and decision-making to inform practice selection (Duffy &

Healey, 2010). The differences in the practices teachers selected as their first and last choices supported the idea that there are likely beliefs that underpin teachers' intentions to use specific practices, which has been observed in other studies (Bonetti et al., 2005; Fishman et al., 2018). Narrative rationales for why teachers selected a practice first or last were obtained. Interestingly, while some teachers described selecting a practice first for a certain reason (e.g., DTT is structured which helps eliminate distractions), other teachers indicated a similar reason for selecting it last (e.g., DTT is too structured for this age group). Beyond noting differences between the likelihood that teachers selected particular practices, this variability speaks to the notion of equifinality, which suggests there may be different pathways to the same end destination (Cichetti, 1996); In this case, the possibility of achieving the same desired child outcome through the use of different practices that align with teachers' beliefs and intentions (Kretlow & Helf, 2013, Proctor et al., 2011). Future research should explore the idea of supporting implementers in using practices that match their beliefs resulting in the same outcome for children with the same underlying need.

Understanding Patterns in ECSE Teachers' Practice Selection

ECSE teachers most often selected NI first and DTT last. Exploring the similarities and differences between these two practices reveals potential selection mechanisms that may enhance understanding of the limited implementation of specific practices (Locke et al., 2018). Although both practices are rooted in behavioral principles (Wong et al., 2019), from teachers' perspectives, different ways in which the practices apply these principles (e.g., in adult or child-led activities) may magnify their differences. Highlighting the divergence between NI and DTT may offer insight into factors not measured in this study (e.g., teaching pedagogy, classroom context) that may relate to teachers' beliefs and, thus, their practice selections (Jennett et al.,

2003). Further, these practices represent opposing anchors of two different instructional continua in early childhood: whether a practice is adult vs child-directed and embedded in natural activities or delivered separately. NI entails the adult capitalizing on child-led activities and motivations and embedding learning trials into existing routines and activities using natural reinforcement (Harjusola-Webb & Robbins, 2012; Mancil, 2009). In contrast, DTT is adult-directed, structured, and prescriptive. Although there have been efforts to embed DTT into play-based activities (Geiger et al., 2012), the practice has a history of being considered less generalizable to the natural context (Mesibov et al., 2005). While these findings may be interpreted to mean that teachers overall prefer NI to DTT, it is essential to note the individual differences that this study exposed—a portion of this sample selected DTT first (15.8%), and NI last (13%). Together, these findings stress the need to inquire into how practice features may interact with teachers' beliefs and prior experience to influence their selection decisions.

Preschool Teachers' Beliefs about Key EBPs

In this study, teachers' beliefs often differed significantly between practices and predicted practice selection, confirming their value in predicting intentions together and separately (Ajzen, 1991; Lyon et al., 2019). Each belief factor may provide unique information for the development of implementation supports (Cook et al., 2015). The independent and combined contributions of the beliefs warrant further exploration (Prenger & Schildkamp, 2018). By leveraging the study findings, researchers may tailor dissemination and implementation supports based on how each belief individually contributes to teachers' selection. Specifically, self-efficacy may increase with Behavioral Skills Training (Brock & Carter, 2017), subjective norms may improve through key opinion leaders and influential peers describing the benefits of their use of the practice (Rogers,

2005), and attitudes may rise through knowledge promotion about the expected outcomes expected as a result of using a particular practice (i.e., outcome expectancies; Cook et al., 2015).

Beliefs as Determinants of Practice Selections

Given that ECSE teachers' selections of first choice were dependent on how positive their beliefs were about each practice and that their last choice depended on how negative their beliefs were, it is pivotal to understand both poles of this continuum. Consistent with demonstrations that intention relates to implementation (Bonetti et al., 2005; Prenger & Schildkamp, 2018), teachers are likely to demonstrate improved implementation for practices they select and hold positive beliefs about. Supporting the use of practices about which teachers have positive beliefs may serve to focus on stimulating the use of a few key EBPs rather than expecting teachers to implement all EBPs (Locke et al., 2018). In contrast, if a teacher is struggling to use a given EBP, gathering information about their beliefs may be an initial step to tailoring implementation supports in the form of follow-up training or coaching for that teacher (Fishman et al., 2018).

Highlighting negative beliefs and their impact on inhibiting selection of a practice may inform how researchers consider the development of effective practices and dissemination strategies. Knowing that teachers feel more negatively about specific practices could inform what practices need (a) further work to adapt them to be perceived more positively, (b) tailored dissemination strategies to address specific belief barriers, or (c) tailored implementation supports to address contextual barriers that may be associated with specific belief barriers (e.g., lack of self-efficacy given competing demands). For example, DTT was the practice for which teachers held the most negative beliefs, were least likely to select first, and most often indicated they would not try. Given that there are situations in which a specific practice is likely the most effective for achieving an intended outcome, which some ASD researchers have argued is the

case for DTT (Sturmey, 2011), there is an opportunity to consider how negative beliefs may inform new approaches to dissemination and implementation. For example, empirical guidance on adapting DTT to be more usable in different preschool routines may facilitate more positive beliefs among teachers who are the expected implementers. Similarly, dissemination and implementation supports tailored to address negative beliefs may promote implementation of a broader array of practices or the selection of the right practice for the situation with a given student. If there are only a few practices to select from and teachers feel negatively about them, tailored dissemination or implementation supports may be necessary to promote more positive beliefs. When a teacher holds negative beliefs about a practice, efforts to counteract negative beliefs may improve implementation (Fishman et al., 2018; Lyon et al., 2019).

Limitations & Future Directions

As with all studies, this study has limitations rooted in methodological decisions made to balance a pragmatic and rigorous approach that are important to consider when interpreting the findings. First, this study is correlational in nature with findings not demonstrating causality. Second, the sampling procedure did not guarantee a random sample (Nardi, 2014). Third, because these questionnaire items were not validated beyond Think-Aloud protocols with former ECSE teachers, there may be threats to convergent and discriminant validity (Agarwal, 2011). Fourth, using discrete choice analysis to test the effects of beliefs limited the opportunity to explore whether teachers would select multiple practices simultaneously or select practices that augment comprehensive models (Odom et al., 2010), future research could take a qualitative approach to eliminate quantitative constraints by allowing educators the opportunity to respond by describing their practice use (Brock et al., 2020). Fifth, though there were statistically significant differences in the group's ratings of some beliefs (i.e., lower ratings of Discrete Trial

Teaching) and these beliefs predicted their selection, we have yet to test whether there is meaningful difference that relates to actual decision-making for students. Finally, although this study was designed to reduce potential influences of factors that are beyond a teacher's control (e.g., practices that are cost prohibitive), decision-making and implementation do not occur in a vacuum. Future research would benefit from exploring individual and organizational level factors and their possible composite and dynamic interactions (Cook et al., 2015; Locke et al., 2018) and incorporate teachers' many considerations including their knowledge of and familiarity with practices (Knight et al., 2018) in a more authentic context.

This study offers value-added contribution to literature focused on addressing the implementation gap in ECSE. Future research and implementation efforts can leverage the influence of beliefs to advance the implementation of EBPs in ways that accelerate learning for young children with ASD. As is the case that careful matching of an intervention to an individual student's needs results in effective and efficient skill acquisition, adapting dissemination and implementation supports to teachers' needs, preferences, and beliefs may be a means to minimize resource waste and facilitate implementation that results in a greater number of young children with ASD accessing the experiences and supports they need (August et al., 2010). Effective tailoring may operate on the "homogeneity within the heterogeneity" (Cook, 2020) observed in this study such that there may be profiles developed of teachers based on factors (i.e., beliefs, preferences) that help guide what implementation interventions may be effective for whom.

Beyond tailoring, this study calls for more attention directed toward teachers' decision-making process with a specific call to incorporate selection into professional development and intervention efficacy research as an immediate step toward more rapid adoption and implementation of EBPs. Implementation scientists' desire to promote effective practice in

community-based settings drives study development and professional development efforts (Lyon, 2017; Mandell, 2020; Odom et al., 2013). Nevertheless, intervention studies often are designed to test the effects of practices chosen by researchers, perhaps impairing school-based implementation from the start. Because beliefs influence selection decisions, in instances when professional development providers or researchers recognize a few or more practices may be effective, a menu of choices should be offered. This call is both practical and grounded in research. First, in actual practice, the role of special educators includes making practice selection decisions individualized to students (Fuchs & Fuchs, 1995). Second, when teachers exert their preferences in practice decision-making, they are more motivated to use their selected practice with better fidelity and sustainability (Johnson et al., 2014; Wills & Holmes-Rovner, 2006). The blending of social-cognitive and behavioral models has the potential to improve implementation by allowing the implementer to exert their preference and act on their beliefs within research or professional development circumstances (August et al., 2010).

Conclusion

EBPs are only effective if teachers select and implement them well. Because autistic students are not making adequate social communication progress (Brock et al., 2020), focusing attention on supporting ECSE teachers' implementation of key EBPs that are infrequently used but require minimal resources may reduce the implementation gap. ECSE teachers must have multiple "tools" in their toolbox (Kasari & Smith, 2013). Yet, this study suggests that the toolboxes teachers develop are associated with the beliefs they possess about the practice itself. Just as teachers should consider student and contextual fit of interventions, professional development providers and implementation researchers should explore tailoring their dissemination strategies and implementation supports to individual teachers' beliefs that are

promotive of selection decisions and use (Cook, 2020; Fishman et al., 2018). In so doing, researchers and professional development providers may facilitate teachers' adoption and use of practices that increase the likelihood of promoting better outcomes for young children with ASD**.**

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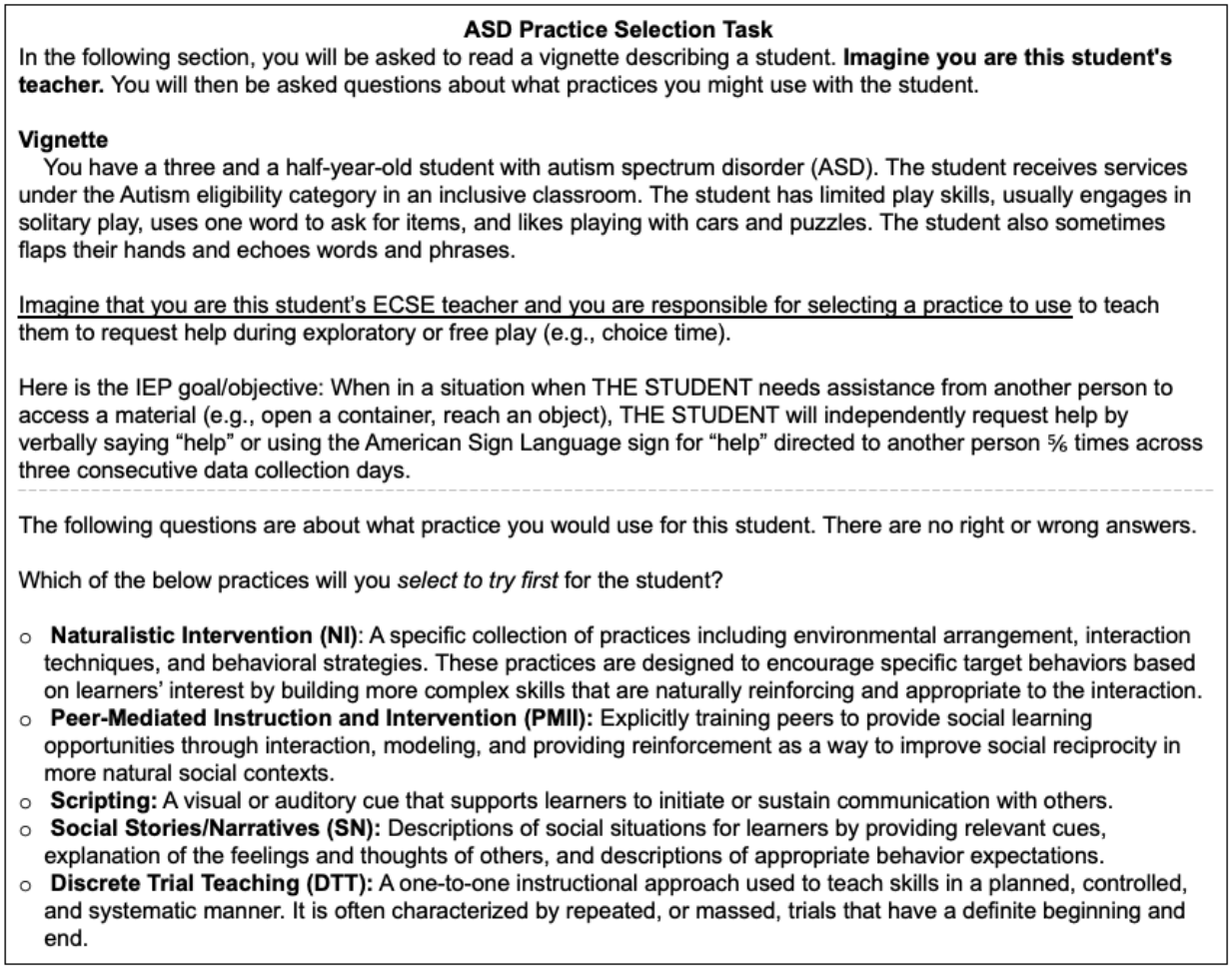
Figure 1.

Sample of the ASD Practice Selection Task



ASD Practice Selection Task

In the following section, you will be asked to read a vignette describing a student. **Imagine you are this student's teacher.** You will then be asked questions about what practices you might use with the student.

Vignette

You have a three and a half-year-old student with autism spectrum disorder (ASD). The student receives services under the Autism eligibility category in an inclusive classroom. The student has limited play skills, usually engages in solitary play, uses one word to ask for items, and likes playing with cars and puzzles. The student also sometimes flaps their hands and echoes words and phrases.

Imagine that you are this student's ECSE teacher and you are responsible for selecting a practice to use to teach them to request help during exploratory or free play (e.g., choice time).

Here is the IEP goal/objective: When in a situation when THE STUDENT needs assistance from another person to access a material (e.g., open a container, reach an object), THE STUDENT will independently request help by verbally saying "help" or using the American Sign Language sign for "help" directed to another person ⅘ times across three consecutive data collection days.

The following questions are about what practice you would use for this student. There are no right or wrong answers.

Which of the below practices will you *select to try first* for the student?

- **Naturalistic Intervention (NI)**: A specific collection of practices including environmental arrangement, interaction techniques, and behavioral strategies. These practices are designed to encourage specific target behaviors based on learners' interest by building more complex skills that are naturally reinforcing and appropriate to the interaction.
- **Peer-Mediated Instruction and Intervention (PMII):** Explicitly training peers to provide social learning opportunities through interaction, modeling, and providing reinforcement as a way to improve social reciprocity in more natural social contexts.
- **Scripting:** A visual or auditory cue that supports learners to initiate or sustain communication with others.
- **Social Stories/Narratives (SN):** Descriptions of social situations for learners by providing relevant cues, explanation of the feelings and thoughts of others, and descriptions of appropriate behavior expectations.
- **Discrete Trial Teaching (DTT):** A one-to-one instructional approach used to teach skills in a planned, controlled, and systematic manner. It is often characterized by repeated, or massed, trials that have a definite beginning and end.

Note. Sample of part of the ASD Practice Selection Task to illustrate the vignette and practice options. Each practice was presented with a description derived from the National Professional Development Center (NPDC) and the Texas Statewide Leadership for Autism Training's Texas Autism Resource Guide for Effective Teaching (TARGET) and aligning with researcher definitions (Wong et al., 2015).

Table 1.

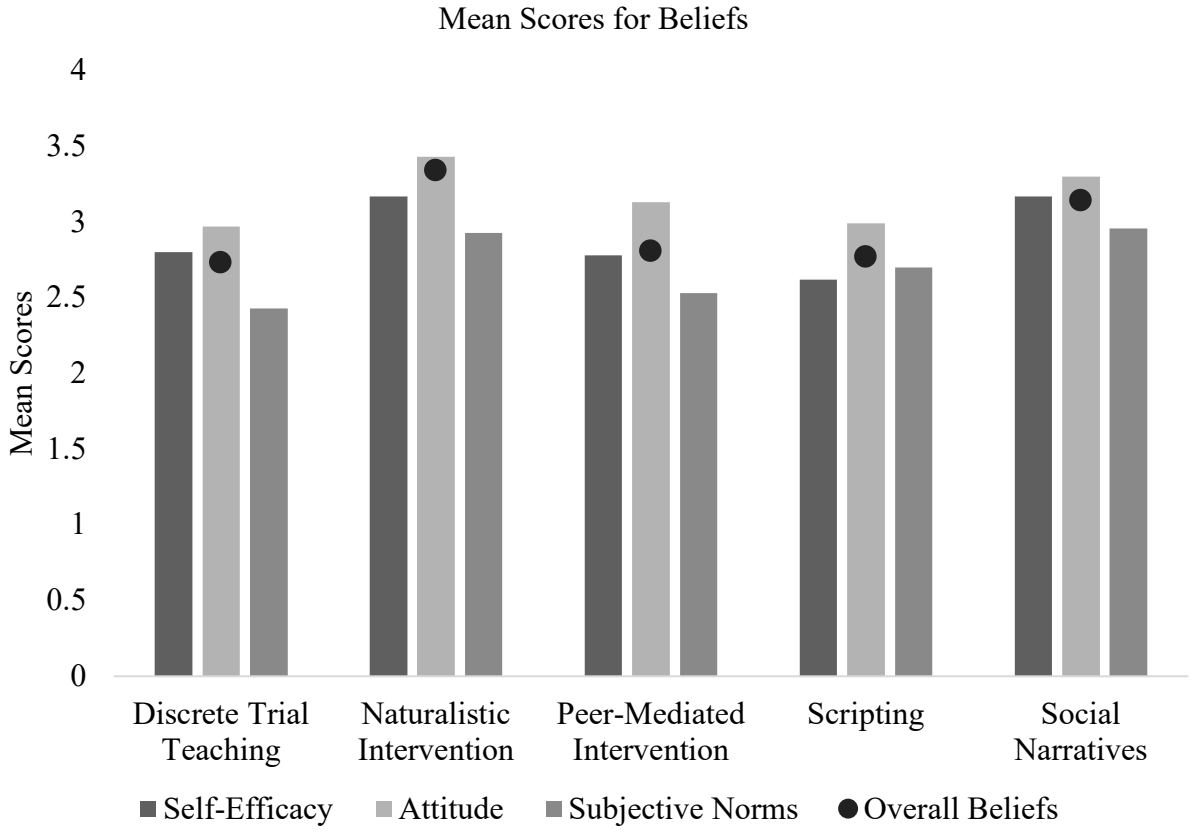
Participant Demographic Information

	Demographic Information	***n***	**%**		
Initial License Type	Deaf/Hard of Hearing	1	0.5		
	Early Childhood Special Education	155	69.8		
	Emotional/Behavioral Disorders	6	2.7		
	General Education	71	32		
	High Incidence	4	1.8		
	Learning Disabilities	11	5		
	Low Incidence	3	1.4		
	Moderate/Severe	19	8.6		
	Other	26	11.7		
Years Licensed & Working in Preschool		**Licensed**		**Preschool**	
		n	**%**	***n***	**%**
	<1 Year	17	7.7	19	8.6
	1-3 Years	35	15.8	41	18.5
	4-8 Years	62	27.9	65	29.3
	9-13 Years	44	19.8	47	21.2
	14-18 Years	26	11.7	21	9.5
	19-23 Years	19	8.6	17	7.7
	>23 Years	19	8.6	12	5.4

Note. $N = 222$

Figure 2.

Mean Beliefs Factor Ratings and Overall Ratings by Practice



Note. DTT= Discrete Trial Teaching, NI= Naturalistic Intervention, PMII= Peer-Mediated Instruction and Intervention, Script= Scripting, SN= Social Narratives

Figure 3.

Proportions of Practices Selected First and Last Choice