Exploring Determinants of Early Childhood Special Educators' Practice Selections
for Young Children with Autism Spectrum Disorder

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Table of Contents

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Abstract

Evidence-Based Practices (EBPs) can only improve children's outcomes when implemented. There is much to still learn about Early Childhood Special Education (ECSE) teachers' implementation of EBPs when it comes to their selection and use of practices to facilitate social communication development for children with autism spectrum disorder (ASD). Understanding what practices teachers consider for use can inform the development of implementation supports at the initial Exploration and Adoption-Decision stages of implementation. To detect malleable determinants of practice selection, this study addressed these aims: (a) identify ECSE teachers' familiarity and current use of EBPs and unsubstantiated practices, (b) identify their practice selections, and (c) determine whether teachers' beliefs predicted practice selections. A web-based survey gathered responses from 222 ECSE teachers related to these objectives. Overall, teachers' familiarity with and current use of EBPs and unsubstantiated practices varied. Most teachers were highly familiar with and often used certain EBPs (e.g., reinforcement), and fewer teachers used others despite familiarity (e.g., discrete trial teaching). Aligned with the Theory of Planned Behavior, the researcher ascertained teachers' beliefs (self-efficacy, attitude, subjective norms) about EBPs. Teachers' had the most positive overall beliefs for naturalistic intervention and least for discrete trial teaching. The researcher used Discrete Choice Analysis, a method of exploring individuals' choices, to investigate teachers' selection decisions, and to find that beliefs predicted their practice selections. Together, these findings suggest that there are individual determinants of practice selection that can be acted on by tailoring pre-implementation supports to improve implementation from the start.

List of Tables

iv

List of Figures

Chapter 1 - Introduction

For young children with autism spectrum disorder (ASD), there is no "one-size fits all" approach to intervention. Instead, educators and service providers select individual practices to teach critical skills to each child to improve their future quality of life (Lubas et al., 2016). Unfortunately, despite the availability of evidence-based practices (Wong et al., 2015), many children with ASD are not entering kindergarten with the necessary skills for school success (Lloyd et al., 2009) and have poor outcomes in adulthood (Chen et al., 2015). Explaining why education systems are not producing better outcomes requires understanding if there are inadequate interventions or inadequate implementation of effective interventions (Proctor, 2011). Before assuming that failures in producing desired child outcomes can be attributed to an intervention, it is necessary first to understand factors associated with the implementation of interventions (Proctor et al., 2009). Educators working with young children with ASD need to make decisions about which practice to implement to teach different skills for different children. This is a complex decision-making process that precedes their actual implementation of an intervention and may serve as a critical time during which implementation supports may improve later implementation and sustainment of evidence-based practices. To begin to examine that decision-making as it relates to the diverse needs and skills of young children with ASD, focusing on a range of intervention practices and addressing a variety of children's skills is required.

Evidence-Based Practices for Students with ASD

Evidence-based practices (EBPs) are "instructional techniques with meaningful research supporting their effectiveness that represent critical tools in bridging the

research to practice gap and improving student outcomes" (Cook & Cook, 2013 p.71). For young students with ASD, EBPs are designed to address their primary areas of need; social communication (SC) skills, and restricted and repetitive patterns of behavior, interests, or activities (American Psychological Association, 2013). Both the Individuals with Disabilities Education Improvement Act (IDEIA, 2004) and No Child Left Behind Act (NCLB, 2002) mandate EBP use for students with disabilities. In order for EBPs to improve outcomes for students with ASD, however, there must be proper implementation (Durlak & Dupre, 2009; Fixsen et al., 2009). Researchers and organizations have focused on establishing the evidence-base for interventions for students with ASD (National Professional Development Center on ASD [NPDC], National Autism Center [NAC], 2009). Nevertheless, the implementation of these practices is limited. Unfortunately, many practitioners report that they do not frequently use many EBPs and are not confident in implementing them for students with ASD (Brock, et al., 2014; Morrier et al., 2011; McNeill, 2019).

Studying the use of a specific type of EBPs, *focused intervention practices* (FIPs), used to address SC needs of students with ASD, may be necessary to reduce the implementation gap and thereby improve SC outcomes for people with ASD. Autism researchers have evaluated the efficacy of interventions for students with ASD and found 20 evidence-based FIPs to teach SC skills to young children with ASD (Wong et al., 2015). These include practices such as discrete trial teaching, reinforcement, scripting, and peer-mediated instruction and intervention. FIPs may be more readily usable by teachers than complex, multi-component practices that a school-system may choose for use (i.e., comprehensive treatment models such as Strategies for Teaching based on

Autism Research; [STAR] or Structured TEACCHing). FIPs require minimal physical resources (i.e., no need to purchase trademarked curriculum materials) and no administrator approval to access cumbersome training and coaching (Wilson & Landa, 2019). They are simple, and can be used to teach one specific skill (e.g., using a visual script to teach a child how to initiate a play interaction by asking "can we play?"). Despite their evidence-base and relative ease of implementation as compared to comprehensive treatment models, teachers report minimal use of many of these practices for students with ASD. This implementation gap is concerning given their apparent need as students with ASD are still not making adequate gains in their social communication development (Brock et al., 2014; McNeill, 2019; Morrier et al., 2011).

Within the category of FIPs there are different types of practices that vary in their complexity and application. Importantly, they are also not mutually exclusive from one another. Two recent studies showed an increase in kindergarten-twelfth-grade special education teachers' reported use of the most foundational, and simplest, FIPs; reinforcement, visual supports, modeling, and prompting procedures (Brock et al., 2019; McNeill, 2019). Although teachers report using them frequently, some of these same teachers report that most of their students are not meeting their annual Individualized Education Plan goals (Brock et al., 2019). These FIPs are components of implementing other, more complex, FIPs including discrete trial teaching, naturalistic intervention, and peer-mediated instruction and intervention. These practices incorporate contextual information and content as well as the use of prompting procedures, modeling, reinforcement and visual supports into their implementation steps (Wong et al., 2015).

The implementation gap of these FIPs is concerning and may contribute to the poor outcomes for children with ASD.

Prioritizing Improved Implementation of FIPs for Critical Skills

Social communication skills are critical for independence and are considered an essential Human Right (Convention on the Rights of the Child, 1989). These skills build capacity and increase access to opportunities for people with ASD from infancy through adulthood; from expressing needs to caregivers, understanding and expressing oneself in school, building and maintaining relationships, engaging in social activities, to securing and maintaining a job and advocating for one's needs in society. Although kindergarten-twelfth-grade teachers of students with significant disabilities report academic outcomes as their highest priorities (Brock et al., 2019), social communication should not be overlooked as they facilitate academic skills. Therefore, making as much gain in social communication development during preschool pays off in future educational opportunities. Because SC is a primary area of need for young children with ASD, researchers and practitioners have dedicated many years of work to developing and validating interventions to address this core deficit (for reviews see Duffy & Healy, 2011; McConnell, 2002). Combined with the knowledge that early language exposure and responsive relationships are crucial to developing social-emotional and language competencies for all children—the SC needs of young children with ASD exacerbating this—the lack of social communication opportunities young children with ASD in preschool settings experience is concerning (Boyd et al., 2008). With scaled implementation of FIPs, the potential for young children with ASD in their early and later

years can be fully realized. Understanding if, how, and why EBPs that show fast and effective research results are selected and implemented is essential.

Understanding Implementation of FIPs: Starting at the Beginning

Because research suggests there is a disparity between the abundance of available FIPs and teachers' minimal use of these practices, it is imperative to understand how to facilitate the use of FIPs. Research in other fields shows that implementation efforts are often unsuccessful in the long-term, even with significant resources (Damschroder et al., 2009; Powell et al., 2014). A new approach to improving implementation is needed. One option is to focus on a different stage of the implementation process. Though the majority of research studies evaluating implementation of EBPs for students with ASD focus on the implementation and sustainment phases (e.g., Fishman et al., 2018; Locke et al., 2018), there is minimal information regarding the necessary precursor to adoption and implementation—the selection decision. As the first school-based providers for young children with ASD and therefore having little or no information on the history of effectiveness of classroom-based interventions or approaches for a specific child, ECSE teachers are in a unique position when selecting a practice that necessitates exploration. Examining the origin of practice implementation by focusing on how special educators *select* a practice to use is a novel approach to understanding and reducing the implementation gap. It is at this initial "adoption-decision" stage (Aarons et al., 2011), when a teacher may decide against using a practice, resulting in no implementation, or decide to implement a practice, resulting in a broad array of possible outcomes and experiences that may influence future decision making.

Statement of the Problem

Though EBP implementation has become a national educational imperative (Institute for Education Sciences, 2019), research has paid little attention to the intervention decisions teachers make and what factors may influence such decisions. Within the Adoption-Decision stage, a teacher's practice selection can be likened to developing an *intention* to use a practice (i.e., a person stating that they are going to do something). Although the ASD implementation research primarily focuses on practices selected by researchers (Fishman et al., 2018; Locke et al., 2018), in practice, ECSE teachers face instructional decisions throughout the school year that they make independently or with professional development support or administrative guidance. Despite this discrepancy, only teachers' reported use of a practice, not their intention, or selection of a practice has been documented in the research literature. As such, there is a need for understanding the factors that predict intention, which may serve as critical mechanisms in promoting implementation of EBPs prior to the use of a practice (Cook et al., 2015; Lyon et al., 2019).

As shown in research on individuals engaging in other types of behavior change (e.g., people with addictions changing their alcohol use), individual factors such as an individual's beliefs, current behavior, and knowledge of practice options, could explain both whether an individual develops an intention and the strength of an intention (i.e., how motivated they are to act on the intention; Ajzen, 1991). Knowing that people may only make choices from sets of practices with which they are familiar or knowledgeable, more information is also needed to adequately characterize ECSE teachers' familiarity with and use of practices to address SC needs of young children with ASD (Brock et al., 2019). In addition, a teachers' individual beliefs about a practice may influence what they

select to use, how well they use it (i.e., the degree of fidelity of implementation; Cook et al., 2015), and whether they continue to use it over time whenever it is needed (Fishman et al., 2018).

Although individual beliefs, such as their attitude, have been explored regarding specific FIPs, limited research has explored the combined effects of beliefs on teachers' implementation of EBPs. Theories are needed at the inception of a research study, rather than used retrospectively to interpret and explain findings (Lynch et al., 2018). The Theory of Planned Behavior (TPB; Ajzen, 1991) is an explanatory theory that describes how perceived behavioral control (i.e., self-efficacy), attitude, and subjective norms predict a person's intention. Together, these beliefs account for a substantial portion of the difference in intentions between individuals (Davis et al., 2015), yet remain rarely investigated within special education (Cook et al., 2015; Fishman et al. 2018, Lyon et al., 2019; Ruble et al.,2018) and not at all within ECSE. Though few studies have focused on how the TPB explains or predicts intention and implementation of EBPs in special education (Cook et al., 2015; Fishman et al. 2018, Lyon et al., 2019; Ruble et al., 2018), the findings from these studies suggest that the TPB may explain teachers' selection of EBPs. Taken together, the research suggests that beliefs are malleable (Cook et al., 2015), practice-specific (Fishman et al., 2018), and associated with implementation of evidence-based practices in special education (Lyon et al., 2018).

Study Purpose

The selection and use of a practice is ultimately dependent on the individual implementing the practice. Therefore, there is a need to understand ECSE teachers' current practice use (Brock et al., 2019) and factors that influence their selection of key

FIPs that can promote SC development for young children with ASD. As beliefs are malleable factors that may serve as mechanisms for selection, adoption, and full implementation and sustainment of EBPs (Cook et al., 2015; Lyon et al., 2019), the following priorities require research attention; a) promoting selection of EBPs about which teachers hold positive beliefs, and b) understanding the factors relating to teachers' negative beliefs about other EBPs. This information may guide professional development providers and researchers in tailoring implementation supports to increase and improve the use of EBPs.

With the intent to discover key tailoring factors for the development of implementation supports, this study, grounded in the Theory of Planned Behavior, explored teacher's familiarity with and current use of SC practices, and whether beliefs predict teachers' selection of EBPs. The purpose of this study was to investigate ECSE teachers' practice selection and determinants of their selection by addressing the following questions:

1. What proportion of ECSE teachers are familiar with evidence-based and unsubstantiated SC practices? Which practices do they report using?

2. What is the distribution of practices ECSE teachers selected to try first and least likely to try to address an SC need of a student with ASD?

3. What are ECSE teachers' beliefs (self-efficacy, attitude, subjective norms) about key EBPs used to address an SC need of a student with ASD?

4. Do beliefs about key SC practices predict practice selection of an EBP used to address an SC need of a student with ASD?

Dissertation Organization

Following this introductory chapter, this dissertation is organized into four chapters. Chapter Two presents the current state of research on FIP use by ECSE teachers and the need to study factors that explain teachers' practice selection. Chapter Three includes a detailed description of the methodological procedures for this study. Chapter Four includes the results of the study concerning the research questions. Finally, Chapter Five provides a thorough discussion of the findings as they relate to future research imperatives and implications for research and practice in light of study limitations.

Chapter 2 - Literature Review

For young children with ASD, social communication skills are both facilitated by and facilitative of skill acquisition through the use of evidence-based practices (EBPs). The limited selection and use of various EBPs by special educators (e.g., Brock et al., 2019; McNeill, 2019) may explain the poor SC and long-term outcomes for students with ASD (Chen et al., 2015). This implementation gap is a priority for researchers, who have worked to identify and address barriers to implementation at the system and individual educator levels. Nevertheless, there is minimal evidence of EBPs implementation in authentic settings outside of the research context, and that implementation of EBPs is sustained once research studies close (Alexander et al., 2015; Fishman et al., 2018). The gap persists. Shifting the research focus to special educators' *selection* of a practice, which is when they choose a practice from available options to address a specific child's need, should be a priority. Exploring their decision-making regarding which practice to use, and what factors influence this selection, rather than focusing on the implementation of pre-determined practices, may offer a new approach to promoting implementation and sustainment of EBPs.

Purpose

With the intent to inform the development of implementation supports for teachers, this chapter presents an exploration of the literature on special educators' decision-making preceding their selection of a practice and what factors influence this process. When the focus is on individual educators as they consider adopting a new SC practice for a young child with ASD, their contemplation (i.e., how they consider available practices) and the internal factors influencing their practice selection are

essential. With the aim of reducing the research-to-practice gap, this chapter also investigates early childhood special education (ECSE) teachers' practice selection and proposes opportunities for future research. Exploring teachers' current practice use and how their beliefs impede or facilitate their selection of a new practice is imperative to understanding the intricacies of their contemplation of available practices fully.

In this chapter, the researcher explores existing theoretical and empirical literature that contributes to our current understanding of ECSE teachers' selection of practices used to promote SC skills for young children with ASD. Before exploring an ECSE teacher's contemplation process that leads to their selection of a new practice, the researcher provides the rationale for the need to target individual ECSE teachers' selection of focused intervention practices that are evidence-based. Next, the contemplation process is described in relation to selection guidance and current practice use. Then, the Theory of Planned Behavior (TPB; Ajzen, 1991), an empirically supported theory explaining how beliefs motivate a person to intend to use a behavior or practice, will be discussed as a framework for understanding the impact of beliefs on selection. Finally, specific directions for future implementation research on ECSE teachers' contemplation of new practices grounded in the TPB are proposed in an effort to facilitate ECSE teachers' selection and implementation of EBPs.

Evidence-Based Practices for ASD

Implementing EBPs is an educational and policy imperative. Legislative and Federal funds are dedicated to ensuring widespread use of EBPs for students with Disabilities (IDEIA, 2004; NCLB, 2002). Yet, mandating EBPs is likely an inadequate effort to ensuring EBP use in and of itself. Professional development organizations,

institutes of higher education, teacher preparation programs, and district and school administration must all work together to ensure teachers are both aware of EBPs and know how to use them. Unfortunately, there is uneven uptake and use of EBPs for students with ASD, and no studies providing the use of EBPs for preschool-aged children with ASD (Brock et al., 2014; Morrier et al., 2011).

Two organizations, the National Professional Development Center on ASD (NPDC) and the National Autism Center (NAC; 2009) have surveyed, reviewed, and analyzed the methods and results of existing research to distinguish among practices that have sufficient evidence of effectiveness (i.e., EBPs). They have identified groups of practices, those that do not have enough research and are unsubstantiated, and those that have been researched but show limited or no positive effects. The NAC identified evidence-based, *comprehensive treatment models*, which are packaged interventions that consist of many *focused intervention practices (FIPs)*. FIPs identified as evidence-based by the NPDC review are the focus of this study. Comprehensive treatment models align with a theoretical background and target core ASD deficits (e.g., Early Start Denver Model, Structured TEACCHing) are not the focus of this study as they are multicomponent and thus require complex implementation systems and supports and are distilled down to different combinations of FIPs (Chorpita et al., 2005).

EBPs to Target for Implementation Research: Focused Intervention Practices

Practitioners' selections of FIPs should be a target of research for both practical and theoretical reasons. As a category of EBPs, FIPs include practices such as, discrete trial teaching, reinforcement, modeling, and naturalistic interventions. Because of their short-term use, ability to address a specific core deficit of ASD, and simple

implementation as compared to comprehensive treatment models, there is reason to believe that they are feasible and usable interventions for practitioners to implement without substantial resources. Compared to comprehensive treatment models, implementing a FIP requires fewer resources to implement (e.g., no need for administrator approval and cumbersome training and coaching; Wilson & Landa, 2019), thereby reducing barriers to selection and implementation. For the remainder of this dissertation, the EBPs described will be FIPs, unless otherwise specified. FIPs have empirical support for their use in addressing the primary areas of need for children with ASD: social communication skills and restricted and repetitive patterns of behavior or interests.

Prioritizing Implementation of Social Communication EBPs for Children with ASD

Social-communication skills are a core deficit for children with ASD. Young children with ASD may have limited spoken language, atypical prosody, irregularities initiating and using eye contact for interactions, or limited gestures, a combination of these differences, or other communication differences. Social skills inherently require communication and are often studied in relation to peer interactions, including, but not limited to, initiating and joining play activities or understanding others' emotions. Likewise, communication is inherently social as the act of communicating requires a partner. Communication skills that have been targeted for intervention for young children with ASD include spoken language, verbal responses using a communication device, and requesting assistance. Historically, social and communication skills have often been studied separately; however, intervention practices that are used for these two skills almost entirely overlap in their uses and evidence supporting both skills (Wong et al.,

2015; see Table 1). Social and communication abilities were combined as one deficit area for an ASD diagnosis (American Psychiatric Association, 2013). This overlap, combined with the inherently social nature of communication, supports the combination of these skills and interventions as one category for this study.

There are several SC interventions considered to be EBPs. The NPDC synthesized the experimental intervention research on FIPs for children with ASD and further categorized evidence based on whether there was enough evidence for a practice to be considered an EBP for a specific skill area (e.g., social) and age range (e.g., birth to five years old). The NPDC found 20 of the 27 EBPs met criteria to be considered evidence-based for addressing SC needs of young children up to five-years-old (see Table 1). Johnson and colleagues (2017) evaluated the studies used within the NPDC review for reporting practices regarding student and interventionist characteristics. They found that 12 of the practices had "stand-alone" evidence of effectiveness in the category of SC skills (*n* = 12, see Table 1), indicating that the research articles supporting them provided sufficient information for ECSE teachers to translating their use to their own students.

Table 1.

Social Communication Practices with an Evidence-Base for Children Ages Birth-Five

	Social	Communication	Stand Alone Evidence
Antecedent-Behavioral Intervention	X	X	X
Communication Extinction		X	
Differential Reinforcement of Alternative, Incompatible, or Other Behavior	X	X	X
Discrete Trial Teaching	X	X	X
Functional Communication Training	X	X	
Modeling	X	X	
Naturalistic Intervention	X	X	X

Peer Mediated Instruction and Intervention	X	X	X
Picture Exchange Communication System (PECS)	X	X	
Pivotal Response Training	X	X	X
Prompting	X	X	X
Reinforcement	X	X	X
Response Interruption/Redirection	X	X	
Scripting	X	X	
Social Narratives	X	X	
Social Skills Training	X	X	X
Technology Aided Instruction and Intervention	X	X	X
Time Delay	X	X	
Video Modeling	X	X	X
Visual Supports	X	X	X

Note. X indicates this practice is considered evidence-based for the corresponding category.

Limited Use of EBPs

Despite the promise of feasible evidence-based FIPs for SC skills, there is not widespread, regular use of these practices. Through an initial exploration of the implementation gap for children with ASD, Hess and colleagues (2008) surveyed practitioners and found that fewer than 15% of respondents used any SC EBPs. Similarly, Odom, Cox & Brock (2013) reported on the use of EBPs for SC for teachers of students with ASD and found that, before receiving coaching and professional development, fewer than half of the teachers in their study reported using the EBPs of prompting, visual schedules, and reinforcement. Likewise, Morrier and colleagues (2011) surveyed teachers and found that fewer than 5% reported using EBPs for students with ASD. In a more recent survey study, educators reported more frequent use of EBPs than practices that are not evidence-based, but the researchers still found that many EBPs (e.g., Social Narratives and Picture Exchange Communication System; PECS) were infrequently used

and the use of all practices varied across educators (Knight et al., 2018). In a more recent study surveying kindergarten-twelfth-grade special education teachers, teachers described their use of some EBPs frequently than in the past; however, many EBPs remain unused by this group of teachers, and there is no information on ECSE teachers' current use of EBPs (Brock et al., 2019; McNeill, 2019).

Minimal use of EBPs may be related to inadequate training on EBPs. Teachers report limited training, knowledge, and implementation of many empirically supported SC practices for students with ASD (Hendricks, 2011; Hess et al., 2008; McNeill, 2019). Hendricks (2011) surveyed over four hundred special educators, half of whom served students with ASD in early childhood and elementary and found that they had low to intermediate levels (i.e., statistical means of 2-3 on a 1-5 scale) of implementation of the practices in the following categories; individualization and support strategies, communication, social skills, behavior, and sensory-motor development. Despite social skills being a primary area of need for students with ASD, it was the area that teachers had the lowest level of knowledge. Consistent with other studies (McNeill, 2019), in this study, knowledge directly related to implementation, as there was also low-frequency implementation for communication and social skills interventions. Knowledge, however, does not compel implementation or a preference for a practice. In a recent study on pre-service teachers' likelihood to use or recommend EBPs and unsubstantiated practices for students with ASD, Hugh, Johnson & Fleury, (in press), found that familiarity with a practice did not relate to their likelihood to use or recommend for every practice included in the study.

There is an encouraging trend toward using some FIPs for students with ASD reported in recent studies for teachers who work with older students (Brock et al., 2019; McNeill, 2019). Nevertheless, the use of some EBPs remains low (e.g., discrete trial teaching, Peer-Mediated Instruction and Intervention), and little is known about the need for these different practices to improve children's outcomes. According to teachers' reports in previous studies, reinforcement, prompting, modeling, and visual supports were used most frequently (Brock et al., 2014; Brock et al., 2019; McNeill, 2019; Morrier et al., 2011), yet outcomes remain dismal for people with autism as they grow into adulthood (Orsmond et al., 2013). Although this may be an issue of deficient implementation of these practices, it may also speak to those frequently used FIPs being insufficient when used on their own. Other FIPs (e.g., peer-mediated instruction and intervention, discrete trial teaching, naturalistic intervention) incorporate the use of these most frequently used EBPs within their implementation by systematically providing and removing prompts (including modeling and visual supports) and reinforcement based on the individual learners' needs and progress. Yet, teachers report minimal use of these and other EBPs (e.g., discrete trial teaching, pivotal response teaching, peer-mediated instruction and intervention; McNeill, 2019). Focusing attention on these minimally used EBPs may lead to more full intervention implementation that promotes SC development of children with ASD.

Young children with ASD need a variety of intervention practices to learn SC skills. The nature of ASD as a spectrum disorder, combined with possible comorbidities, and the varying contexts that influence social-communication specifically, necessitate a number of substantively different practices to be available for use (Lubas et al., 2016).

The variety of practices that are likely to be effective for teaching a young child a targeted SC skill differ in the degree to which they are adult-directed (e.g., discrete trial teaching) or child-directed (e.g., naturalistic intervention), what types of social communication skills of focus, what types of prompting strategies used, and whether they involve manipulating the antecedent (e.g., social narratives) or consequence (e.g., reinforcement) to the SC behavior of interest. Given this variability and the specifications of each EBP, a practitioner must make an informed decision about which practice to use; however, guidance within this literature base is insufficient in equipping an educator to select and use the most appropriate practice (Johnson et al., 2017; Kasari & Smith, 2013; Lubas et al., 2016).

Individual ECSE Teachers as Decision-Makers Around Practice Use

When considering SC EBP implementation of a certain FIP rather than comprehensive packages, an individual teacher can make the decision to use or modify a practice without administrative or higher-level policy change. The reduction of external barriers may be facilitative of ECSE teachers selecting their own practice to use, without obtaining approval, getting certified in practice implementation, or substantial resources. This, in turn, presents a critical point at which their individual factors are salient in their decision-making—a point at which we may focus our research to reduce the implementation gap.

The focus on individuals is essential because implementation outcomes such as fidelity of implementation have shown to vary across implementers even in the same school/context (Durlak & Dupre, 2008), though research identifying individual factors that influence the selection and use of EBPs is limited (Domitrovich et al., 2008). In an

examination of organizational and individual factors influencing implementation of EBPs for young students with ASD, Locke and colleagues (2019) found no effects of organizational factors that they measured but did find variability in individual educators' implementation of EBPs for students with ASD. Furthermore, research demonstrates that practice selection is influenced by individual special educator factors more than external factors, even when external factors such as cost and training need are reduced (Knight et al., 2018). The effects of individual factors present an opportunity for researchers to address the implementation gap.

A constellation of stakeholders in special education service provision and research promotes the use of EBPs for students with ASD, though it is still mostly unknown whether practitioners are selecting the right practices for an individual student, the skill of focus, and the learning context (Knight et al., 2018). For example, consider a teacher selecting a practice to teach a young child with ASD with minimal verbal skills (i.e., goal of one word for requests and protests) to initiate play interactions with a peer by gaining the peer's attention and verbally saying "play". In addition to the considerations specific to the skill, the teacher would consider the learning context—in this case, there needs to be opportunities within the classroom routines (i.e., free play, playground time) for both initiation of play and joint play with another child. The teacher will need to consider physical space constraints, such as making sure the children have the appropriate materials and space to engage in a shared activity. There are a few EBPs that could be used to teach this child this skill, some of which are more appropriate than others.

Comparing two EBPs, discrete trial teaching (DTT) and peer-mediated instruction and intervention illustrate the need for an appropriate fit of intervention to a child and

contextual factors. Peer-mediated instruction and intervention would be an appropriate selection for this scenario, as it requires training the child's peer(s) to respond to the child's request and support them in the request. The peer could be engaging with a toy the target child prefers, waiting for the target child to request to play, and upon request, begin playing with the child. In contrast, DTT, an intervention based in applied behavior analysis, requires high frequency and quick trials of the skill to rehearse the behavior repeatedly (Wong et al., 2015). Though trials may be interspersed with rehearsal of other skills, and there are efforts to embed DTT within natural routines (Kasari & Smith, 2013), the natural opportunities for a child to initiate play and then spend time playing with the peer is less frequent than would be the case in DTT. These two practices illustrate the importance of picking the appropriate SC EBP for the child, skill, and context. There is a dearth of research, however, on whether teachers consider these factors, or other factors, such as their beliefs, as part of choosing the appropriate SC practice for a young child with ASD.

Bolstering the need for understanding individual teachers' choices between FIPs for students with ASD, specific practices are considered differentially socially valid by elementary and secondary special education teachers (McNeill, 2019). Social validity speaks to the value of the goals, acceptability, and outcomes of an intervention (Wolff, 1978). McNeill (2019) found that special education teachers rated the social validity of practices differently, and those with higher levels of social validity were used more often. These findings highlight the need to explore how teachers perceive specific FIPs. Whereas social validity refers to characteristics and features of practices, beliefs represent an individual's interpretation of specific practices and associated practice components,

20

which may impact a teacher's consideration of the social validity of a practice and their ultimate selection and use of a practice.

In conjunction with the practice, skill, and contextual fit, a practice needs to fit with the ECSE teacher's beliefs as they are the decision-maker regarding EBP to use. Adding to the example above, not only may different EBPs be appropriate for specific SC skills (i.e., DTT for labeling objects, peer-mediated intervention for requesting to join in play), there also may be multiple EBPs that are appropriate for a single skill and context. In the case of initiating peer play, naturalistic teaching or visual supports could have been appropriate practices to use instead of or in conjunction with peer-mediated intervention. Individual beliefs may then influence the selection among these EBPs that are all potentially appropriate for the student and skill about a practice, such as their perceived ease of using the practice and whether they approve of the practice.

In order for teachers to select practices to fit with the child and context and that are in alignment with their beliefs, there is a need for research that explores and tests the relations between beliefs and practice selection. At present, however, the research on evidence-based FIPs focuses on practices that are selected by outside purveyors (i.e., researchers, professional development providers). Given the individual differences associated with uptake of new practices and the conditions of a teacher's authentic problem-solving, further study on how teachers select practices is imperative. In doing so, researchers may be able to identify supports to promote the selection and later use of appropriate EBPs to address the SC needs of young children with ASD.

Contemplation of Practices to Select for Implementation

There is a need for understanding the mechanisms by which individual special educators select SC EBPs for young students with ASD and the factors that may influence this process. Practice implementation is a multi-stage process that is dependent on several factors at each stage (Davis et al., 2015; Durlak & Dupre, 2008). Educators need support in each stage of the implementation process (Lyon, 2017). In the case of focused intervention practices geared toward addressing SC skills for young students with ASD, it is especially important to proactively explore practice choice at the initial stage of implementation, when practitioners are considered "*pre-intenders*" (Schwarzer et al., 2011). There are substantive differences between pre-intenders and intenders (Schulz et al., 2009). Pre-intenders have identified a problem and not yet established an intent to adopt a specific practice. In contrast, intenders have not only decided that there is a problem, they have also determined which practice to adopt in order to address the problem. The *contemplation* stage is when an individual's intent to change their behavior by performing a specific behavior is solidified when a pre-intender becomes an intender (Prochaska & Velicer, 1997). Translated to practitioners who work with students with ASD, it is when they have selected a practice to implement.

Figure 1 highlights the hypothesized process by which an individual selects a practice, which is defined as an intent to change their behavior or adopt a new practice. According to the Transtheoretical Model of Change (TTM; Prochaska & Velicer, 1997), a stage-based model that is one of the most highly researched theories of individual behavior change (Davis et al., 2015; Schwarzer et al., 2011), an individual who is going to change their behavior is first in the *pre-contemplation stage*, during which they have not yet identified a need for a change. Once they have, they transition to the

22

contemplation stage. Prochaska (2008) explains that during contemplation the individual may at first be ambivalent about the potential behavior or practice(s), and pros and cons of the potential practice carry equal weight, but that this weight distribution shifts to evaluating the practice as having more pros leading the individual to develop an intent to implement a practice (i.e., select a specific practice).

When considering a new practice to adopt, teachers also consider their standard instructional practices. In this process, a special educator compares their current behavior or practice to the possible new practice and weighs the pros and cons of each of these in comparison to the other (Prochaska, 2008). At the same time, the teacher's beliefs about a potential practice(s) are formed or changed and considered as part of the strength of an intention to use the new practice, and the reasoning for selecting or not selecting a practice (Ajzen, 1991). The beliefs are; attitude toward a practice, perceived behavioral control to use the practice, and perceived subjective norms about the practice. It is hypothesized that the use of a research-based selection model facilitates the consideration of the pros and cons of the available new practices, EBPs, as compared to the current practice.

The contemplation stage is complete when the individual develops an intent to use the EBP, which is when they have selected an EBP to implement. While selection is not the ultimate goal of implementation, it is a necessary step toward the *preparation stage,* at which point the special educator develops their plan to use the practice prior to adoption and sustainment.

Figure 1.

A Special Educator's Contemplation Leading to the Intention and Selection of an EBP
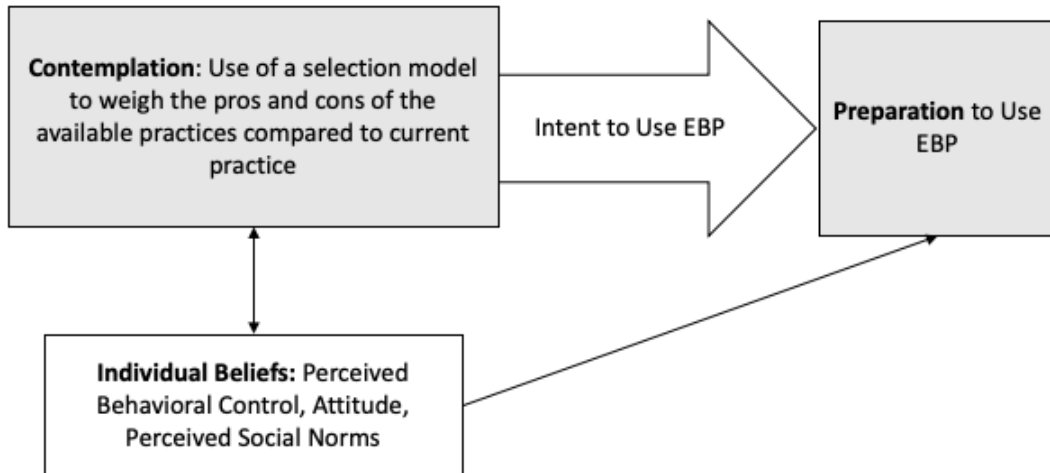
Note. Grey boxes indicate two of the stages of the TTM.

Availability of Information to Guide Selection Within the Contemplation Stage

Without the support of professional development providers, researchers, or

research-based guides, teachers may use sources on practices that do not align with the

research base, necessitating the dissemination of guidance and resources supported by

research to select an appropriate EBP. Practitioners lack access to and rarely use,

research-based sources such as journal articles (Brock et al., 2014; Morrier et al., 2011),

and there is preliminary evidence that pre-service practitioners' approval of practices

varies based on the source of information (Hugh et al.*,* in press). Knight et al., (2018)

found that most teachers reported that they do not learn about practices from researchers

or journal articles. In addition, the available research can lack the information needed for

a practitioner to determine if a practice is an appropriate match specifically for young

students with ASD (Johnson et al., 2017). Limited use of research presents an opportunity

for resource development and the dissemination of implementation supports in ways

outside of traditional methods (i.e., peer-reviewed journal articles) to scaffold ECSE teachers' EBP selections.

To address this need and make research findings accessible and useable, The National Professional Development Center on Autism Spectrum Disorders (NPDC) developed free, web-based resources on all EBPs identified in their review. The AFIRM (Autism Focused Intervention Resources and Modules, see https://afirm.fpg.unc.edu/afirm-modules) modules offer descriptions, interactive training, and fidelity forms for EBPs. The NPDC launched AFIRM modules in December 2015 and has collected data through June 2018 (Sam et al., 2019). In that time, the most frequently earned certificates for completing training on SC EBPs were for, visual supports (n = 7055), reinforcement (n = 6142) and prompting (n = 6033). Whereas modules with the fewest certificates earned were for pivotal response training (n = 215), technology-aided instruction and intervention (n = 529), and video modeling (n = 769). Though all modules were rated useful and relevant, the reach of these resources remains small. While over 17,000 users were special educators, merely 4% of employed special educators had accessed the resources (N = 440,000 in 2016, US Department of Labour). Students with ASD as their primary category of disability eligibility, however, represent over 13% of students receiving special education services (National Center for Education Statistics, 2016). The data on AFIRM module use represent both the attempts to disseminate and translate research to practitioners and the continued need to reduce the research-to-practice gap.

In regard to the guidance in the explicit selection of practices, the NPDC offers two resources on practice selection. The first tool is a webpage with a short video

introducing the selection process, a description of selection starting with defining goals, an enhanced domain matrix that matches skill areas to EBPs, case studies, and a planning worksheet that includes considerations of intervention and child characteristics (see https://afirm.fpg.unc.edu/selecting-ebp). This tool has yet to have published research on its effectiveness in supporting educators to select appropriate EBPs for SC or other skills. The second tool is part of a multi-site study on a comprehensive treatment model for secondary-aged students with ASD (Center for Secondary Education of Students with Autism; CSESA). It provides educators with online resources for educators on practice selection. CSESA offers a guide, *Linking Selected Goals to Evidence-Based Practices,* which outlines example goals within each developmental domain and an evidence-based FIP that can be used to address that goal. Although this tool is designed for older students and therefore not directly transferrable to ECSE teachers, it may be an initial reference point for developing a guide for teachers of young students with ASD.

To support teachers in selecting appropriate EBPs for students with ASD, Leko, Roberts, Peyton and Pua (2019) recently developed and disseminated a decision-making matrix in a practitioner article. The matrix includes four steps; (a) identifying evidence of effectiveness, which suggests educators use the resources from the NPDC, (b) assessing the cost, (c) considering complexity and transferability of the practice, and (e) determining the contextual fit. The EBP matrix provides a structure and rubric for scoring multiple practices. Though there has yet to be empirical support for the use of this matrix, the process described aligns with the contemplation stage because of a teacher's weighing of the pros and cons of each practice.

Despite the availability of information and guides, there is a missing link. Taken together, the disseminated models and guidance offer teachers structure and information that they should consider when contemplating a new practice. They do not, however, incorporate an opportunity for the teacher to compare their current practice to new practices under consideration. This gap is critical, as evidence suggests that a teacher must believe that the new behavior or practice holds *relative advantage* over the current practice in order to be selected and adopted (Damschroder et al, 2009; Rogers, 2005).

Comparing a Current Practice to a Potential Practice

There are additional considerations that need to be acknowledged when exploring how special educators function relating to not only how and why they select and eventually adopt new practices, but also to how current practices are considered in relation to the potential practices. Relative advantage is described by Damschroder et al. (2009) as an individual's "perception of the advantage of implementing the intervention versus an alternative solution" (p. 6). This perception is developed based on an individual's beliefs—in order to actually make a change and select a new practice, the beliefs about the new practice under consideration must not only be positive, but more favorable than those they hold for their current practice. For example, Locke et al., (2018) found that the teacher's identification of the divergence between discrete trial teaching (DTT) and their current practice was high and negatively associated with how often educators used DTT. These findings suggest that a large difference in the practice itself or the individual's beliefs about a potential practice and current practice may make a teacher less likely to select the new practice. The divergence highlights the importance of an individual's perceptions of practices and how implementation likely necessitates

eliminating the current use of a different practice. Therefore, it is hypothesized that a new

practice a teacher identifies through the use of a selection guide must be perceived to

hold relative advantage over their current practice in order to be selected.

To understand the formation of beliefs about potential practices, it is critical first

to know what practices ECSE teachers currently use. Unfortunately, the use of practices

not supported by an evidence-base is widespread (Hess et al., 2008). Though research

does not exist identifying what interventions ECSE teachers use to address SC skills

specifically, the special educators' self-reported practice use is disheartening. One

example is provided by Knight et al. (2018), who found that teachers reported using rapid

prompting method more frequently than PECS or video modeling. Rapid Prompting

Method is a version of facilitated communication, a disproven practice that requires a

"facilitator" to support the person communicating to physically refer to a symbol or

symbol, though research has shown that the facilitator controls the person's movements

(Simpson & Smith-Myles, 1995).

Similarly, evaluating the use of EBPs in one southern state ($N = 185$ special

educators), Hess, et al., 2008 found that, with the exception of Social Narratives, the most

frequently used practices were practices that lacked an evidence-base (i.e., Sensory

Integration Therapies and Facilitated Communication). These practices are considered

"low-value practices", as they are implemented due to tradition or habit, can be

detrimental, and lack effectiveness (Upvall & Bourgault, 2018; Wang et al, 2019). The

utilization of low-value practices is particularly concerning given that many of the

practices in use for children with ASD have been shown to be ineffective and may be

harmful (Metz et al., 2015; Travers, 2017).

Current use of low-value practices must be considered when exploring a teacher's future practice selection (Patey et al., 2018; Wang et al., 2019). Substitution de-implementation means implementing a new practice and halting the use of another practice (Upvall et al., 2018), It has implications on an educator's selection of new practices. Primarily, the individual's use of the low-value practice may affect attempts to promote selection of EBPs and, ultimately, implementation. Wang et al. (2019) describe that researchers must "consider its underlying processes of unlearning to discontinue or deviate from ineffective practice and learning to apply newer, more effective practices" as a means to increase implementation of EBPs. In addition to the behavioral processes used to increase and decrease behavior, as described in Operant Learning Theory (Patey et al., 2018), a person's beliefs underlying their thought-process must shift during contemplation to support selection of a different practice.

Though low-value practices are ineffective, it is presumed that ECSE teachers hold positive beliefs about those they use, as beliefs predict intention and use (Ajzen, 1991). Because low-value practices for students with ASD are often based in pseudoscience and faulty claims (Metz et al., 2015; Travers, 2017), the validated information about an EBP may contradict their beliefs leading to confirmation bias (Travers, 2017). When an educator interprets information about a new practice in a way that aligns with their current beliefs or practice information as is the case with confirmation bias, the new EBP may not be perceived positively, resulting in it not being selected (Lewandowsky et al., 2012; Travers, 2017). Therefore, selecting an EBP requires more than the use of a new practice or "undoing" (Upvall et al., 2018) of the current

practice, and also that the individual's perceptions of the new practice they select must have relative advantage over the current practice.

Individual Beliefs Influencing Selection

An individual's beliefs about potential practices can impede or promote of selection of a practice. The impact of beliefs is evident through the observed differential rates of selection and adoption of EBPs for teachers of students with ASD (Collier-Meek et al., 2019; Fishman et al., 2018; Locke et al., 2018; Odom et al., 2013). This varying implementation may be rooted in the different beliefs a teacher holds about practices prior to developing an intent to use a practice. The beliefs that an individual holds around their current, possibly low-value, practice influence their beliefs about a potential new practice, which, in turn, influence whether or not they select the new practice. Research that is informed by a theory that comprises beliefs found to be related to selection may best ensure the beliefs critical to selection decision-making are studied. At the individual implementer level, the Theory of Planned Behavior (TPB), an empirically founded, parsimonious theory explaining the factors related to intention to implement or adopt a practice may guide researchers and professional development providers in supporting practitioners' selections of EBPs to address SC needs of young students with ASD.

Lynch et al., (2018) developed a guide for researchers and implementation teams to use when selecting theories to guide their implementation projects. Though they do not explore the TPB within their review, the authors reason that ensuring a match among the who, where, what, why, and when of both the chosen theory and the project will support theory-informed research that is likely to build on the field's knowledge in a way that moves implementation science forward. According to the guide, the TPB is appropriately

30

suited for understanding a special educator's selection of a FIP to improve SC skills of young students with ASD. Following is a description of these criteria for the TPB regarding ECSE teachers' EBP selections.

First, the "what" of the TPB is that it is an explanatory motivational theory. When applied to an ECSE teacher's selection of EBPs, the TPB explains (i.e., why) the beliefs related to intention, a strong intention indicating high motivation and selection of a practice. The TPB assumes that the individual has the resources they need to change their behavior. In this case, focused intervention practices, paired with the resources available through sources like the NAC and NPDC fulfill teachers' needs. While special educators may benefit from coaching or other additional implementation supports to implement a practice, focused intervention practices require fewer resources than comprehensive treatment models and eliminate the need for administrative level decisions and resources. Next, the TPB describes an individual's behavior (i.e., who), rather than that of a group, which is appropriate for an individual ECSE teacher. In addition, the TPB describes predictors, which are considered antecedents to intention and selection (i.e., when). Finally, future research informed by TPB will include capturing the appropriate data to support the "how" of the TPB by including measurement of each individual's beliefs in relation to their selection and implementation of EBPs.

In addition to the theoretical and experimental grounding supporting TPB, qualitative explorations of educators' practice selection replicate the TPB's empirical tests. Nelson, Leffler and Hansen (2009) summarized their findings from a qualitative study on educational decision-making stating: "in both policy and practice, all change must overcome resistance or unwillingness to alter well-established patterns of behavior

31

and thought. At the heart of that resistance are belief systems, tradition, complacency, or even inertia" (p. 16). Nelson and colleagues (2009) summarize the educators' personal beliefs which include the beliefs identified as predictive of intention in the TPB; tradition and practices they may currently be using, the social norms around practice use in an educator's context, their beliefs about their ability to use the practice, and their attitude about the practice. These findings demonstrate the importance that educators place on their own beliefs, fortifying the call to evaluate these beliefs in relation to special educators' intention and implementation.

The Theory of Planned Behavior (TPB)

The TPB is considered a motivational theory, as it describes how beliefs predict and drive an intention to implement a new behavior (Ajzen, 1991), or practice selection. Toward this end, the TPB was "designed to predict and explain human behavior in specific contexts" (Ajzen, 1991, p. 181). Founded from the Theory of Reasoned Action, the TPB established that an individual's attitude and subjective norms were predictors of intention or selection. Adding to the Theory of Reasoned Action, Ajzen (1991) found that perceived behavioral control was also a critical driver of intention (Ajzen, 1991), which established the three determinants of intention as outlined in the TPB. The beliefs outlined in this theory account for much of the variance between individuals in their intention to perform a specific behavior (Ajzen, 1991). This finding lead to its application in many research studies have used TPB to inform their understanding of implementation or test the effects of beliefs (Davis et al., 2015).

The TPB predicts an individual's intent to perform a behavior, the strength of which is indicative of motivation, or how hard someone may be willing to work to
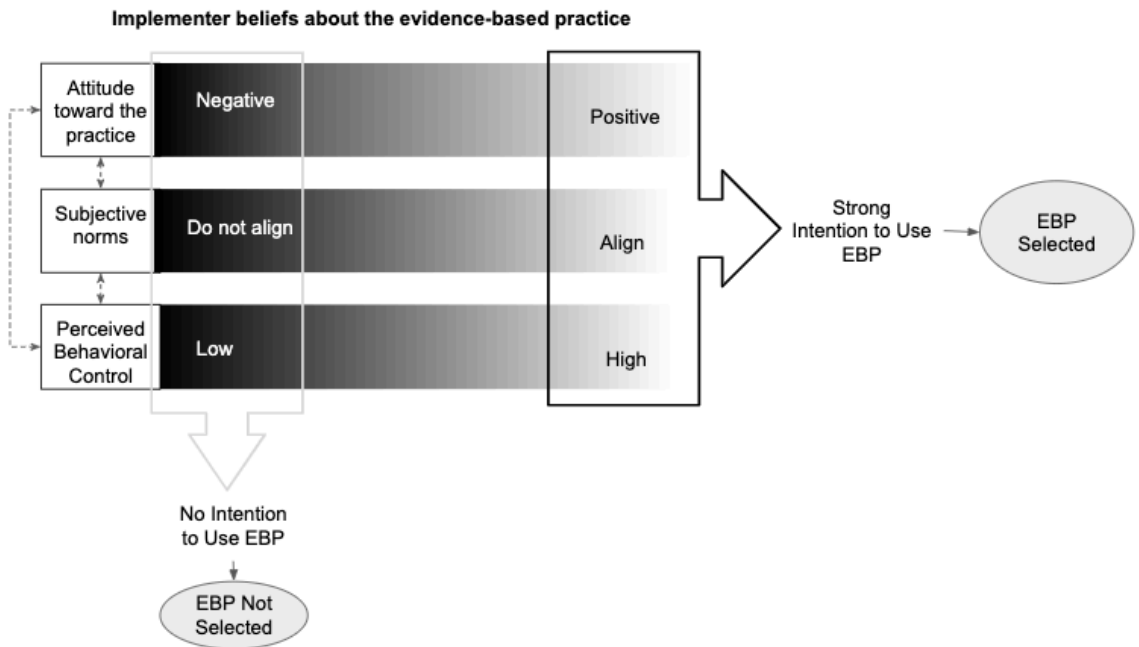
perform a behavior or use the selected practice (Ajzen, 1991). It is hypothesized that an

individual ECSE teacher considers the three factors identified as predictive of intent to

implement a practice, and therefore selection, in TPB; perceived behavioral control,

subjective norms, and attitude toward the practice when they are in the contemplation

stage. The TPB distinguishes between beliefs and the cognitive constructs that represent

these factors (i.e., behavioral beliefs and attitude toward the behavior, control beliefs and

perceived behavioral control, and normative beliefs and subjective norms). Ajzen (1991)

describes that salient beliefs specific to each construct comprise these individual

constructs. Consistent with Ajzen's claim that "the underlying foundation of beliefs

provides the detailed descriptions needed to gain substantive information about a

behavior's determinants" (p. 206), the term "beliefs" is used in this study representing

these determinants. The use of this terminology is intended to represent an individual's

conviction around these constructs. In other words, ECSE teachers regard their attitude,

perceived subjective norms, and perceived behavioral control to be their true perceptions

of a practice.

Figure 2 depicts the relation between each belief from the TPB and how these

beliefs can lead to selection of a practice. The beliefs, comprised of attitude, perceived

behavioral control, and subjective norms relate to one another but are not perfectly

correlated. Each belief contributes individually to a person's intention or selection

(Ajzen, 1991). Beliefs lay on a continuum; when all three are positive about a practice,

they predict a strong intention to implement a practice and lead to selection. In contrast, a

negative attitude, subjective norms that do not align, and low perceived behavioral

control (i.e., task self-efficacy) are likely to lead to a weak intention to use a practice, or no intention at all, meaning the practice is not selected for use.

Figure 2.

Individual Beliefs Influencing Intention

Implementer beliefs about the evidence-based practice

Attitude toward the practice: Negative — Positive

Subjective norms: Do not align — Align

Perceived Behavioral Control: Low — High

Strong Intention to Use EBP → EBP Selected

No Intention to Use EBP → EBP Not Selected

Attitude Toward the Practice. A person's attitude toward a practice is thought to be an indicator of whether or not they will use a practice, although research on the predictive nature within special education is limited. An individual's attitude toward the behavior represents "the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question" (p. 188, Ajzen, 1991). Attitude can be measured on a continuum from negative to positive, and a positive attitude has been considered approval or acceptability of a practice (Elliott, 1988). An attitude toward a practice is a direct response to what the educator knows about the practice and the characteristics of the practice such as the intervention source, evidence, strength and quality, relative advantage, adaptability, trialability, complexity, design quality and

packaging, and cost (Damschroder et al., 2009; Rogers, 2005). Rather than prospectively assessing the attitude to determine if there is an appropriate fit between the teacher's beliefs about the practice and practice selection or use, attitudes have largely been investigated as a measure of social validity when the effects of an intervention are being tested after the practice has been used (Elliott, 1988). Future research is needed to determine if attitudes about practices are related to which practices special educators select to address SC needs of young children with ASD.

In a recent study exploring pre-service special education practitioners' perceptions of practices and likelihood to use or recommend practices (i.e., intent to use), Hugh et al. (in press) found variability in respondents' approval of practices across both evidence-based and low-value practices. Interestingly, though most participants agreed or strongly agreed that they approved of and were likely to use (i.e., intention) most EBPs (PECS, social narratives, self-management), they often were neutral or did not approve of DTT and most were unlikely to use it. While not explicitly measuring the construct of attitude, these findings on the related construct of approval illustrate that beliefs vary based on each practice, rather than just by practice type (i.e., EBP vs. low value practice). Importantly, respondents were largely neutral in their approval of the low-value practices (pressure/weighted vests, gluten-free casein-free diet, and brushing), with which most were also familiar. Taken together, their familiarity with practices and neutral ratings of approval provide insight into the preconceived ideas a special educator may have when taking in new information about a practice—the new information about EBPs likely contradicts the explanation of why these low-value practices are thought to work. The new information needs to influence a person's approval or attitude to support their beliefs

to be more supportive of the new practice than for the low-value practice. While this study sheds light on the variability of beliefs such as approval and their relation to intent to use a practice, more research is needed on the degree of positive attitudes ECSE teachers hold for specific EBP practices for SC.

Perceived Behavioral Control. Perceived behavioral control is an individual's belief in their ability to perform the behavior including how difficult it might be for them to perform the behavior, or, in this case, implement the EBP. The construct of perceived behavioral control is based on Bandura's construct of self-efficacy but is specific to the behavior or practice of interest (Ajzen, 1991). Combined with intention, Ajzen theorized that PBC was directly predictive of "behavioral achievement", or, whether the person implemented the behavior in the way intended. Within education, self-efficacy studies focused on teachers' perceptions of their global instructional abilities and specific to use of an intervention (Domitrovich et al., 2008). Across the educational literature, perceived behavioral control's conception matches self-efficacy, which has been a predictive antecedent of behavioral intent (Schwarzer et al., 2011) and implementation fidelity (Smylie, 1988).

Special educators' task self-efficacy of using a specific FIP has not yet been investigated, though there have been other explorations of special educators' self-efficacy serving students with ASD. Jennett, Harris, and Mesibov (2003) evaluated teacher's ratings of their overall teaching self-efficacy and found it correlated with their commitment to a teaching philosophy or pedagogy—the more committed to the philosophy, the higher their self-efficacy in teaching. Brock et al. (2014) surveyed teachers on their use of EBPs and their confidence in their ability to use specific practices

and found that overall they lacked confidence in implementing EBPs. Importantly, there was a wide range in respondents' confidence across each practice. These findings suggest that an individual's self-efficacy is specific to each practice, and certain practices may be perceived as more usable in that practitioners believe they can implement them. Furthermore, this variability in self-efficacy presents an opportunity for promoting the selection of EBPs. Later implementation may improve by capitalizing on the EBPs for which teachers have high self-efficacy through supporting them in selecting and implementing those practices.

Subjective Norms. Subjective norms represent the social pressure to use or not use a practice (Ajzen, 1991). While this is a rarely approached topic of research specifically for teachers of students with ASD, the information sources that teachers use to gain knowledge on practices may speak to social pressure and awareness of practices as does their feeling of belonging within the school (Damschroder et al.; 2019). In addition, the findings that practitioners tend to get practice information from other practitioners speak to the influence subjective norms may have on special educators' intent to implement specific practices, and may explain the proliferation of low-value practices that lack an evidence-base (Brock et al., 2014; Knight et al., 2018). Specifically, opinion leaders who are well-respected community members (i.e., fellow teachers) may form a culture or norm within a school around a specific practice or type of practice (Cook et al., 2013; Rogers, 2005). Because of the influence opinion leaders and fellow practitioners have regarding a teacher's use of a practice, an ECSE teacher selecting a new practice may be less likely to pick an EBP as few are in use and, therefore, unlikely to be recommended or modeled by colleagues. In addition, it is important to note that,

though subjective norms may reflect organizational culture, they are perceived by the individual, and different educators within the same community may perceive these norms differently, making them individual factors.

Behavioral Intent. The construct of behavioral intent to perform a behavior or implement a practice is rooted in the TPB and was originally thought to represent an individual's attempt to perform a new behavior (Ajzen, 1985). Modeling the construct and the predictive beliefs showed it was unique to state that one was going to attempt to perform the new behavior (Ajzen, 1991). The strength of an individual's intent represents their motivation to use the practice. Towards this end, the explicit selection of a practice as representing behavioral intent is consistent with the original definition. Likewise, developing behavioral intent is distinct from developing a plan to perform the behavior, which is a subsequent step to developing an intent (Ajzen, 1991). In regards to an ECSE teacher's independent selection of a practice to use to address the SC needs of a young child with ASD, a practice is selected once an individual has developed a strong intent to implement it.

Behavioral intent has predicted special educators' use of EBPs for young students with ASD. Fishman et al., (2018) explored the intentions and use of four FIPs by teachers of students with ASD in kindergarten through second grade with that were components of a comprehensive treatment model (Strategies for Teaching based on Autism Research; STAR). These FIPs were; (a) individual schedules, (b) use of positive reinforcement to teach new skills, (c) conducting individual teaching sessions using DTT or pivotal response training and, (d) data collection to monitor student progress. The researchers surveyed teachers on the frequency and duration they intended to use each practice.

Teachers were observed during a randomly selected classroom transition to determine if they used visual schedules during that transition from one activity to the next, and their use was compared to a self-report survey of their intention to use schedules. The predictive nature of intent was relatively strong, with 72% of teachers indicating a strong intention to use schedules and 64% observed using them, demonstrating a strong association between intention and implementation.

In a second study by Fishman et al., (2018), educators completed a survey indicating their intention to use four EBPs that were components of STAR following a workshop training. The comparison of intentions by practice indicated varying strengths of intention to use the different practices across the educators ranging from 33%, indicating a strong intention to use data collection practices to the strongest 66%, indicating such use of reinforcement (66%). This variability in the intention to implement across different practices shows how intention strength can vary, which may influence selection and later implementation.

The strength of behavioral intent is a strong predictor of implementation, particularly when an individual is selecting a practice over others (Ajzen, 1991). Within special education, strength of behavioral intent has positively correlated with implementation and to vary across practices (Fishman et al., 2018). This finding further explains the compatibility between the constructs of selection of a practice as behavioral intent, given that individuals can have a strong intention to implement a practice they have chosen at one time. In contrast, a weaker intent may be present for other practices that were not selected. Though a behavioral intent is not a means to an end or perfectly predictive of adoption and implementation, there is an abundance of research supporting

39

intention as a mediator to adoption (Hagger & Luszcczynska, 2014), and quality implementation cannot occur without an intent to implement. This holds for selection as well—if an individual has a strong intent to use a practice that they have picked from a number of options, as is the case with EBPs for SC, they are more likely to implement that practice than they would be if they had not yet decided on a practice.

Theory of Planned Behavior in Relation to ASD Practice. There is one study based in the TPB that demonstrates the importance of individual teachers' beliefs about a singular practice, rather than a comprehensive treatment model, for students with ASD. Ruble and colleagues (2018) performed a descriptive study on teachers' intent to collect data. Early childhood through third grade teachers participated as part of a consultation model for classroom teachers of students with ASD in addressing their social, communication and literacy skills. The researchers found that teachers' perceived behavioral control, subjective norms, and attitudes toward data collection were all predictive of their intent to collect data. In addition, perceived behavioral control was predictive of actual implementation, as measured by teachers' self-report of their data collection practices and presentation of permanent products. These findings have implications for teachers' intentions to implement SC interventions. While data collection is not an intervention, it is a component of implementing EBPs. The findings on barriers related to collecting data on specific SC skills may be generalizable to those faced by teachers implementing interventions to address SC development. Based on the predictive nature of teachers' beliefs predicting data collection, future research should investigate these beliefs concerning special educators' own selection of intervention practices for students with ASD.

Future Research Directions

Special educators serving young students with ASD engage in a complex decision-making process when selecting which EBP to use to support a child's SC development. Because selection and use of a practice is ultimately dependent on the individual implementing the practice, in this case, the ECSE teacher, understanding the nature of their individual beliefs in relation to their selection of practices is critical. Research is needed to explore ECSE teachers' attitudes toward, subjective norms about, and perceived behavioral control of the practices they currently use and EBPs they do not use and how these beliefs may inform selection of EBPs.

Theories are needed at the inception of a research study, rather than used retrospectively to interpret and explain findings (Lynch et al., 2018). Though few studies have focused on how the TPB explains or predicts intention and implementation of EBPs in special education, those that have offer direction points for future research that have the potential to reduce the implementation gap. Studies within special education grounded in the TPB have centered on the predictive nature of intention, variability in teacher's intent to implement a practice, beliefs as outlined in the TPB, and assessing the effects of a pre-implementation intervention targeted at the determinants of behavioral intent as identified in the TPB (Cook et al., 2015; Fishman et al. 2018, Lyon et al., 2019; Ruble et al., 2018). While only two of these studies focused on discrete practices for students with ASD (Fishman et al., 2018; Ruble et al., 2018), other studies that address behavioral intent for comprehensive models illuminate findings that relate to the malleable nature of beliefs and inform the field on future research needs (Cook et al., 2015; Lyon et al., 2019).

Incorporating ECSE teachers' beliefs into research on selection can help explain whether a practice is selected and implemented and identify targets for implementation supports. With that in mind, the following research priorities are described; (a) promoting selection of EBPs about which teachers hold positive beliefs, (b) identifying EBPs about which ECSE teachers hold negative beliefs, and (c) tailoring implementation supports to an individual's beliefs to promote selection and implementation of EBPs. These research avenues are described below in relation to the extant literature incorporating the TPB in special education-related research.

Promoting Selection of EBPs About Which Teachers Have Positive Beliefs

Because there are several EBPs of use to teach a specific skill, and each EBP can be individualized, ECSE teachers may be able to use selection models (e.g., NPDC) to select an EBP that not only matches the needs of the student and the context but also aligns with their own beliefs. Knowing that when an individual holds supportive beliefs about a specific behavior or practice, they have a stronger intention to choose it, research on whether having practitioners select their own practices to adopt could help inform the field in a number of ways. Researchers should attend to the individual special educators' positive beliefs about SC focused intervention practices for young children with ASD.

Based on the empirical support for individual beliefs impeding and promoting behavioral intent and implementation, Cook and colleagues (2015) developed a supportive beliefs intervention for school-based coaches and educators adopting a behavioral multi-tiered system of support (B-MTSS). A few key findings from this study highlight how positive beliefs corresponded with better implementation. The researchers found that the degree of change in beliefs as a result of the implementation intervention

was predictive of the implementation outcomes (i.e., data-based decision-making, tier one implementation, school-wide evaluation tool) as schools with teachers and coaches who had positive beliefs about B-MTSS had better implementation, and those with negative beliefs had poor implementation. In addition, a comparison of educators' pre- and post-intervention assessments demonstrated the relation between TPB beliefs and implementation; higher pre-intervention scores for beliefs corresponded with better implementation and more positive beliefs following intervention. These findings all speak to the possibility of better implementation of practices that teachers' beliefs support.

The TBP identifies factors that, when positive, can be mechanisms for behavior change. Exploring and testing the mediation and moderation effects of an individual's attitude, perceived behavioral control, and subjective norms about a practice is crucial for identifying how beliefs can be barriers or facilitators of intention and adoption. Cook et al. (2015) suggest that these factors can be considered indicators of an individual's readiness for change, or, in this case, they can be considered readiness for selection of a particular practice. In situations when expedient decisions must be made and two or more EBPs may address the need a teacher has identified for a young child with ASD, coaches or other professional development providers may be able to quickly identify which practice a teacher is more likely to use based on their beliefs. They can then support teachers' implementation of that selected practice.

Identifying Practices About Which ECSE Teachers Have Negative Beliefs

Just as it is important to identify practices that ECSE teachers are likely to use because their beliefs support them, it is equally important to identify practices for which

they hold negative beliefs. Negative, or unsupportive beliefs, are necessary to identify for a few reasons. First, negative beliefs have been shown to correspond with poor implementation (Cook et al., 2015). Second, differential rates of adoption (the initial uptake of the intervention) implementation of comprehensive treatment models show that there may be competing beliefs that influence whether parts of a model are implemented, which overall influence whether the entire model is implemented and the effectiveness of the program (Cook et al., 2015; Fishman et al., 2018). Furthermore, ten of the 62 schools that participated in an implementation intervention had poor implementation following intervention (Cook et al., 2015). Though the researchers suggest this may be due to limited dissemination or competing demands, additional barriers may have been the beliefs themselves, which may have been negative. Like many comprehensive treatment models, B-MTSS is a large-scale program composed of many research-based practices—the composite nature of such a large scale program may mean that educators and coaches held negative beliefs around components of the B-MTSS model that influenced their overall beliefs about the comprehensive intervention. Similarly, negative attitudes about one focused intervention practice may mean that another evidence-based intervention that addresses the same goals and is likely to be successful may be a better match based on an individual ECSE teacher's beliefs.

Because negative beliefs lead to a weak or no intent to use a practice, practices about which ECSE teachers have negative beliefs are unlikely to be selected for use (Ajzen, 1991). One way around this is to support teachers' use of selection guides in order to find a practice that has a research base and matches the needs of the student, skill of interest, and context in which the skill is taught. Using these selection guides and

allowing teachers to select the practice they wish to use, rather than prescribing an intervention, may account for teachers' negative beliefs about specific practices that could otherwise impede implementation. Allowing for individual practice selection within research is not sufficient, however, as there are practices that should be considered for use but may not be readily selected by teachers based on their beliefs (i.e., DTT). New information about EBPs learned from selection guides must overcome their current beliefs about practices they currently use. As such, research needs to examine how to change beliefs to promote selection.

Tailoring Implementation Supports to an Individual's Beliefs

Knowing an ECSE teacher's beliefs is the first step to individualization of implementation supports addressing a special educator's beliefs may promote selection of EBPs. Within implementation science, this concept of individualizing an implementation intervention is known as *tailoring* (August et al., 2010) and can be used to promote selection of EBPs (Cook et al., 2019).

Malleability of Beliefs. In order for tailored implementation supports to be successful, the target of the intervention must be changeable. Bringing an intervention model to scale, Lyon et al. (2019) developed and provided a pre-implementation intervention to 17 school mental health practitioners based in the TPB. The researchers provided a multifaceted pre-implementation intervention for school-based practitioners adopting the Cognitive Behavioral Intervention for Trauma in Schools (CBITS). CBITS is a multicomponent mental health intervention implemented in individual, group, and parent education sessions. The intervention group in this randomized control trial received three types of interventions targeting the three beliefs related to behavioral

intent; (a) strategic education to influence attitudes, (b) social influence to influence subjective norms, and (c) motivational interviewing to influence perceived behavioral control. Practitioners who received these interventions had more positive scores across beliefs following intervention than the control group. Additionally, though the treatment group's behavioral intent did not change, the control group's deteriorated, with a significant difference between groups. In light of these mixed findings that include limited adoption and sustainment of implementation for the majority of practitioners, the results of this study suggest that beliefs are malleable and there may be a longer duration of implementation when these beliefs are treated as mechanisms of implementation that can be supported through an intervention.

There is also a need to explore the counterfactual in relation to pre-implementation interventions targeting beliefs (Lemons et al., 2019). Though not the primary purpose of this study, an exploration of the attention control group's behavior may shed light on the current "business as usual" conditions that many school systems and research teams provide through professional development. The control group received a didactic training on the importance of using EBPs designed to mimic standard professional development (Lyon et al., 2019). Not only did the control group's behavioral intent deteriorate and differ significantly from the treatment group's following intervention, their scores deteriorated across beliefs from the beginning of the study to the end of the study. For attitude, the scores were lower post-intervention for appeal, openness, and fit. The same pattern was observed for self-efficacy and subjective norms. Though the deterioration of beliefs is undesirable, these findings suggest that beliefs are malleable.

Tailoring Pre-implementation Interventions. As described, initial research on tailoring to an individual's beliefs shows mixed effects, with moderate effect sizes for some tailored interventions (Cook et al., 2015), and promotion of perceived behavioral control with tailored feedback and auditing (Bonetti et al., 2005). The extant research, however, focuses on comprehensive treatment models, which may require more and different supports due to the specific beliefs practitioners may hold about components of a given model. Research is needed on the effects of tailoring implementation supports to address negative beliefs. With tailored implementation supports, ECSE teacher's beliefs may overcome preconceived notions that they may hold about specific practices that, though they tend to be effective, are rarely used (e.g., DTT).

Conclusion

The persistent research to practice gap necessitates exploration and implementation interventions to promote the use of practices that are likely to be effective at improving SC skills of young children with ASD. Descriptive studies documenting special educators' use of practices show pervasive use of low-value practices that lack evidence, and limited use of focused intervention practices that are evidence-based (Brock et al., 2014; Hess et al., 2008). Due to this imbalance, efforts are needed to investigate why practitioners select specific practices, which may be related to their beliefs such as attitude toward the practice, subjective norms about the practice, and perceived behavioral control (Ajzen, 1991). Focusing on the beliefs of special educators who serve young children with ASD can help enable the field to determine what implementation supports work, for which practitioners, and under what conditions (Klingner & Boardman, 2011; Odom et al., 2005).

Research is needed to explore ECSE teachers' attitudes toward, subjective norms, and self-efficacy of the practices they currently use and the EBPs they do not use and how these beliefs may inform selection of EBPs. Lynch et al. (2018) call for theories to inform the inception of a research study, rather than used retrospectively to interpret and explain findings. Therefore, this study is grounded in the Theory of Planned Behavior and will explore these beliefs in relation to practices a teacher considers and selects for use. Figure 3 is an illustration of the hypothesized relations between factors and an ECSE teacher's practice selection. When exploring factors that relate to which practices teachers select, their current practice use and whether they have prior knowledge (i.e., familiarity) should be considered.

The figure depicts three potential configurations of how these factors may relate and predict selection of a practice within the sample. These potential relations are not exhaustive, but highlight some of the primary hypothesized relations of interest for the purpose of this study. The first model displays the hypothesis that an ECSE teacher is likely to hold favorable beliefs about practices they currently use. Applying the same logic in the second model, if an ECSE teacher is not familiar with a practice they also would not use it and may hold unfavorable beliefs about it. In this case, they would not select that practice. The third model shows that if a practitioner is familiar but does not use the practice, the ECSE teacher is hypothesized to hold unfavorable beliefs about this practice and would not select the practice. These models guided the design and method of this study.

Figure 3.

Theoretical Models Depicting Hypothesized Determinants of Practice Selection
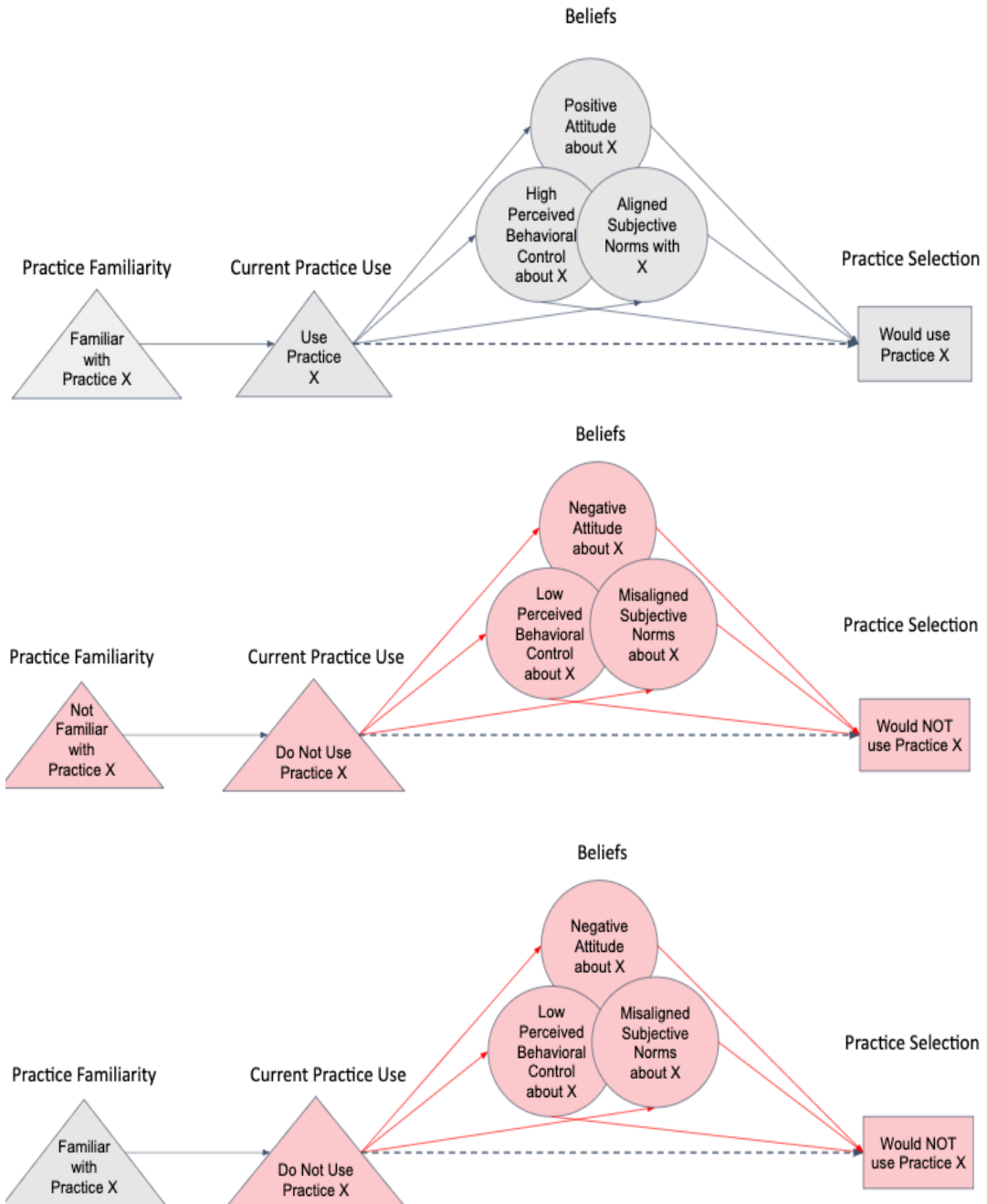
Purpose

With the intent to gather information that can be used to modify how researchers

and professional development providers disseminate efficacious practices to promote

their adoption, this study will focus on special educators' decision-making what factors influence these selection decisions. When the focus is on individual educators as they consider what SC practice to implement for a young child with ASD, both their current practice use and what their beliefs are about the available practices are important. The purpose of this study was to investigate early childhood special education (ECSE) teachers' practice selection and determinants of their selection. To fully understand the intricacies of their consideration of practices, exploring a teacher's current practice use and how their beliefs impede or facilitate their selection of a practice is imperative.

Chapter 3 - Methods

Given the need to develop implementation supports to promote teachers' use of effective, evidence-based practices for young students with ASD, this study was designed to identify and explore possible determinants of ECSE teachers' practice selections. Given the complexity and nuanced design of the questionnaire that provides the basis for this study, this chapter begins with a detailed description of the process used to develop the study questionnaire. Then a description of the study participants, procedures, and data analysis in service of addressing the following research questions;

1. What proportion of ECSE teachers are familiar with evidence-based and unsubstantiated SC practices? Which practices do they report using?

2. What is the distribution of practices ECSE teachers selected to try first and least likely to try to address an SC need of a student with ASD?

3. What are ECSE teachers' beliefs (self-efficacy, attitude, subjective norms) about an key EBPs used to address an SC need of a student with ASD?

4. Do beliefs about key SC practices predict practice selection of an EBP to address an SC need of a student with ASD?

Process for Developing the Study Questionnaire

The development process for the questionnaire used for data collection involved the creation of two components; the ASD Practice Use Questionnaire and the ASD Practice Selection Task. In addition, the researcher modified one tool to create the ASD Practice Intentions Scales from the IEP Data Collection Intentions Scales (Rudolph, 2019). The researcher engaged in an iterative development process of the full questionnaire by drawing on the expertise of practitioners and researchers in ASD

interventions to modify existing tools and develop an original tool (ASD Practice Selection Task). The full questionnaire is in Appendix A.

Throughout the questionnaire, the research wrote items to support the validity of inferences by following item-writing guidance with specific attention to: avoiding double-barreled items, each item being a complete question or sentence, avoiding negatively worded questions, and avoiding leading questions (Haladyna & Rodriguez, 2013). In addition, the researcher paid careful attention to response options such that they were mutually exclusive and used forced-choice (rather than instructing participants to select any or all items) (Dillman et al., 2014). To evaluate construct validity, field experts provided consultation on the modifications or development of each tool (Evans et al., 2014). After incorporating any feedback, two former ECSE teachers participated in a "Think-Aloud" procedure. This method, also called Cognitive Interviewing, consists of the Think-Aloud participant reading the questionnaire and then articulating their thoughts aloud as they answer the questions (Dillman et al., 2014). The Think-Aloud process led to the refinement of many of the items and organization of the questionnaire. The specific development procedures for each tool are described below.

Development Procedures for Each Tool

ASD Practice Use Questionnaire.

Though researchers have explored teachers' self-reported use of practices for students with ASD in the past (Brock, Huber, Carter, Juarez & Warren, 2014; Hess, Morrier, Lloyd, Irwin, and Hertzman, 2008) and in more recent years (Brock et al., 2019), a tool that comprehensively includes both EBPs and unsubstantiated practices based on current research reviews does not exist (Green & Ricciardi, 2015; Wong, et al.,

2015). For this study, to investigate familiarity and current practice use of both EBPs and unsubstantiated practices for students with ASD, the practices included were adapted from Hess and colleagues' (2008) Autism Treatment Survey. Like the Autism Treatment Survey, the design of the ASD Practice Use Questionnaire includes the presentation of evidence-based practices (EBPs) from the updated NPDC evidence-based practice review (Wong et al., 2015) and frequently used unsubstantiated practices for social communication development (Hess et al., 2008), along with corresponding questions for each practice. Table 2 displays the criteria used to determine which practices were included in this tool. This section was presented as a matrix of practices with the instruction to check each box that was true for them for each practice (described below).

Table 2.

Inclusion Criteria for ASD Practice Use Questionnaire

Inclusion Criterion	Rationale for Criteria	Evidence-Based Practices	Unsubstantiated Practice
Educational Intervention Practice	To be relevant to ECSE teachers, this study is investigating educational intervention practices for that age population.	Practice used to teach a skill with or without specific materials (i.e., not the materials used for a practice)	
Evidence-Based Status	Evidence-based and unsubstantiated practices that are described as helping people with ASD are both in use.	From Wong et al. (2015) shown to have evidence for social communication for preschool-aged students	Autism Treatment Survey, a practice that is not evidence-based described as being used to address social-communication needs
Targeted Intervention Practice	These focused practices require fewer external resources as compared to comprehensive treatment models, which reduce the external barriers associated with implementation and can help isolate only individual factors.	A practice that includes one or a few components, that is used to address one, or only a few goals (i.e., not a comprehensive treatment model or a packaged intervention)	
Skill acquisition as primary focus	This study is focused on skill acquisition, adding in other considerations related to challenging behavior could be confounding.	A practice that is focused on social communication skill acquisition primarily, not in relation to reduction of challenging/undesirable behavior	

To prevent the potential misunderstandings that participants to previous questionnaires may have experienced (e.g., Hess et al., 2008) and ensure a shared construct between researcher and participants, a brief practice description was presented with each practice (McNeill, 2019). Practice descriptions included both the form and purpose of a practice. Descriptions of the empirical basis, pedagogy, philosophy, or theoretical grounding of the practice were not included in the descriptions so as to reduce potential confounds (Jennett, Harris & Mesibov, 2003).

The EBP practice descriptions were based on the descriptions from National Professional Development Center (NPDC) and the Texas Statewide Leadership for Autism Training's Texas Autism Resource Guide for Effective Teaching (TARGET). These descriptions align with how the researchers defined these practices in their review of each practice's evidence base (Wong et al., 2015). The list of unsubstantiated practices was taken from the Autism Treatment Survey (Morrier et al., 2008) and TARGET. Descriptions for unsubstantiated practices were taken from TARGET, the practice purveyors (e.g., the website for Gentle Teaching), or the National Autistic Society (NAS) to ensure that the description was commonly used. The modified practice descriptions, their evidence-based status, and their original sources are presented in Table 3.

Table 3.

Autism Practice Use Questionnaire Practice Descriptions

Practice	Description	Evidence-Based Status	Original Source of Description
Animal Therapies	A group interventions that incorporate animals using a formal, structured set of sessions to help people reach specific goals in their treatment.	Not	NAS
Antecedent-Based Interventions	Modifying the environment to decrease an identified interfering or inappropriate behavior and increase engagement	EBP	NPDC
Auditory Integration Training	A person listening to a selection of music or other sounds which have been electronically modified.	Not	NAS
Differential reinforcement	Differential reinforcement of other behaviors means that reinforcement is provided for desired behaviors, while inappropriate behaviors are ignored.	EBP	TARGET
Discrete Trial Teaching	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.	EBP	TARGET*
Extinction	A procedure whereby a behavior that was formerly reinforced is no longer reinforced.	EBP	TARGET*
Facilitated Communication	A specific technique in which a facilitator physically supports another person and helps them to point at pictures or words.	Not	TARGET*

FloorTime	A relationship-based approach in which the caregiver takes an active, developmental role in spontaneous and fun activities that are directed by the child's interests and actions.	Not	NAS
Functional Behavior Assessment	A systematic set of strategies used to determine the underlying function or purpose of a behavior so that an effective intervention plan can be developed.	EBP	TARGET
Functional Communication Training	A positive behavior support intervention designed to reduce problem behaviors by replacing them with meaningful or functional communication, whether verbal or gestural. The emphasis of the communication is on functionality as opposed to form.	EBP	TARGET
Gentle Teaching	A specific non-violent approach for helping people with special needs and sometimes challenging behaviors. It focuses on four primary goals of caregiving for the learner/partner to; 1) feel safe, 2) feel loved, 3) be loving, 4) feel connected to the caregiver.	Not	NAS
Integrative Movement Therapy	An individual and group therapy approach that combines speech-language pathology, behavioral and mental health counselling, and yoga.	Not	NAS
Modeling	The demonstration of a desired target behavior that results in imitation of the behavior by the learner and that leads to the acquisition of the imitated behavior.	EBP	TARGET*
Naturalistic Intervention	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' interests by building more complex skills that are naturally reinforcing and appropriate to the interaction.	EBP	TARGET

Parent-Implemented Interventions	Parents directly using individualized intervention practices with their child to increase positive learning opportunities and acquisition of important skills.	EBP	TARGET
Peer-Mediated Intervention	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.	EBP	TARGET
Picture Exchange Communication System	A specific alternative/augmentative communication system. It is used to teach learners to communicate through systematic prompting, error correction, and reinforcement procedures across six phases.	EBP	TARGET*
Pivotal Response Training	A specific approach builds on learner initiative and interests, enhancing the pivotal learning variables: motivation, responding to multiple cues, self-management, and self-initiations of social interactions.	EBP	TARGET*
Prompting Procedures	Systematic use of supports that provide help to the learner that assists them in becoming independent in using a specific skill.	EBP	TARGET
Rapid Prompting Method	A form of augmentative or alternative communication which involves a therapist using constant, fast-paced questioning, prodding, and engaging of the person with a disability.	Not	NAS
Reinforcement	Something that is done or provided after a behavior that increases the likelihood that the target behavior/skill will occur again in the future.	EBP	TARGET
Response Interruption/ Redirection	The introduction of a prompt, comment, or other distractors when an interfering behavior is occurring. The distractor is designed to divert the learner's attention away from the interfering behavior and results in its reduction.	EBP	TARGET

Scripting	A visual or auditory cue that supports learners to initiate or sustain communication with others.	EBP	NPDC
Self-Management	Teaching learners to to discriminate between appropriate and inappropriate behavior, accurately monitor and record their own behaviors, and reward themselves for appropriate behavior or use of skill.	EBP	NPDC
Sensory Integration Therapy	A collection of strategies and supports designed to help children with poor sensory integration. Sensory integration is the ability to receive, process, and make sense of multiple sensory inputs at the same time.	Not	NAS
Social Skills Training Groups	A form of group or individual instruction designed to teach learners ways to appropriately interact with peers, adults, and other individuals.	EBP	TARGET*
Social Stories/ Narratives	A descriptions of social situations for learners by providing relevant cues, explanation of the feelings and thoughts of others, and descriptions of appropriate behavior expectations.	EBP	NPDC
Structured Play Groups	Small group activities with a defined area, activity, theme, and roles with typically developing peers and an adult scaffolding as needed to support the learner's performance.	EBP	NPDC
Task Analysis	The process of breaking a skill into smaller, more manageable steps in order to teach the skill.	EBP	TARGET
Technology/ Computer-Aided Instruction	Instruction or interventions in which technology is the central feature supporting the acquisition of a goal for the learner.	EBP	TARGET

Time Delay	A practice that focuses on systematically fading the use of prompts during instructional activities.	EBP	TARGET
Video Modeling	A mode of teaching that uses video recording and display equipment to provide a visual model of the targeted behavior or skill.	EBP	TARGET
Visual Supports	Concrete supports utilizing the strength in visual processing	EBP	TARGET

Note. EBP= evidence-based practice, TARGET= The Texas Autism Resource Guide for Effective Teaching, NPDC= National Professional Development on Autism Spectrum Disorder, Research Autism= National Autistic Society (England), *= description was slightly modified to remove information relating to the theoretical basis

The Think-Aloud process greatly informed the modifications to some practice descriptions as the participants in this process had different understandings of some practices when just the NPDC or creator's description was provided. For example, the original description of Peer-Mediated Intervention and Instruction was not specific about the essential component of training peers as the providers of the intervention. One of the Think-Aloud participants shared that they thought incorporating peers within the intervention as playmates may be considered PMII, however, PMII, as defined as an EBP, requires explicit training of peers to provide the intervention (e.g., providing prompting and reinforcement). As such, the description was written more specifically in collaboration with the Think-Aloud participants. The researcher made changes to the descriptions of the following practices: Gentle Teaching™, PMII, modeling, prompting, naturalistic intervention, and PECS.

Identifying teachers' familiarity with a practice. It was important to measure familiarity in this study as it was a hypothesized determinant of practice selection and to reduce potential confounds that have been exposed through previous research when participants may lack familiarity with a practice. Recent qualitative research investigating what practices teachers use to teach students with ASD by Brock and colleagues (2019) shows differing results from the previous research. In their study, teachers described using EBPs and unsubstantiated practices to address high priority individualized education program (IEP) goals for students with ASD. In contrast, previous studies that used survey questionnaires listing all practices showed that special educators working in kindergarten-twelfth-grade settings were more often using unsubstantiated practices than EBPs (Brock et al., 2014; Hess et al., 2008). These conflicting findings may reflect either

61

the efforts to improve dissemination and uptake of EBPs over the last ten years (e.g., Sam et al., 2019) or the different methodologies researchers employed. Brock et al. (2019) argue that the findings in Hess et al. (2008) may be a result of teachers indicating they used practices that had appealing names. To reduce this possible confusion, the ASD Practice Use Questionnaire explicitly asked teachers to indicate their familiarity with the practices, and which of the practices they used at the time of data collection (during the 2019-2020 school year).

In addition to including the construct of familiarity within this questionnaire, the researcher developed new items to capture familiarity that represented varying degrees of familiarity, rather than a dichotomous response option of familiar or unfamiliar (Hugh et al., in press). To do this, the researcher fielded options of varying degrees of familiarity with experts and think-aloud participants. Teachers responded to the following items to represent how familiar they were with each practice, a) I have not heard of it, b) I have heard of it, c) I have observed others to use it, and d) I have used it in my own teaching. To reduce any potential non-response across items, participants were presented with both an option to indicate if they had not heard of or if they had indeed heard of a practice. Because these two options are mutually exclusive, participants were expected to respond to at least one of these items per practice.

Identifying current use of a practice. As part of the ASD Practice Use Questionnaire, ECSE teachers reported their current use of each practice. Participants were presented with an item within the item matrix that read "I have used this practice this school year".

Scoring.

To represent the degree to which a participant was familiar with a practice, each response option endorsing some degree of familiarity (I have heard of it, I have observed others to use it, I have used it within my own teaching) was assigned a value of one and summed for a total value of familiarity. Endorsements for "I have not heard of it" received a value of zero. As such, familiarity scores ranged from zero to three. Current practice use was dummy coded as dichotomous yes or no endorsements.

ASD Practice Selection Task.

The ASD Practice Selection Task is an original tool designed for this study to simulate a decision-making scenario similar to what ECSE teachers experience in their instructional planning for a young student with ASD. There is little research that explores or tests how teachers make practice selections. Notably, the few studies that do present tests of selection have evaluated the effects of making selections (Johnson et al., 2014) or data-based decision-making related to functional behavior assessments (Geiger, Carr & LeBlanc, 2010). Though this literature is important in establishing the need for choice and decision-making in promoting the use of practices, there is still a dearth of information relating to what internal individual factors may be influencing selections in the context of ECSE teachers' instruction. To assess what practice a teacher would select to address a social communication need for a young child with ASD, and maintain the intended purpose of isolating the possible relations with an individual's beliefs, the researcher created a selection task. The task consisted of two parts; a) a vignette describing a student with ASD who needs to develop a social communication skill, and b) questions asking the participants to select a practice from a list of available practices, that they would use to teach the child a social communication skill. To simulate teachers'

actual selection, participants received instructions to "imagine" themselves as the teacher of this student to avoid potential biases (Marsh et al., 2019).

The vignette provided the opportunity to elicit authentic responses from the ECSE teachers, while reducing external variables that may influence their selection (i.e., different characteristics of their own students). Vignettes appear in the decision-making literature across disciplines as they are "designed to approximate, isolate, manipulate, and measure key aspects of the decision-making processes that individuals use in real-world situations." (p. 164, Evans et al., 2014). Using a vignette can serve as a *pragmatic* approach to exploring these individual determinants through the related questions in the associated measures that are brief, applicable, and sensitive to differences (Glasgow, 2013).

For this study, guidelines for vignette-based research by Bradbury-Jones, Taylor and Herber (2014) provided the basis for the design of the vignette. The researcher incorporated clinical perspectives and research from other fields to develop this vignette to represent the characteristics of a student with ASD who would be similar to a student ECSE teachers may have taught. The researcher wrote the vignette to ensure the vignette captured reality, had vignette-participant congruence, reduce the influence of potential bias, and simulate a student with whom they may be familiar to help them position themselves in this situation (Marsh et al., 2019). In order to make the vignette generalizable to teachers' own experience, the vignette excluded information about the gender, name, race, interfering/challenging behaviors, or other unique characteristics of the sample student. In contrast, the vignette included specific details about a skill a child

needed to learn to ensure that all participants were answering questions based on how to teach the same skill. The vignette read as follows:

> You have a three and a half-year-old student with autism spectrum disorder (ASD). The student receives services under this eligibility category in an inclusive classroom. The student has limited play skills, 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. <u>Imagine that you are this student's ECSE teacher and you are responsible for selecting a practice</u> to use to teach them to request help during exploratory or free play (e.g., choice time). Here is the IEP goal: 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 ⅚ times across three consecutive data collection days.
> Following the presentation of the vignette, participants viewed a list of five

practices from which to select for use in addressing the student's SC need. The list of practices included descriptions from the ASD Practice Use Questionnaire. Table 4 includes the criteria for selecting practices included as options. To explore and isolate individual factors (rather than resource or administrative) that may be related to ECSE teachers' selection of a specific EBP, a practice was only included if it: a) was an educational intervention practice, b) was evidence-based according to the NPDC for children 0-5 in addressing SC needs, c) was used to target one goal rather than many skills, d) focused solely on skill acquisition rather than including a behavior reduction component, e) required specific training or certification, and f) is associated with limited or variable use based on empirical evidence (Brock et al., 2019; McNeill, 2019).

Table 4.

Inclusion Criteria for Practice Included as Selection Options

Inclusion Criterion	Exclusion Criterion	Rationale for Criteria	Evidence-Based Practices
Educational Intervention Practice	Medical or diagnostic practices	This study is investigating intervention practices	Practice used to teach a skill with or without specific materials (i.e., not the materials used for a practice)
Evidence-Based Status	Any practice that is not classified by Wong et al. (2015) as an EBP	Evidence-based and unsubstantiated practices that are described as helping people with ASD are both in use and we need to understand why.	From Wong et al. (2015) shown to have evidence for social communication for preschool-ages
Targeted Intervention Practice	"Practices" that are solely materials, rather than the teaching strategy with the materials, practices that address multiple goals at once	Reduce the external barriers associated with implementation	A practice that includes one or a few components, that is used to address one, or only a few goals (i.e., not a comprehensive treatment model or a packaged intervention)
Skill acquisition as primary focus	Interventions that address challenging behavior and aim to reduce a behavior	Adding in other considerations related to challenging behavior could muddy the inferences we could make	A practice that is focused on social communication skill acquisition primarily, not in relation to reduction of challenging/undesirable behavior

Practices that do not require specific certification	Practices that require training from specific organization/people, and/or certification	Certification could function as a barrier and confound the selection decision	A practice that does not require specific certification as described by Wong et al. (2015).
Historical Variable or Limited Use	Practices that are frequently used are not a target of this study.	Trying to understand teachers' beliefs about these practices in order to increase the implementation of them.	Using recent studies: Brock et al. (2017), Brock et al. (2019), and McNeill (2019) to determine the frequency of EBP use.

Of the 20 practices identified as EBPs for SC skills for young children, five practices met these criteria; a) Naturalistic Instruction/Intervention, b) Peer-Mediated Intervention, c) Social Narratives, d) discrete trial teaching and, e) Scripting.

Selection Items. After the presentation of the five practices, items were presented to ascertain what practice a participant would select to try first or last, information related to how they compare practices to one another (i.e., rankings), and brief written descriptions of why they did or did not choose a practice. To reduce potential order effects, the survey software presented all response options in random order across participants.

1. **Item 1**: Which practice will you select to try first for this student? (forced choice)

2. **Item 2**: Which practice are you least likely to select to try for this student? (forced choice)

3. **Item 3:** Please provide a brief (up to 3 sentences) description of why you chose Practice X to try first. (open-ended)

4. **Item 4:** Please provide a brief (up to 3 sentences) description of why you

   indicated you were least likely to try Practice Y. (open-ended)

5. **Item 5:** Rank the remaining three practices in the order in which you would try

   them for this student.

6. **Item 6:** Select any or all of the practices you would not try for this student. (select

   all that apply of five practices, including an option for "I would try all of these").

7. **Item 7:** Is there a practice that was not provided as an option that you would try

   first? (yes/no with write in)

ASD Practice Intentions Scale (APIS) .

The ASD Practice Intentions Scale is based on the previously validated,

Individualized Education Plan Data Collection Intention Scale (IDCIS; Rudolph, 2019).

Grounded in the TPB, the IDCIS provides a measure of ECSE practitioners' beliefs and

intentions as they apply to data collection practices on IEP goals.

> The IDCIS can be used to produce precise measures of teachers' attitudes,
> subjective norms, self-efficacy, controllability, and intentions related to the
> collection of IEP data. Furthermore, the IDCIS scores can be used to make valid
> and reliable inferences about teachers' levels of each construct in order to inform
> the creation and modification of future implementation supports. (p. 3, Rudolph,
> 2019).

 The IDCIS is a 24-item questionnaire assessing participants' attitudes toward data

collection (n = 8 items), subjective norms regarding data collection (n = 6 items), self-

efficacy related to data collection (n = 5), and intentions to collect data (n = 5) to perform

a specific behavior.

In a study of 368 ECSE teachers in the state of Minnesota, researchers determined

that the IDCIS had adequate reliability and validity as a measure of teachers' intentions to

engage in data collection practices and their beliefs ($X^2 = 943.15$ $(df = 246), p =$

$0.00, CFI = .924, SRMR = .100$). The IDCIS accurately and consistently rank-orders individuals as indicated by the person reliability and separation values for each belief (attitude, 0.86 and 2.48; subjective norm, 0.80 and 1.99, self-efficacy, 0.81 and 2.08, respectively). Consistent with previous research on the TPB, structural equation modeling of the IDCIS revealed that attitudes, subjective norms, and self-efficacy account for a significant proportion of variance between individuals' intentions to perform a behavior ($R^2 = 0.317$).

Figure 4.

Structural Modeling Results for IDCIS (Rudolph, 2019)
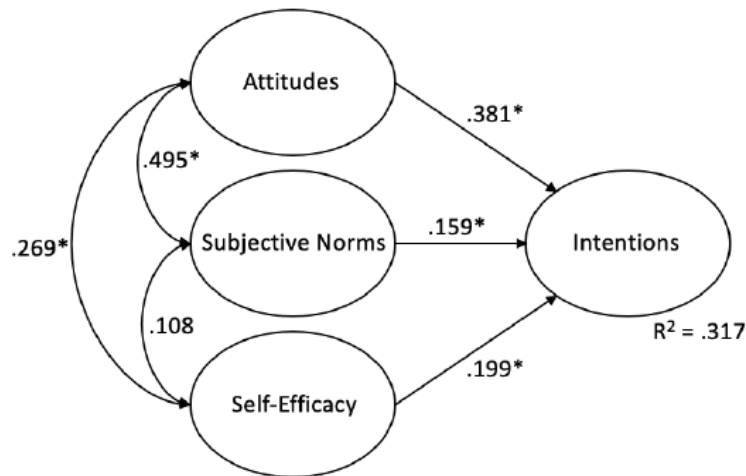
Figure 21. Structural Modeling Results for Model 2.
*p < .05

Note: Image used with permission from Dr. Brenna Rudolph (University of Minnesota)

The IDCIS also includes a measure of participants' actual intentions to use data collection practices (e.g., will you use this practice in the next six months) that were excluded from in this study's questionnaire. The intentions items were excluded because,

in this study, intention was measured within the ASD Selection Task as selection of practices for a vignette child.

IDCIS Scoring. To determine a score for each IDCIS factor (i.e., beliefs; attitudes, subjective norms, self-efficacy) the ratings from each item within a factor are summed and averaged. For example, within attitude, which includes eight items, the ratings are assigned a score of 1-4 (lowest to highest agreement) and then divided by the total number of items within the factor ($n = 8$). Higher scores indicate more favorable beliefs. This method is consistent with previous research on ECSE teachers' self-efficacy (Guo, Dynia, Yeager & Justice, 2014).

The IDCIS provides an item structure that may be a useful measure of teachers' beliefs and intentions when applied to practices other than data collection. The item stems can refer to different practices and practice components. In addition to reading the development study describing the IDCIS, the researcher met with the author of the IDCIS to discuss ways to maintain the purpose of each item while modifying items to refer to the different practices included in the Autism Practice Selection Task. The researcher changed any item referring specifically to IEP data collection to refer instead to the corresponding practice for that version of APIS developed for each practice (i.e., "Social Narratives" for APIS-Social Narratives version). Second, in the current IDCIS, items 5.3 and 5.5 include the task analyzed steps of IEP data collection. These items were modified specific to each version to include the NPDC practice elements of each of the five practices (NPDC Implementation Checklists). These minimal changes lead to five versions of the APIS (APIS: Naturalistic Intervention, APIS: Discrete Trial Teaching, APIS: Peer-Mediated Intervention, APIS: Scripting, APIS: Social Narratives). Each

participant completed each of the five versions of APIS in a randomized order across participants.

Demographics Questionnaire.

Demographic information for reporting purposes (e.g., age, race, gender) was collected as well as more specific information hypothesized or shown to correlate with teachers' beliefs (e.g., years of experience teaching, teacher licensure area, number of students with ASD they serve). All demographics questions were optional.

Data Collection Using the Study Questionnaire to Address the Primary Aims

Procedure

The University of Minnesota Institutional Review Board (IRB) reviewed this study and determined that it was exempt from continued oversight as research involving human subjects.

Recruitment. After approval of exempt status from the University Institutional Review Board (IRB), the researcher contacted teachers, special education coordinators, university special education faculty, and national organizations for special educators with information about the study. The researcher recruited the sample via a modified Snowball sampling procedure, as no list of licensed ECSE teachers nationwide is available (Nardi, 2014). All recruitment materials included information about the researcher, study purpose, participant eligibility, incentives, and participation requirements. In addition, materials included a request that participants distribute the information to ECSE teachers in their programs. Recruitment occurred in two waves.

Wave one recruitment involved participants accessing an anonymous link to participate directly in the survey in at least one of a few ways; a) directly by school

administrators (in Minnesota), b) directly by colleagues of the researcher (Tennessee, Minnesota, Washington, Texas, North Carolina, Kentucky, and Illinois), or c) via a study website link shared on social media (Twitter© and Facebook©). Specifically, in Minnesota, a Minnesota Department of Education (MDE) list of early childhood special education coordinators was acquired with permission from MDE through a university colleague ($n = 139$ special education leaders, $n = 350$ ECSE teachers). Twenty-two coordinators replied to the email, agreeing to forward information to their staff. Resulting from these recruitment efforts, on the first day of opening the survey for responses (February 7, 2020), 53 authentic responses and 247 inauthentic responses were gathered. After seven hours, the researcher closed the survey and made procedural modifications to reduce the opportunity for inauthentic responses in the second wave of recruitment and data collection. In all, wave one contributes 53 responses of the total 222 for the study.

Following approval of modifications to the procedures from the University's IRB, wave two recruitment started on February 24, 2020 (survey closed March 23, 2020). The researcher opened a modified version of the survey and recruitment was re-initiated through direct contact from known sources (district administrators, ECSE teachers from Minnesota, professional colleagues, autism researchers, and faculty at teacher preparation programs, the Council for Exceptional Children Division for Autism and Developmental Disabilities, and the Council for Exceptional Children Division of Early Childhood). The researcher also made a generic social media post about the study that excluded links to the survey itself but prompted interested individuals to contact the researcher. Like in wave one, the researcher also asked participants to share the information with ECSE teachers they knew. Regardless of contact method in this wave, potential participants then

72

completed a screener distributed via Qualtrics™ that included BOTS protections and ensured eligibility. After completing the screener, eligible participants received a unique link to complete the survey with the request to take the survey at a time and place where they can focus and carefully consider options (Stolte, 2001). Potential participants received reminders to complete the survey if they had not completed it within approximately two weeks of receiving their link, or if their link was due to expire based on their last use being six days from their initiating the survey. By the close of wave two, 272 people completed the screener, 17 of whom were ineligible (did not currently teach a student with ASD or were not a licensed teacher). One hundred seventy-one of the eligible participants ($N = 255$) from wave two completed the survey (62%). Very few (.5%) survey responses during this wave were incomplete and therefore excluded. In all, wave two contributed 171 of 222 participants.

The researcher provided the questionnaire to participants via Qualtrics™. Based on a pilot by the researcher, the survey was estimated to take approximately 30 minutes to complete. Though some participants left the survey window open on their computer or completed it in multiple sittings, thus some participants' duration was excessively long (e.g., 900 minutes), the majority of participants took approximately 30-40 minutes to complete the questionnaire. The first section of the questionnaire included a description of the study along with questions relating to the inclusion criteria (read and understand English, 18 years old or older, currently teaching a student with ASD, and early childhood special educator) and consent. Participants were able to access complete it in a location and at a time of their choosing through March 23, 2020. Figure 5 depicts the tools in the order in which they were presented within one questionnaire.

Figure 5.

Presentation Order of Tools Within Questionnaire

Note: randomized order of presentation of the APIS presentations
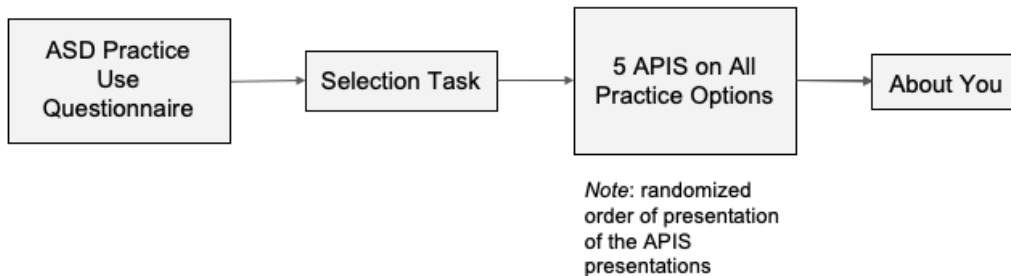
Data Integrity The first version of the questionnaire included all recommended BOT protections from Qualtrics (reCAPTCHA, preventing ballot box stuffing). The researcher developed decision rules for the first batch of data to evaluate data integrity. These decision rules included criteria for ensure accurate patterns of responding, analysis of open-ended questions for their response to the actual questions, detection of duplicate IP addresses, and evaluation of short durations of responding. Any responses that did not meet authenticity criteria were not included in this study. In the second version of the survey, the research assured data integrity through the stricter recruitment procedures for the second wave of data collection along with added BOTS protections including; using "Honey Pot" questions that only display via back-end access to the survey and adding inattention checks (Simone, 2019). An example of an embedded Honey Pot question within the ASD Practice Selection Task. It read, "Please select the best practice to use" and had three response options of practices from the Autism Practice Use Questionnaire. The design of this question followed recommendations to make Honey Pot questions related to the content to not flag potential programmers that the question was a Honey Pot question. If the survey was accessed via the back-end, these questions were displayed. An

74

example of an inattention check added to the ASD Practice Use Questionnaire added a generic practice called "Teaching" and instructed participants to select "I have used this practice this schoolyear" to show they were human. In addition to the application of the original data decision rules for authenticity, the researcher created criteria to exclude data from a participant if their responses included two failed inattention checks and any response to a Honey Pot question. On review, no such responses existed.

Incentives. Following review of submitted responses using data integrity decision rules described above, participants who completed the survey with integrity were paid a $30 e-gift card.

Participants Meeting Criteria for Inclusion in Analyses

A total of 222 licensed special educators who currently serve at least one student with autism spectrum disorder (ASD) aged 3-5 years old in preschool settings responded to all of the primary outcome items in the questionnaire. This sample is approximately 1.5% of the school-based ECSE teachers in the United States (U.S. Bureau of Labor Statistics, 2019). Due to the nature of snowball sampling, an accurate response rate is not possible to calculate, however, estimates of response rates are described in the recruitment section in relation to both recruitments waves.

Demographics The majority of participants provided optional general demographic information. Table 5 presents the available participant demographic data. Participants from 27 states responded to the survey with the majority being from Minnesota (52.7%) and the second largest portion from North Carolina (8.6%) and Illinois (6.8%). Participants worked in six of the seven regions of the United States, except for the Pacific (Hawaii and Alaska; U.S. Census Bureau). There are no national

databases that include the race of preschool special education teachers, however, this sample was close to the nationwide demographic make-up of kindergarten-12th grade teachers (U.S. Department of Education, 2016). The vast majority of participants identified their race and ethnicity as White/Caucasian (89.6%), with all other groups being less than 3%. Women made up 95% of participants, with 1.8% male and 1.8% indicating they prefer to self-describe, though they did not provide a description. The majority (95%) of participants worked 40 hours a week.

Participants provided information about their licensure and teaching history that was relevant to this study. Because initial licensure may speak to the most comparable types of training, whereas teachers may earn current licenses through variable training methods (e.g. alternative license, add-on licenses through classroom-based teaching experience), participants were asked to provide their initial licenses. For special education, the number and types of licenses vary by state, however, most states include some type of license for special educators serving children under the age of five (e.g., Early Childhood Special Education license in the state of Minnesota, these licenses tend to range from birth through eight years old across states), and types of licenses that are either disability-specific (e.g., Autism license in the state of Minnesota) or are specific to different levels of student needs (e.g., Moderate/Severe and High Incidence licenses in Tennessee) for students who are ages five to 21. The majority of participants had at least an initial ECSE license, and 38% initially earned more than one license. Of the participants who responded, All other special education license types were represented, with a range of .5-11.7% of participants holding these licenses. Teachers' years of licensed teaching experience varied from less than one year (7.7%) to more than 23 years

(8.6%) with the plurality of participants teaching for four to eight years (27.9%). A similar pattern was observed for years that teachers spent working with children with disabilities in birth-preschool classrooms with 8.6% having spent less than one year, 5.4% more than 23 years, and the plurality having spent 4-8 years (29.3%).

Table 5.

Participant Demographic Information

	Participant Demographic Information		
		n	%
State	Alabama	1	0.5
	California	3	1.4
	Colorado	4	1.8
	Delaware	2	1
	District of Columbia	4	1.8
	Florida	2	0.9
	Idaho	4	1.8
	Illinois	15	6.8
	Indiana	1	0.5
	Kansas	1	0.5
	Kentucky	3	1.4
	Michigan	2	0.9
	Minnesota	119	53.7
	Missouri	2	0.9
	Nebraska	3	1.4
	Nevada	5	2.3
	New Jersey	2	0.9
	New York	1	0.5
	North Carolina	19	8.6
	Ohio	1	0.5
	Oregon	4	1.8
	Pennsylvania	3	1.4
	Tennessee	7	3.2
	Texas	4	1.8
	Utah	1	0.5
	Virginia	3	1.4
	Washington	5	2.3
Race	American Indian/Alaska Native	1	0.5
	Asian	5	2.3

		n	%		
	Black/African American	5	2.3		
	Latino/a/x	2	0.9		
	Native Hawaiian/Other Pacific Islander	1	0.5		
	White/Caucasian	199	89.6		
	Self-Describe	2	0.9		
Gender	Female	211	95		
	Male	4	1.8		
	Self-Describe	4	1.8		
Initial License Type	Autism Spectrum Disorder	7	3.2		
	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		

		Licensed		Preschool	
		n	%	n	%
Time Licensed & Working in Preschool	<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. $N = 222$

In addition to personal demographics, participants provided general information on their caseload and classrooms for the 2019-2020 school year (see Table 6). As ECSE teachers often serve students in multiple settings, teachers could select all classroom

models that they worked in during the 2019-2020 school year. Most teachers currently work in at least one inclusive setting (special educator-led inclusive, 26.1%; general educator-led inclusive, 34.3%; or co-taught inclusive, 24.8%) and the majority worked in a self-contained setting (52.7%), Teachers had varying numbers of students with disabilities on their caseloads (range 1-5 to more than 25), with most having 6-10 (28.4%) or 11-15 (28.4%). The majority of participants had at least one student who is an English Language Learner (ELL) on their caseload (74.8%), with the majority plurality having less than half (49.5%) and some (2.7%) having all students who are ELL. The majority of teachers (50.9%) spent five days per week in classrooms with students with ASD with very few spending minimal time with students with ASD (less than one day per week, 1.4%).

Table 6.

Participants' Classroom and Caseload Demographics

Participants' Classroom and Caseload Demographics			
		n	*%*
Classroom Models	Inclusive Led by Special Education	58	26.1
	Self-Contained	117	52.7
	Inclusive: General Education with "push-in"	76	34.2
	Inclusive Co-Taught	55	24.8
	ECSE Other	10	4.5
	Multiple Models		
Number of Hours	<10 Hours	0	0
	10-20 Hours	4	1.8
	21-30 Hours	7	3.2
	31-40 Hours	211	95
Number of Students on Caseload	1-5 Students	9	4.1
	6-10 Students	52	23.4
	11-15 Students	63	28.4
	16-20 Students	63	28.4
	21-25 Students	23	10.4
	>25 Students	12	5.4
Time with Students with ASD	5 Days/Week	113	50.9
	4 Days/Week	72	32.4
	3 Days/Week	18	8.1
	2 Days/Week	14	6.3
	1 Day/Week	1	0.5
	<1 Day/Week	3	1.4
Proportion of Students who are ELL	None	56	25.2
	Less Than Half	110	49.5
	About Half	28	12.6
	More Than Half	22	9.9
	All	6	2.7

Note. *N* = 222

Data Analysis

R Studio ™ and SPSS V. 25 (2017) were used to summarize data and run analyses. Procedures used for data analyses are described below in relation to each research question.

Research Question #1: What proportion of ECSE teachers are familiar with evidence-based and unsubstantiated SC practices? Which practices do they report using? Descriptive data from the ASD Practice Use Questionnaire were summarized and presented to describe the following; (a) percentage of participants who had heard of, observed others to use, or had used each evidence-based and unsubstantiated practices, (b) median degree of familiarity with practices across participants using the familiarity score, (c) percentage of participants who indicated they currently use each evidence-based and unsubstantiated practices. The researcher also performed Chi-Square tests of independence to explore any relations between participants' degree of familiarity and their current use of a practice.

Research Question # 2: What is the distribution of practices ECSE teachers selected to try first and least likely to try to address an SC need of a student with ASD? Descriptive data from the ASD Practice Selection Task were summarized and presented to describe the following; a) percentage of participants who had selected each of the key EBPs to try first, b) percentage of participants who had selected each of the five practices as their last choice, c) percentage of participants who indicated they would not try each of the five practices, and d) the distribution of rankings of the five key EBPs. In addition, the researcher performed multinomial logit modeling using a base model

(i.e., no predictors in the model) to investigate differences between rates of practices selected as first and last choice.

Research Question # 3: What are ECSE teachers' beliefs (self-efficacy, attitude, subjective norms) about a key EBPs used to address an SC need of a student with ASD? The researcher calculated mean scores for each of the beliefs factors (self-efficacy, attitude, subjective norms) for all five practices, and an Overall Beliefs score (mean of the factor scores). These descriptive data were summarized to describe the ratings for each factor and the Overall Beliefs score by practice and by ranking of that practice.

Research Question # 4: Do beliefs about key SC practices predict practice selection of an EBP to address an SC need of a student with ASD? The researcher used Discrete Choice Analysis via multinomial logit modeling to test the effects of beliefs. Discrete Choice Analysis (DCA) helps identify consumers' (in this case, teachers') perception of the utility of different choices. Though measured and designed for individual-level behavior, DCA provides information on the aggregate that helps explain the behavior of groups of people (Ben-Akiva et al., 1997). Using this analysis requires that the set of choices be mutually exclusive and exhaustive (Train, 2009). In this study, the list of available choices along with the instructions to choose one to try first and one being least likely (i.e., maintaining that there need only to be one thing to try at first but you could consider trying all practices), allowed for this type of analysis to be applied. In DCA, explanatory or predictive variables can be choice-dependent (e.g., price of a product), individually-dependent (e.g., a person's age), or a combination of choice and individual dependence as item-participant variables (e.g., an individual's distance for

to travel to a specific location). In this study, an individual's beliefs about a specific

practice are considered item-participant variables. In other words, the beliefs variables

were specific to each individual and to each choice available. These types of variables

can help inform conclusions that the utility of a selected practice is both individually

dependent and interacts with the features of choices (i.e., practices, Allison & Christakis,

1994).

Due to the unordered, categorical nature of the outcome (i.e., response options are

the practices), the researcher used multinomial logit modeling to determine the relative

probability that a participant would select a practice given their beliefs about the practice.

Using multinomial logit modeling, the relative probability that a teacher selected the

practice is the log odds, relative to a reference group. For example, here is the log-odds

that the person selects Scripting to try first:

$$\varphi_{scriptfirst} = \frac{1}{1 + \exp\left\{-\eta_{scripttryfirst}\right\}}$$

The researcher hypothesized that participants would more often select a practice to

try first if they held favorable beliefs (i.e., higher beliefs ratings) about the practice. In

contrast, it was hypothesized that participants would more often select a practice as least

likely to try if their beliefs about the practice were less favorable. To test these

hypotheses, the researcher used two models; one model tested the predictive effects of

beliefs on their selection of a practice to try first, and the other tested the predictive

effects of beliefs on their selection of a practice as least likely to try. To inform

professional development providers and researchers, the specific question focused on

identifying if beliefs about a specific practice predict use of that same practice (e.g.,

beliefs about DTT predicting selection of DTT). Therefore no interaction terms were

included in the models:

$$ln(\hat{\pi}_i|1-\hat{\pi}_i) = \beta_0 + \beta_{NIBeliefs} + \beta_{DTTBeliefs} + \beta_{SNBeliefs} + \beta_{PMIbeliefs} + \beta_{ScriptBeliefs}$$

Variables

- tryfirst: the categorical dependent variable for the model predicting which practice a participant selects first, response options include: NI, DTT, PMI, Scripting, and SN
- leastlikely: the categorical dependent variable for the model predicting which practice a participant selects first, response options include: NI, DTT, PMI, Scripting, and SN
- NIBeliefs: a participants' Overall Beliefs score (mean score of factors: attitude, subjective norms, self-efficacy) about Naturalistic Intervention
- DTTBeliefs: a participants' Overall Beliefs score (mean score of factors: attitude, subjective norms, self-efficacy) about Discrete Trial Teaching
- SNBeliefs: a participants' Overall Beliefs score (mean score of factors: attitude, subjective norms, self-efficacy) about Social Narratives
- PMIBeliefs: a participants' Overall Beliefs score (mean score of factors: attitude, subjective norms, self-efficacy) about Peer-Mediated Instruction and Intervention
- ScriptBeliefs: a participants' Overall Beliefs score (mean score of factors: attitude, subjective norms, self-efficacy) about Scripting

Model Assumptions. Multinomial Logit Modeling assumes three characteristics

of the data; low collinearity between predictors, independence of the sample, and a linear

relationship between predictors and outcome (Train, 2009). The researcher explored

collinearity and the linear relations between predictors and the outcome prior to

evaluating the models predicting selection (see Chapter 4). Though there is no empirical

test for independence, the diverse sample and the variables of interest being individual-

level suggest these data could be considered independent (i.e., the Beliefs score for one

person is not dependent on the Beliefs score for another person). The researcher recruited

the sample through national listservs and multiple states representing different regions of

the United States. The sample then included participants from 27 states with varying

years of teaching experience and types of classroom experiences (e.g., classroom types).

In addition, the predictors (Beliefs) are individual-level data that are inherently subjective and dependent on an individual's experience and thoughts (Ajzen, 1991). This suggests that an individual's self-report of their beliefs about a practice is not dependent on another individual's self-report of their own beliefs.

Missing data

Participants' responses were included in the analyses if they missed no more than two items within each tool. Within the Autism Practice Use Questionnaire, participants were excluded if they did not respond to any items for one of the five Autism Practice Selection Task (DTT, NI, SN, Scripting, PMII). The researcher only imputed data for the score for their degree of familiarity. On occasion ($n = 5$), participants did not select that they had heard of a practice, but selected they used a practice. Knowing that at some point before using a practice, one must have been exposed to it (i.e., heard of it), in the few cases when a participant neglected to select "I have heard of it" but did select that they had observed others to use it or that they have used the practice themselves, it was imputed that they also had a code of 1 for "I have heard of it". Because the ASD Practice Selection Task included forced responses for all quantitative items (practice to try first, practice least likely to try, and ranking), all participants responded to all items, and no data were imputed.

For the five APIS tools, random data were occasionally missing for up to two items per participant. For example, they may have responded to all items within the self-efficacy factor for naturalistic intervention, but neglected to indicate their degree of confidence in identifying the routine (one item of six items for this factor). In such cases, the mean was imputed for their response to the item within that factor, and then assigned

to the missing item. Data imputation only occurred for 17 of the participants (7.6%). This

method of imputing and handling missing data is considered to reduce bias and error

(Enders, 2012; Nardi, 2014).

Chapter 4 - Results

This study aimed to identify critical factors related to the selection and implementation of key EBPs for social communication skill development for young children with ASD by: a) characterizing ECSE teachers' familiarity with and current use of EBPs and unsubstantiated practices, b) describing their selection of practices from a set of key EBPs, c) identifying their beliefs about key EBPs, and d) identifying if ECSE teachers' beliefs about practices predict their practice selections. This chapter presents the study results organized by the four research questions. Subsections are also provided to detail specific component results for each question.

Research Question #1: Familiarity and Use of EBPs and Unsubstantiated Practices

ECSE teachers provided ratings of their familiarity with and current use of EBPs and unsubstantiated practices designed to address SC needs of young children with ASD using the ASD Practice Use Questionnaire. To ascertain a participants' familiarity with each practice, participants endorsed any of the following items that were true for them; a) I have heard of the practice, b) I have observed others to use the practice, and c) I have used the practice. These items comprised the score for a participants' degree of familiarity. A score of one was assigned to each item and then summed to create a familiarity score. The range of possible scores was from zero (have not heard of the practice) to three (have heard of it, observed others to use it, and have used the practice). To ascertain an ECSE teachers' current use of each practice, participants indicated whether they had used the practice within the current school year. Table 7 provides the proportion of participants endorsing each familiarity item, median degree of familiarity,

and the percent of participants endorsing their current use of the practice (i.e., have used it this school year) for each of the EBPs and Unsubstantiated Practices ($N = 33$).

Table 7.

Familiarity With and Current Use of EBPs and Unsubstantiated Practices

	Familiarity								Current Use	
	Heard Of		Observed		Used		Degree		Use	
	n	*%*	*n*	*%*	*n*	*%*	*M*	IQR	*n*	*%*
	Evidence-Based Practices									
Antecedent-Based Interventions	176	79.3	119	53.6	146	65.8	1	2.00	127	57.2
Differential Reinforcement	202	91.0	155	69.8	182	82.0	3	1.00	160	72.1
Discrete Trial Training	191	86.0	141	63.5	124	55.9	2	2.00	88	39.6
Extinction	191	86.0	124	55.9	153	68.9	3	2.00	103	46.4
Functional Behavior Assessment	217	97.7	185	83.3	184	82.9	3	1.00	125	56.3
Functional Communication Training	143	64.4	110	49.5	110	49.5	2	3.00	95	42.8
Modeling	217	97.7	192	86.5	214	96.4	3	0.00	216	97.3
Naturalistic Intervention	111	50.0	79	35.6	92	41.4	1	3.00	82	36.9
Parent-Implemented Interventions	147	66.2	66	29.7	71	32.0	1	2.00	45	20.3
Peer-Mediated Intervention	148	66.7	71	32.0	82	36.9	1	3.00	60	27.0
Picture Exchange Communication System	209	94.1	190	85.6	187	84.2	3	0.00	145	65.3
Pivotal Response Training	138	62.2	73	32.9	68	30.6	1	2.00	50	22.5
Prompting	164	73.9	149	67.1	165	74.3	3	2.00	150	67.6
Reinforcement	216	97.3	168	75.7	210	94.6	3	0.00	210	94.6

							M	IQR		
Response Interruption/ Redirection	133	59.9	74	33.3	91	41.0	1	3.00	76	34.2
Scripting	189	85.1	124	55.9	133	59.9	3	2.00	108	48.6
Self-Management	149	67.1	81	36.5	75	33.8	1	3.00	46	20.7
Social Skills Training Groups	205	92.3	141	63.5	142	64.0	3	2.00	119	53.6
Social Stories/ Narratives	216	97.3	188	84.7	205	92.3	3	0.00	177	79.7
Structured Play Groups	199	89.6	136	61.3	136	61.3	2	1.75	142	64.0
Task Analysis	216	97.3	168	75.7	194	87.4	3	1.00	179	80.6
Technology Aided Instruction	113	50.9	64	28.8	54	24.3	1	2.00	28	12.6
Time Delay	179	80.6	124	55.9	144	64.9	3	2.00	121	54.5
Video Modeling	192	86.5	130	58.6	108	48.6	2	2.00	46	20.7
Visual Supports	216	97.3	201	90.5	211	95.0	3	0.00	214	96.4
Unsubstantiated Practices										
Animal Therapy	194	87.4	41	18.5	6	2.7	3	0.00	2	0.9
Auditory Integration Training	104	46.8	35	15.8	16	7.2	0	1.00	0	0.0
Facilitated Communication	180	81.1	117	52.7	109	49.1	2	2.00	76	34.2
FloorTime™	187	84.2	130	58.6	143	64.4	3	2.00	115	51.8
Gentle Teaching™	69	31.1	38	17.1	50	22.5	0	1.00	44	19.8
Integrative Movement Therapy	76	34.2	22	9.9	17	7.7	0	1.00	12	5.4
Rapid Prompting Method	77	34.7	26	11.7	12	5.4	0	1.00	10	4.5
Sensory Integration Therapy	202	91.0	143	64.4	117	52.7	2	2.00	95	42.8

Note. $N = 222$, *M* = Median, IQR = Intra Quartile Range

Familiarity with Evidence-Based Practices

Overall, the majority of participants reported they had heard of the majority of practices. The median degree of familiarity for all EBPs was above zero, suggesting that most ECSE teachers have at least heard of all or most of the EBPs presented in the ASD Practice Use Questionnaire. Familiarity with specific practices is described below in relation to the median degree of familiarity across participants, the distribution of the degrees of familiarity across participants, and the percent of participants who had at least some exposure to each practice (i.e., had heard of the practice), which is presented in parenthesis for each practice. Figure 6 displays the distributions of familiarity for each practice. The boxplots show the median degree of familiarity along with the Intraquartile Ranges (IQR), which provides an index of the variability in familiarity across participants. Across practices, as the degree of familiarity decreased with practices, variability in familiarity increased. Figure 7 displays the percent of respondents endorsing each familiarity item for EBPs. Across EBPs, as the degree of familiarity decreased with practices, variability in familiarity increased.

Figure 6.

Boxplot of Familiarity Distributions for Evidence-Based Practices
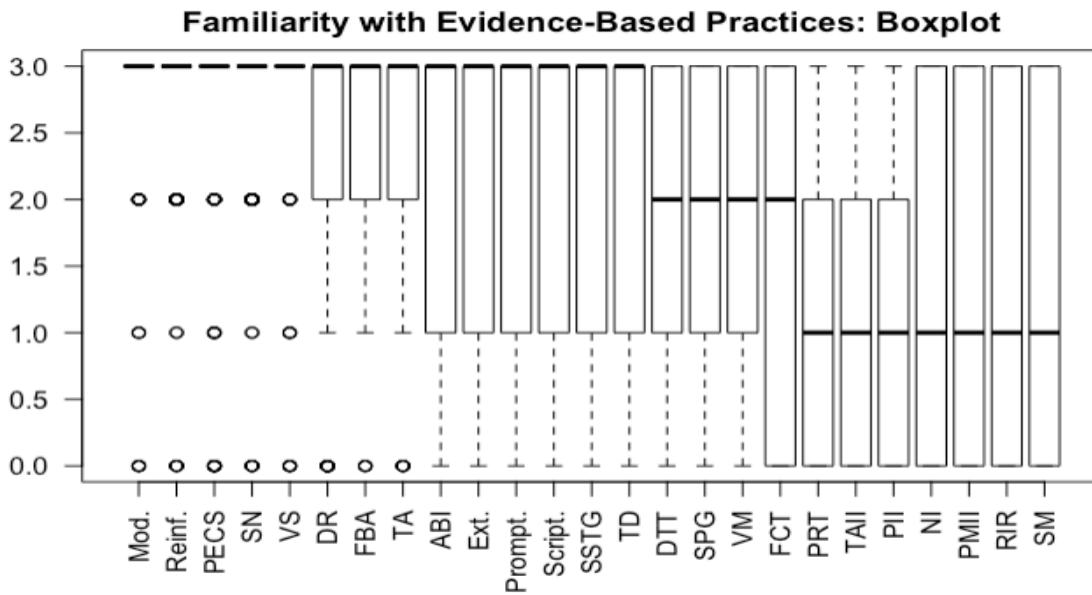
Note. Organized by the highest median degree of familiarity to lowest, then by increasing variability. Mod. = Modeling, Reinf. = Reinforcement, PECS = Picture Exchange Communication System, SN = Social Narratives, VS = Visual Supports, DR = Differential Reinforcement, FBA = Functional Behavior Assessment, TA = Task Analysis, ABI = Antecedent-Based Intervention, Ext. = Extinction, Prompt. = Prompting Procedures, Script. = Scripting, SSTG = Social Skills Training Groups, TD = Time Delay, DTT = Discrete Trial Teaching, SPG = Structured Play Groups, VM = Video Modeling, FCT = Functional Communication Training, PRT = Pivotal Response Training, TAII = Technology Aided Instruction/Intervention, PII =Parent-Implemented Intervention, NI = Naturalistic Intervention, PMII = Peer-Mediated Instruction & Intervention, RIR = Response Interruption/Redirection, and SM = Self-Management.

Figure 7.

ECSE Teachers' Familiarity With and Current Use of Evidence-Based Practices
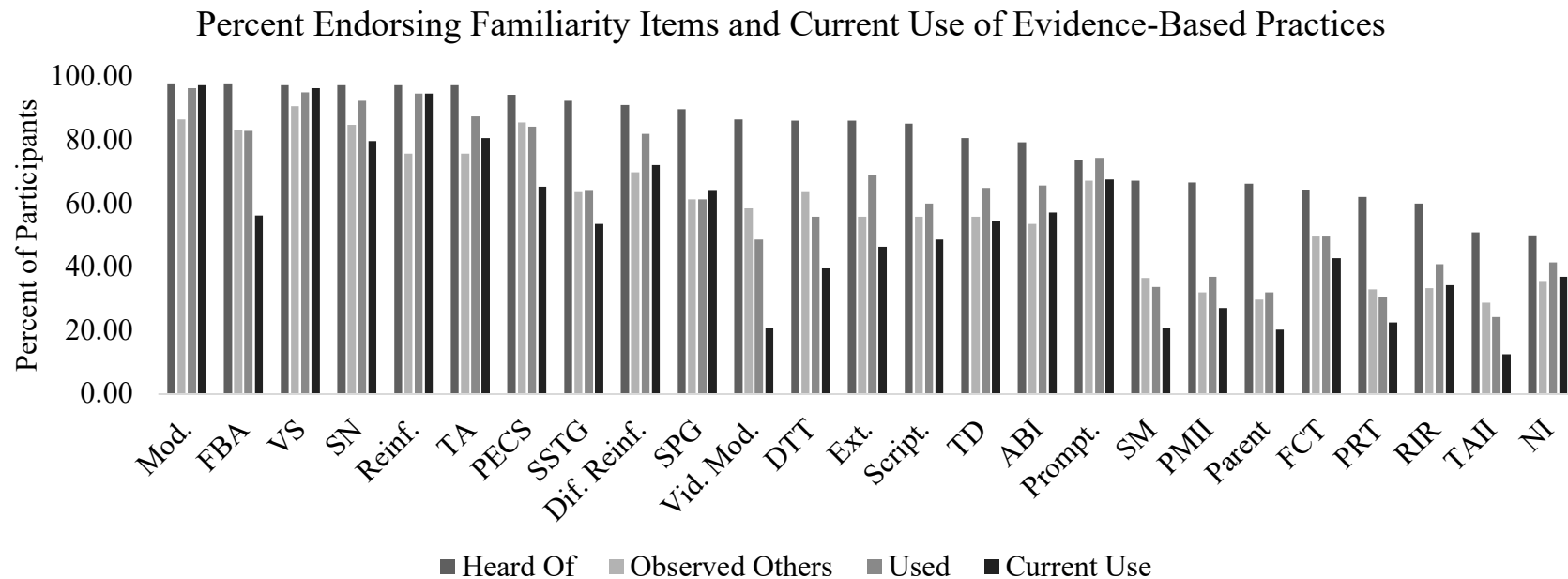
Percent Endorsing Familiarity Items and Current Use of Evidence-Based Practices

Note. Organized by most frequently heard of, then most frequently observed, then most frequently used, then most frequently currently use. ABI = Antecedent-Based Intervention, Differential Reinforcement, DTT = Discrete Trial Teaching, Ext. = Extinction, FCT = Functional Communication Training, FBA = Functional Behavior Assessment, Mod. = Modeling, NI = Naturalistic Intervention, PII = Parent-Implemented Intervention, PMII = Peer-Mediated Instruction & Intervention, PECS = Picture Exchange Communication System, PRT = Pivotal Response Training, Prompt. = Prompting Procedures, Reinf. = Reinforcement, RIR = Response Interruption/Redirection, Script. = Scripting, SM = Self-Management, SSTG = Social Skills Training Groups, SN = Social Narratives, SPG = Structured Play Groups, TA = Task Analysis, TAII = Technology Aided Instruction, TD = Time Delay, VM = Video Modeling, VS = Visual Supports.

EBPs With Which ECSE Teachers Were Highly Familiar. Overall, ECSE teachers

were highly familiar with many EBPs (*n* = 12) and there was little variability across these

practices. Most ECSE teachers were highly familiar with (*Mdn* = 3) twelve of the 27

EBPs. When exploring variability between teachers, the IQR (0) reveals that ECSE

teachers were most often highly familiar (i.e., *Mdn* = 3, had heard of, observed others

use, and used), and nearly all participants had heard of a subset of practices. Including,

modeling (97.75%), visual supports (97.3%), social narratives (97.3%), reinforcement

(97.3%), and picture exchange communication systems (94.14%). Though ECSE teachers

overall were highly familiar with some practices, there was more variability across the

participants (*IQR* = 1) for differential reinforcement (90.99%), functional behavior

assessment (97.75%), and task analysis (97.3%).

Of the practices with the highest degree of familiarity across participants, there

was the most variability (*IQR* = 2) in their familiarity with social skills training groups

(92.34%), extinction, (86.0%), scripting (85.14%), and time delay (80.63%). For

example, for social skills training groups, specifically, though nearly all participants had

heard of the practice, only 63.39% of participants used that practice themselves,

approximately how many had also observed the practice. Participants' responses for

scripting revealed the same pattern (see Figure 7). Participants' familiarity was not highly

variable (*IQR* = 3) for any practice with which the group had the highest degree of

familiarity (*Mdn* = 3).

EBPs With Which ECSE Teachers Were Moderately Familiar. Compared to

EBPs with which ECSE teachers had the highest degree of familiarity, EBPs with which

participants were moderately familiar (*Mdn* = 2) had more variability in their familiarity

scores (*IQR* = 1.75-3). Participants were moderately familiar with (*Mdn* = 2, indicating they have heard of and either used or observed others use the practice) structured play groups (89.4%), discrete trial teaching (86.4%), video modeling (86.4%), and functional communication training (64.41%). Of these, there was the least, though some, variability in participants' familiarity with structured play groups (*IQR* = 1.75) and the most for functional communication training (*IQR* = 3). Like for scripting and social skills training groups, many participants had heard of discrete trial teaching and video modeling though they were much less often observed or used (discrete trial teaching, 63.51% observed, and 55.86% used; video modeling, 58.56% observed, and 48% used).

EBPs With Which ECSE Teachers Were Minimally Familiar. Participants had low familiarity with the remaining EBPs (*Mdn* = 1, indicating they have only heard of the practice). There was the greatest variability across participants for these practices (*IQR* = 2-3): antecedent-based intervention (79.28%), self-management (67.2%), peer-mediated instruction and intervention (66.67%), parent-implemented intervention (66.22%), pivotal response training (62.16%), response interruption/redirection (59.91%), technology aided instruction and intervention (50.9%), and naturalistic intervention (50%). EBPs with the lowest degree of familiarity and highest variability (*IQR* = 3) meaning most participants' familiarity varied across the full continuum of familiarity for naturalistic intervention, peer-mediated instruction and intervention, response-interruption/redirection, and self-management.

Like with practices with which participants high familiarity, a few of the practices with which ECSE teachers were minimally familiar showed a pattern of many participants having heard of the practice but not observing or using the practice. For

technology aided instruction and intervention, though 50.9% had heard of the practice, only 24.32% indicated they had ever used it. Participants were minimally familiar with a few other practices that showed this same discrepant pattern; peer-mediated instruction and intervention (66.67% heard of, 36.94% used), pivotal response training (61.16% heard of, 30.63% used), response interruption/redirection (59.91% heard of, 40.99% used).

Familiarity with Unsubstantiated Practices

Figure 8.

ECSE Teachers' Familiarity With and Current Use of Unsubstantiated Practices
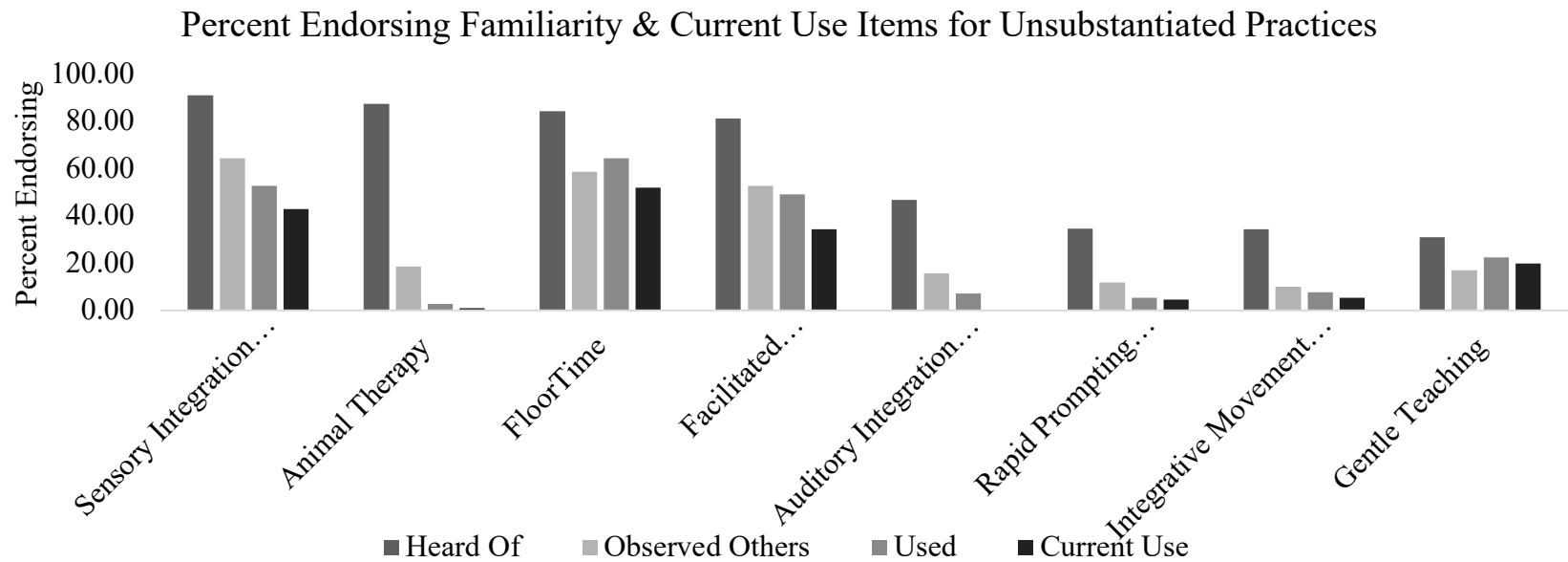
Percent Endorsing Familiarity & Current Use Items for Unsubstantiated Practices

Note. Organized by most frequently heard of, then most frequently observed, then most frequently used, then most frequently currently use. Sensory Integration = Sensory Integration Therapies, Facilitated = Facilitated Communication, Auditory Integration = Auditory Integration Training, Rapid Prompting = Rapid Prompting Method, Integrated Movement = Integrated Movement Therapy,

Figure 9.

Boxplot of Familiarity Distributions for Unsubstantiated Practices

Familiarity with Unsubstantiated Practices Boxplot
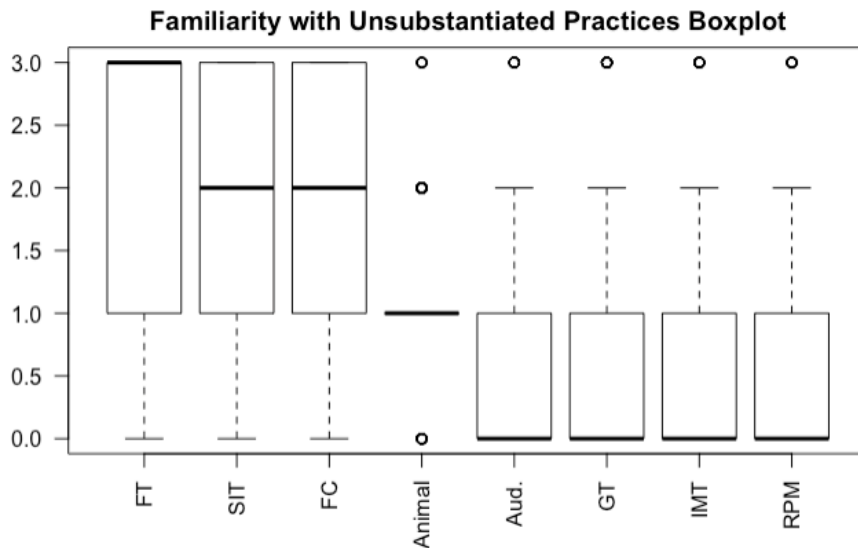
Note. Organized by the highest Mdn degree of familiarity to lowest, then by increasing variability. FT = FloorTime™, SIT = Sensory Integration Therapies, FC = Facilitated Communication, Animal = Animal Therapies, Aud.= Auditory Integration Training, GT = Gentle Teaching, IMT = Integrated Movement Therapy, and RPM = Rapid Prompting Method.

Figure 8 displays the percentage of respondents endorsing each familiarity item for the unsubstantiated practices presented in the ASD Practice Use Questionnaire. Overall, ECSE teachers were familiar with fewer unsubstantiated practices than EBPs. The fewest participants had only heard of unsubstantiated practices (Gentle Teaching™, 31.8%; integrative movement therapy, 34.23%; and rapid prompting method, 34.68%). Familiarity with specific practices is described below in relation to the median degree of familiarity across participants, the distribution of the degrees of familiarity across participants, and the percent of participants who had at least some exposure to each practice (i.e., had heard of the practice), which is presented in parenthesis for each practice. Compared to EBPs, ECSE teachers' familiarity was less variable across

unsubstantiated practices. Figure 9 is a boxplot showing the distributions of familiarity

distributions for unsubstantiated practices. Unlike for EBPs, as the proportion of teachers

familiar with practices decreased, the variability also decreased.

Unsubstantiated Practices With Which ECSE Teachers Were Highly

Familiar. Participants had the highest degree of familiarity (*Mdn* = 3, indicating they

have heard of, observed others use, and used the practice) with a few unsubstantiated

practices (sensory integration therapies, 90.99%; facilitated communication, 81.08%;

rapid prompting method, 34.68%). Of these, there was minimal variability across

participants in their familiarity with animal therapy and sensory integration therapies.

These two practices showed differing familiarity, however, as very few ECSE teachers

had ever used animal therapy (2.70%), and many participants indicated they had used

sensory integration therapies (52.7%) comparatively.

Unsubstantiated Practices With Which ECSE Teachers Were Moderately

Familiar. Although ECSE teachers were moderately familiar with FloorTime™ (84.2%

heard of, *Mdn* = 2) there was moderate variability across participants (*IQR* = 2), and

64.4% indicated they had used the practice.

Unsubstantiated Practices With Which ECSE Teachers Were Minimally

Familiar. This group of participants was not minimally familiar (i.e., had only heard of,

Mdn = 1) with any unsubstantiated practices.

Unsubstantiated Practices with which ECSE Teachers Were Not Familiar.

Most participants had no familiarity with (*Mdn* = 0), and there was minimal variability

(*IQR* = 0) across participants for familiarity with auditory integration therapy (46.85%),

integrative movement therapy (34.23%), rapid prompting method (34.86%), and Gentle

Teaching™ (31.08%). Across these practices, very few ECSE teachers indicated they had

ever used the practices (auditory integration therapy, 7.21%; integrative movement

therapy, 7.66%; rapid prompting method, 5.4%) while 22% of ECSE teachers had used

Gentle Teaching™.

Current Use of Practices

For this study, participants indicated if they used each practice within the current

school year associated with the timing of their survey response. Summaries of

participants' reporting of their current use EBPs or unsubstantiated practices are provided

below.

Current use of Evidence-Based Practices. Nearly all participants in this ECSE

survey reported currently using modeling (97.3%), visual supports (96.4%), and

reinforcement (94.59%). In addition, the majority of participants reported currently using

task analysis (80.63%), social narratives (79.73%), antecedent-based interventions

(57.21%), differential reinforcement (72.07%), prompting (67.57%), picture exchange

communication systems (65.32%), structured play groups (63.96%), functional behavior

assessment (56.31%), time delay (54.5%), and social skills training groups (53.6%). Less

than half of participants reporting current use of scripting (48.65%), extinction (46.4%),

functional communication training (42.79%), discrete trial teaching (39.64%), naturalistic

interventions (36.94%), response/interruption/redirection (34.23%), peer-mediated

instruction and intervention (27.03%), pivotal response training (22.52%), video

modeling (20.72%), self-management (20.72%), parent-implemented interventions

(20.27%), and technology aided intervention and instruction (12.61%) this school year.

Current use of Unsubstantiated Practices. Overall, fewer participants reported current use of unsubstantiated practices as compared to EBPs. FloorTime™ was the only unsubstantiated practice for which slightly more than half of the participants reported using this school year (51.80%). Some participants reported current use of sensory integration therapies (42.79%), facilitated communication (34.23%), and Gentle Teaching™ (19.82%). As compared to EBPs, ECSE teachers reported current use of fewer unsubstantiated practices. Very few participants indicated they were currently using integrated movement therapy (5.4%), rapid prompting method (4.5%), animal therapies (0.9%), and auditory integration training (0%)

Relations Between Familiarity and Current Use of Practices

Figure 10 depicts the relations between the degree of familiarity and current use of a practice. In this figure, practices appear in one of two categories with EBPs on the left and unsubstantiated practices on the right. To visually display relations between familiarity and current use within each category, practices are organized from the highest median degree of familiarity to lowest and then with the highest percent reporting current use to lowest. Figure 8 shows both a linear relation between ECSE teachers' familiarity with practices and their current use of practices and that there is variable familiarity and current use across participants.

Figure 10.

Degree of Familiarity and Current Use of Practices

Familiarity and Current Use of Practices
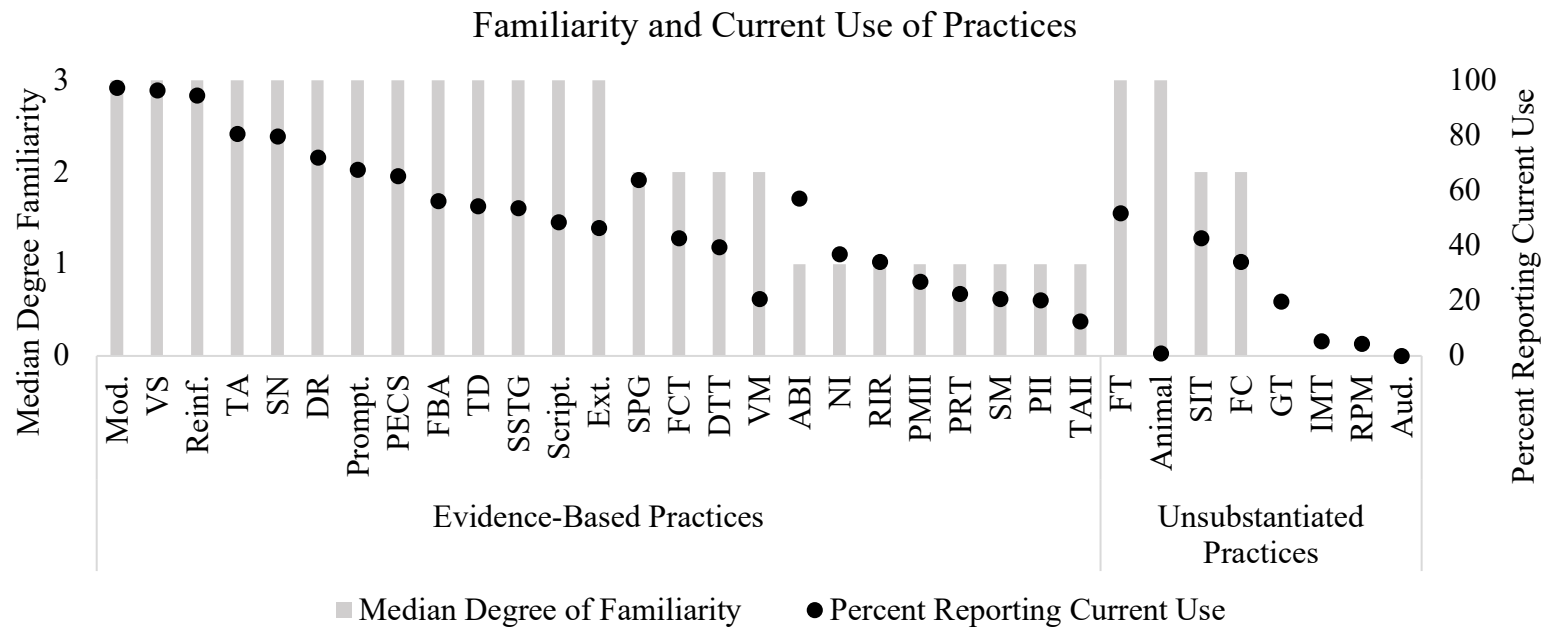
Note. Evidence-Based Practices: ABI =Antecedent-Based Intervention, Differential Reinforcement, DTT = Discrete Trial Teaching, Ext.= Extinction, FCT=Functional Communication Training, FBA = Functional Behavior Assessment, Mod. = Modeling, NI = Naturalistic Intervention, PII = Parent-Implemented Intervention, PMII = Peer-Mediated Instruction & Intervention, PECS = Picture Exchange Communication System, PRT = Pivotal Response Training, Prompt. = Prompting Procedures, Reinf. = Reinforcement, RIR= Response Interruption/Redirection, Script. = Scripting, SM= Self-Management, SSTG= Social Skills Training Groups, SN=Social Narratives, SPG=Structured Play Groups, TA = Task Analysis (TA), TAII = Technology Computer/Aided Instruction and Intervention, TD= Time Delay, VM=Video Modeling, VS = Visual Supports. Unsubstantiated Practices: Animal = Animal Therapy, Aud. = Auditory Integration Training, FC = Facilitated Communication, GT = Gentle Teaching, IMT = Integrated Movement Therapy, RPM = Rapid Prompting Method, SIT = Sensory Integration Therapy.

The researcher performed Chi-Square tests of independence to examine the relations between familiarity and the current use of each practice. Chi-Square tests were appropriate for these data as current use and familiarity are categorical data (Nardi, 2014). The researcher did not perform tests for auditory integration therapy or animal therapies as the distribution of data did not meet assumptions (i.e., at least five participants in each cell) given the very low-frequency use of these practices. Table 8 shows the results of these tests.

Table 8.

Chi-Square Tests of Independence: Current Use and Familiarity with Practices

Practice Type	Practice	χ^2	df
Evidence-Based	Antecedent-Based Interventions	112.880***	3
	Differential Reinforcement	69.101***	3
	Discrete Trial Training	68.584***	3
	Extinction	71.834***	3
	Functional Behavior Assessment	34.189***	3
	Functional Communication Training	138.564***	3
	Modeling	75.752***	3
	Naturalistic Intervention	158.713***	3
	Parent-Implemented Interventions	107.599***	3
	Peer-Mediated Intervention	118.224***	3
	Picture Exchange Communication System	41.074***	3
	Pivotal Response Training	114.678***	3
	Prompting	106.302***	3
	Reinforcement	34.406***	3
	Response Interruption/ Redirection	125.892***	3
	Scripting	117.799***	3
	Self-Management	75.791***	3
	Social Skills Training Groups	110.011***	3
	Social Stories/ Narratives	32.531***	3
	Structured Play Groups	73.251***	3
	Task Analysis	59080***	3
	Technology/Computer-Aided Instruction	79.686***	3
	Time Delay	102.946***	3
	Video Modeling	49.072***	3
	Visual Supports	128.585***	3
Unsubstantiated	Facilitated Communication	80.955***	3
	FloorTime	76.208***	3
	Gentle Teaching	152.140***	3
	Integrative Movement Therapy	100.663***	3
	Rapid Prompting Method	97.823***	3
	Sensory Integration Therapy	120.638***	3

Note. There were no Chi-Square tests of independence performed between Current Use and Familiarity with Auditory Integration Training and Animal Therapies as so few participants reported current use of those practices that assumptions were not met.

Across practices, the higher the median degree of familiarity, the more often a participant indicated they currently used the practice.

Research Question #2: Selections of Key EBPs

Participants reviewed a vignette within the Autism Practice Selection Task describing a young child with ASD who needed to learn an SC skill. Participants then responded to a series of questions asking them to select practices for use with the child in the vignette. First, from the predetermined array of five key EBPs, that were selected based on their appropriateness for the vignette child and minimal resource needs. Participants identified the practice they would try first for the student, then what practice they were least likely to try for the child, and finally, they ranked the remaining (middle) practice choices. Transformations of each participants' selections produced the quantitative rankings assigned to each practice. These included the practice they indicated they would try first (rank 1), the practice they indicated they would be least likely to try (rank 5), and the order in which they selected the remaining practices with lower value rank assignments indicating higher preference (rank 2= second choice to try, rank 3= third choice to try, rank 4= fourth choice to try). Table 9 displays the practice selections, frequency counts, and percentages based on rankings provided by ECSE teachers.

Table 9.

Proportion of Participants' Rankings of Each Practice

| Rank	DTT *n*	%	NI *n*	%	PMI *n*	%	Scripting *n*	%	SN *n*	%
First	35	16	76	34	18	8	70	31.5	23	10.36
Second	40	18	48	22	29	13	61	27.5	44	19.82
Third	29	13	31	14	65	29	43	19.4	54	24.32
Fourth	34	15	39	18	65	29	29	13.1	55	24.77
Fifth	84	38	28	13	45	20	19	8.56	46	20.72
Not Use (n=91)	**DTT**		**NI**		**PMI**		**Scripting**		**SN**	
	50	23	6	2.7	33	15	2	0.9	19	8.559

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

Selection of Practice to Try First

Across practices and rankings, there was variability in the proportion of participants assigning a rank to any given practice, showing individual differences and preferences for practices. No single practice was assigned any rank the majority of the time; though patterns emerged that showed some practices were assigned certain ranks more often than others were. At least one participant selected each of the five practices to try first. The practices selected most often included naturalistic intervention (34%) and scripting (31.5%). Participants selected discrete trial teaching, social narratives, and peer-mediated instruction and intervention less often (15%, 10.36%, and 8%, respectively).

To investigate differences between rates of selection, a multinomial logit base model revealed significant differences between practice selections. Multinomial logit modeling is useful for categorical dependent variables with more than two options (Ben-Akiva et al., 1997). The results are compared to a reference group from the categorical dependent variable (i.e., available practice choices). For this model, naturalistic

intervention served as the reference group because it was the most often selected to try first. Participants were significantly less likely to select peer-mediated instruction and intervention ($\beta = -1.440.23$, $SE = 0.262$, $p < .001$), SN ($\beta = -1.195$, $SE = 0.237$, $p < .001$) and DTT ($\beta = -0.775$, $SE = 0.204$, $p < .001$) than they were naturalistic intervention. The relative probabilities of selecting a practice other than naturalistic intervention to try first were; 34.32% less likely to select discrete trial teaching, 31.51% less likely to select scripting, 10.36% less likely to select social narratives, and 8.10% less likely to select peer-mediated instruction and intervention. These findings reveal significant differences in participants' practice selections.

Selection of Practice as Last Choice

ECSE Teachers indicated their last choice in response to the item asking which practice they would be least likely to select for use. ECSE teachers most often indicated that discrete trial teaching (38%) was their last practice choice of the available options to address an SC need of a young student with ASD. A relatively equal proportion of participants indicated social narratives and peer-mediated instruction and intervention were their last choice (20.72% and 20%, respectively). Only 13% of participants indicated that naturalistic intervention was their last choice. Participants least often indicated that scripting would be their last choice (8.56%).

Investigating differences between rates of selection relied on a multinomial logit base model. Significant differences existed between which practices were participants' last choices. For this model, discrete trial teaching served as the reference group because most participants indicated they would try it last. Participants were significantly less likely to select naturalistic intervention as their last choice (*Relative Risk Ratio* = -1.099,

SE = 0.218, *p* <.001), PMII (*RR* = -0.624, *SE* = 0.184, *p* <.001), scripting (*RR* = -1.486,

SE = 0.254, *p* <.001), and social narratives (*RR* = -.602, *SE* = 0.183, *p*<.001) than discrete

trial teaching. The relative probabilities of a teacher selecting a practice other than

discrete trial teaching as their last choice were; 37.84% less likely to select NI, 20.72%

less likely to select social narratives, 20.27% less likely to select peer-mediated

instruction and intervention, and 8.56% less likely to select scripting. These findings

reveal significant differences in participants' selections across practices such that

individually and across teachers, discrete trial teaching was less preferred in the context

of supporting the vignette child's SC development as it was often selected to try last.

Given that teachers were forced to make a choice of the available practices, it was

important to also understand if they would consider the available practices when not

made to do so. Therefore, to inform interpretations of teachers' practice selections of the

available practices, the research participants identified which of the available practices, if

any, they would not choose to use for this child in the vignette. A considerable portion of

participants (40%, *n* = 91) indicated that they would not use one or more of the available

practices for the child in the vignette. Of those participants, 23% of participants indicated

they would not use discrete trial teaching, 15% would not use peer-mediated instruction

and intervention, 9.6% would not use social narratives, and only few indicated they

would not use naturalistic intervention (2.7%) or scripting (0.9%). The majority of

individuals indicating they would not try one of the available practices chose only one

practice they would not use (*n* = 73). Of the remaining participants, 18 indicated there

were two practices they would not use and two participants indicated they would not use

three of the practices.

Practice Rankings Between First and Last

      After indicating which practice they would select first and which they would select last, participants ranked the remaining (middle) practices. Figure 11 displays these rankings across first through the fifth rank. Rankings for naturalistic intervention and Scripting revealed negative linear trends such that participants most often ranked naturalistic intervention or scripting first and least often ranked these practices last. In contrast, rankings for discrete trial teaching showed a relatively positive linear trend such that participants least often ranked discrete trial teaching first and most often ranked it last. Participants most often ranked social narratives in the middle categories (second through fourth). Finally, participants most often ranked peer-mediated instruction and intervention last. When different from the last choice, participants' rankings of peer-mediated instruction and intervention were relatively evenly distributed across all other rankings (first through fourth). The different distributions of practice rankings again suggest individual differences in ECSE teachers' practice selections.

Figure 11.

Proportions of Practices Assigned to Each Rank
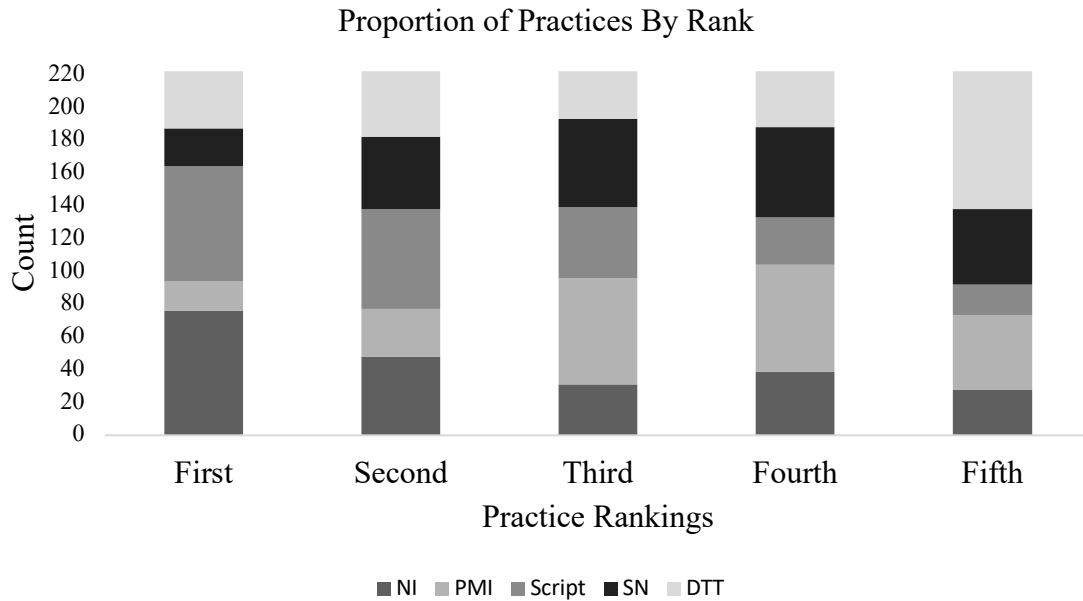
Proportion of Practices By Rank

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

Research Question #3: Beliefs About Key EBPs

Participants responded to five versions of the Autism Practice Intentions Scales (APIS), one for each key EBP included in the Autism Practice Selection Task (discrete trial teaching, naturalistic intervention, scripting, social narratives, peer-mediated intervention). There were three sections within each APIS version: self-efficacy, attitude, and subjective norms. Each of these sections included few to several items for which ECSE teachers rated their responses on a 1-4 scale. Due to the varying number of items within a factor between practice versions, the researcher calculated mean scores for each factor (self-efficacy, attitude, and subjective norms) for each practice. These scores represent an ECSE teachers' degree of positive beliefs regarding a practice. In other

words, the higher the mean score, the more positive that participant felt about that factor relating to a specific practice (Rudolph, 2019). Consistent with the literature on the TPB that combines all three of these beliefs factors as predictors of intention to implement (Ajzen, 1991), for each practice, the researcher calculated a mean to create an Overall Beliefs score by summing the three factor scores for each practice and dividing them by the number of factors ($n = 3$). The researcher used the Wilcoxon Signed Rank Tests to compare ECSE teachers' ratings of practices for each factor and Overall Beliefs. These tests were appropriate because the comparisons were within the same population, and the data were not normally distributed (See Appendix B for probability density plots). Participants' ratings of their beliefs for these key EBPs are described below, first for the range of ratings across practices by factor (self-efficacy, attitude, subjective norms) and then for the Overall Beliefs ratings across practices.

     Table 10 presents the means for each factor (self-efficacy, attitude, subjective norms) and overall Beliefs score for each of the key practices included in the Autism Practice Selection Task.

Table 10.

Mean Scores for Beliefs Factors and Overall Beliefs by Practice

	Belief Score							
	Self-Efficacy		Attitude		Subjective Norms		Overall Beliefs	
Practice	Mean (range)	*SD*	Mean (range)	*SD*	Mean (range)	*SD*	Mean (range)	*SD*
DTT	2.8 (1.33-3.78)	0.63	2.97 (1-4)	0.64	2.43 (1-4)	0.92	2.73 (1.11-3.89)	0.58
NI	3.17 (1-4)	0.78	3.43 (1.17-4)	0.58	2.93 (1-4)	0.89	3.34 (1.13-4)	0.59
PMII	2.78 (1-4)	0.81	3.13 (1-4)	0.59	2.53 (1-4)	0.95	2.81 (1-4)	0.67
Scripting	2.62 (1-4)	0.82	2.99 (1.33-3.67)	0.42	2.7 (1-4)	0.87	2.77 (1.11-3.83)	0.6
SN	3.17 (1-4)	0.64	3.30 (1-4)	0.6	2.96 (1-4)	0.78	3.14 (1.5-4)	0.55

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

Descriptions of Beliefs by Factor

To describe ECSE teachers' attitudes, subjective norms, and self-efficacy relating to these five key EBPs, Figure 10 presents the mean ratings for each factor.

Figure 12.

Mean Beliefs Factor Ratings for Each Key EBP
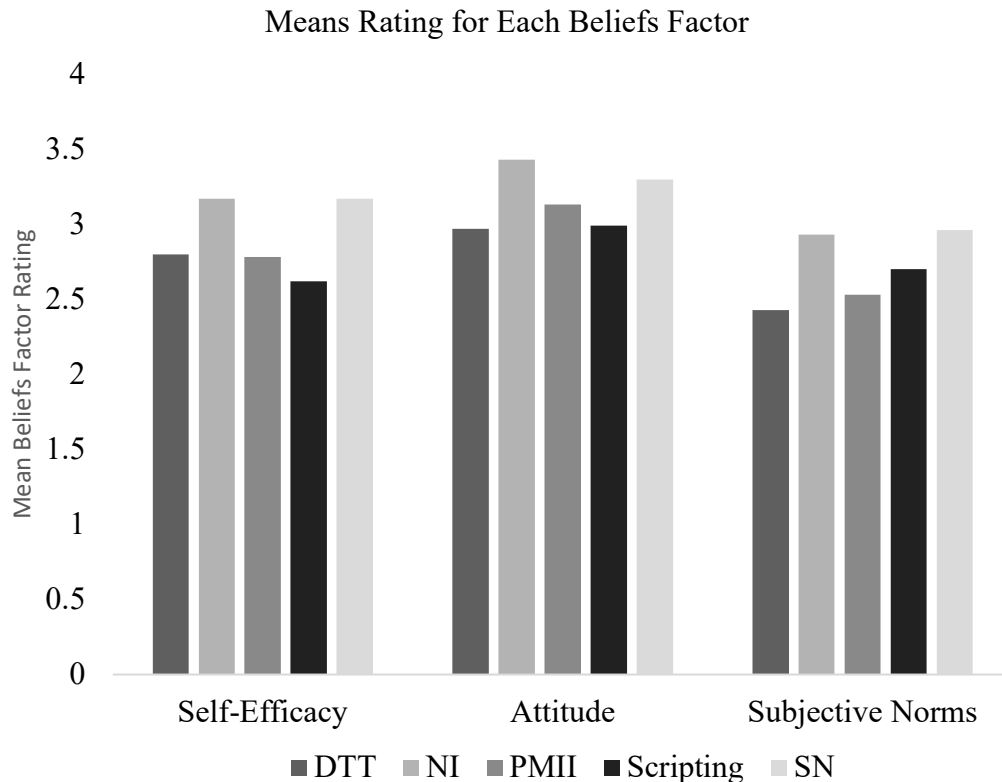
Means Rating for Each Beliefs Factor

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

Self-Efficacy. A teachers' self-efficacy rating represented their belief in their own ability to use the practice and achieve positive outcomes. The mean self-efficacy score across practices was 2.908. ECSE teachers' ratings of their beliefs about self-efficacy across practices showed the least variability of any factor with a range of .37 (2.8-3.17). Participants rated their beliefs about their self-efficacy in using social narratives and

naturalistic intervention highest ($M = 3.17$, $SD = 0.64$, and $M = 3.17$, $SD = 0.78$, respectively). The ratings for peer-mediated instruction and intervention and discrete trial teaching revealed participants' had moderate ratings of their self-efficacy in using these practices as compared to other practices ($M = 2.78$, $SD = 0.81$, and $M= 2.8$, $SD = 0.63$, respectively). Further, participants' ratings of their self-efficacy revealed they had the least self-efficacy implementing scripting ($M = 2.62$, $SD = 0.82$) as compared to the other available practices.

The researcher used a Wilcoxon Signed Rank Test to evaluate if ratings of self-efficacy differed between practices. Table 11 presents the results of these tests by displaying the V values.

Table 11.

Results of Wilcoxon Signed Rank Tests: Differences in Self-Efficacy by Practice

Practice	SN	Scripting	PMII	DTT
Naturalistic Intervention	11178	17426**	16274***	18367***
Discrete Trial Teaching	5876***	12038*	12097	
Peer-Mediated Instruction and Intervention	4942***	12038*		
Scripting	16540***			

Note. SN = Social Narratives, PMII = Peer-Mediated Instruction and Intervention, DTT = Discrete Trial Teaching, *= p <.05, **= p <.01, ***=p <.001

Comparisons between ECSE teachers' ratings of their self-efficacy about each practice revealed the same patterns as their ratings of their subjective norms for practices. Participants' ratings were significantly different between all practices except between the two practices with the highest (naturalistic intervention and social narratives; $V = 11178$) and lowest (PMII and DTT; $V = 12097$) scores.

Attitude. An ECSE teachers' attitude represented how positively they viewed the practice. Of the beliefs factors, ECSE Teachers' attitudes about practices were the most

positive overall, with the highest mean score ($M = 3.164$) across practices of any factor. There was some variability in participants' attitudes across practices (*Range* = 2.9-3.43). ECSE Teachers rated that their attitudes were most positive about naturalistic intervention ($M = 3.43$, $SD = 0.58$); this was also the highest mean rating for any beliefs factor across practices. Participants rated their attitudes about Social Narratives as somewhat less positive ($M = 3.30$, $SD = 0.6$) and PMII even less so ($M = 3.13$, $SD = 0.59$). Participants had the least positive attitude about discrete trial teaching ($M = 2.97$, $SD = 0.64$) compared to other available practices.

The researcher used a Wilcoxon Signed Rank Test to evaluate if participants' attitude ratings differed between practices. Table 12 presents the results of these tests by displaying the V values.

Table 12. *Results of Wilcoxon Signed Rank Tests: Differences in Attitude by Practice*

Practice	SN	Scripting	PMII	DTT
Naturalistic Intervention	9414.5*	17772***	12940***	15950***
Discrete Trial Teaching	5870.5***	9777.5	6486**	
Peer-Mediated Instruction and Intervention	6151***	12165**		
Scripting	16141***			

Note. SN = Social Narratives, PMII = Peer-Mediated Instruction and Intervention, DTT = Discrete Trial Teaching, * = p <.05, ** = p <.01, *** = p <.001

Comparisons between ECSE teachers' ratings of their attitude about each practice revealed statistically significant differences between practices except for one comparison. There was no statistically significant difference between attitude ratings of Discrete Trial Teaching and Scripting (V = 9777.5).

Subjective Norms. An ECSE teacher's subjective norms ratings for a practice represented their perceived support from their colleagues and administrators to use the practice. The mean subjective norms rating across practices was 2.71. ECSE teachers'

mean ratings of their subjective norms across practices showed little variability between

practices (*Range* = 2.43-2.96). ECSE teachers' mean ratings for subjective norms was

highest for Social Narratives (*M* = 2.96, *SD* = 0.78), closely followed by naturalistic

intervention (*M* = 2.93, *SD* = 0.89), suggesting that ECSE teachers report that they feel

that these practices are important to their colleagues and administrators as compared to

the other available practices. Participants' ratings of their beliefs about subjective norms

for scripting and peer-mediated instruction and intervention were moderate compared to

the other practices (*M* = 2.7, *SD* = .87 and *M* = 2.53, *SD* = 0.95, respectively). ECSE

teachers' mean ratings for subjective norms for using discrete trial teaching was the

lowest of all of the practices (*M* = 2.43, *SD* = 0.92) suggesting these teachers felt that

using this practice was the least important to their colleagues and administrators as

compared to the other available practices. The researcher used a Wilcoxon Signed Rank

Test to evaluate if ratings of subjective norms differed between practices. Table 13

presents the results of these tests by displaying the $\mathcal{V}$ values.

Table 13.

Results of Wilcoxon Signed Rank Tests: Differences in Subjective Norms by Practice

Practice	SN	Scripting	PMII	DTT
Naturalistic Intervention	6457	8632.5**	9637***	11334***
Discrete Trial Teaching	3809.5***	5345.5**	6332.5	
Peer-Mediated Instruction and Intervention	3856.6***	5514		
Scripting	8590.5***			

Note. SN = Social Narratives, PMII = Peer-Mediated Instruction and Intervention, DTT = Discrete Trial Teaching, * = *p* <.05, ** = *p* <.01, *** = *p* <.001

ECSE teachers' ratings of their beliefs about subjective norms were statistically

significantly different between practices except there was no statistically significant

difference between the two practices with the highest (naturalistic intervention and social narratives; $\mathcal{V} = 6457$) and lowest scores (PMII and DTT; $\mathcal{V} = 5514$).

Beliefs by Practice

To describe participants' beliefs about key EBPs used to address an SC need for the student with ASD described in the vignette, Figure 13 presents the mean factor and Overall Beliefs ratings by practice. These scores are described below first by factor and then for the Overall Beliefs score.

Figure 13.

Mean Beliefs Factor Ratings and Overall Ratings by Practice
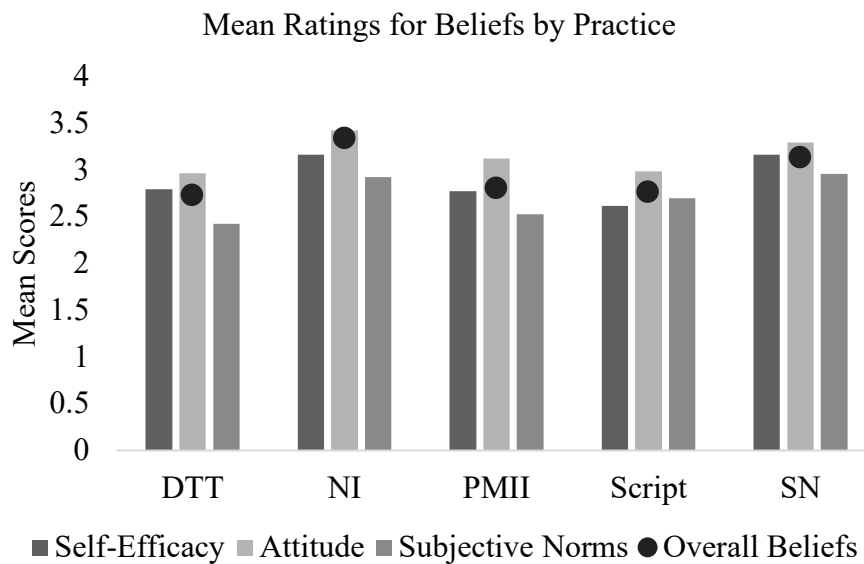
Mean Ratings for Beliefs by Practice

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

Overall Beliefs scores reflect the mean of each participants' self-efficacy, attitude, and subjective norms ratings. Ratings for Overall Beliefs do vary across practices (*Range* = 2.73-3.34). Participants' mean ratings were highest for naturalistic intervention (*M* = 3.34, *SD* = 0.59) and lowest for DTT (*M* = 2.73, *SD* = 0.58). The researcher used a

Wilcoxon Signed Rank Test to evaluate if ratings of Beliefs differed between practices.

Table 14 presents the results of these tests by displaying the $\mathcal{V}$ values.

Table 14.

Results of Wilcoxon Signed Rank Tests: Differences in Overall Beliefs by Practice

Practice	SN	Scripting	PMII	DTT
Naturalistic Intervention	16404***	21523***	20975***	20744***
Discrete Trial Teaching	5566***	11848	10739	
Peer-Mediated Instruction and Intervention	6400***	12902		
Scripting	18526***			

Note. SN= Social Narratives, PMII= Peer-Mediated Instruction and Intervention, DTT= Discrete Trial Teaching, *= p <.05, **= p <.01, ***=p <.001

Overall, participants reported significantly higher Overall Beliefs about

naturalistic intervention than all other practices (V= 20744, p <.001). Participants' beliefs

about social narratives were also significantly higher than those for discrete trial teaching

(V= 5566, p <.001), Scripting (V= 18526, p <.001), and peer-mediated instruction and

interventions (V =6400, p <.001).

Research Question #4: Beliefs Predicting Practice Selection

Evaluating if beliefs predicted practice selection to address an SC need of a young

student with ASD involved examining relations between beliefs and selection rankings

(see research question 2) prior to using multinomial logit regression models. The

researcher investigated these relations in two ways. The first explored the relations

between selection rankings and beliefs regardless of practice. The second explored the

relations between a participant's assigned rank to a specific practice and their beliefs

about that practice. This process informed whether beliefs should be included as potential

predictors in the multinomial logit regression models.

Beliefs by Ranking

The researcher transformed participants' ratings for each factor (self-efficacy, attitude subjective norms) and Overall Beliefs scores for each individual practice using R. The transformations associated participants' beliefs with their rankings rather than with each specific practice. For example, the scores for each participants' first choice practice, regardless of practice, formed a new variable representing the participants' beliefs about their first choice. This process resulted in additional variables of factor and Overall Beliefs ratings for each ranking (first through fifth). Table 15 provides the mean scores for each beliefs factor (self-efficacy, attitude, and subjective norms) and Overall Beliefs by ranking.

Table 15.

Mean Scores for Beliefs Factors and Overall Beliefs by Rank

	Belief Score							
Rank	**Self-Efficacy**		**Attitude**		**Subjective Norms**		**Overall Beliefs**	
	Mean	*SD*	Mean	*SD*	Mean	*SD*	Mean	*SD*
First	3.23 (1-4)	0.65	3.44 (1.5-4)	0.47	3.09 (1-4)	0.79	3.3 (1.75-4)	0.54
Second	2.98 (1-4)	0.75	3.23 (1.17-4)	0.58	2.75 (1-4)	0.88	3.02 (1.13-4)	0.62
Third	2.86 (1-4)	0.79	3.24 (1-4)	0.55	2.79 (1-4)	0.9	2.99 (1-4)	0.62
Fourth	2.77 (1-4)	0.8	3.05 (1-4)	0.57	2.55 (1-4)	0.85	2.82 (1.11-4)	0.62
Fifth	2.69 (1-4)	0.75	2.86 (1-4)	0.79	2.37 (1-4)	0.96	2.67 (1.11-3.98)	0.65

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

To explore whether participants' degree of positivity for practices varied by rank, Figure 14 shows the mean ratings of beliefs by practice ranking.

Figure 14.

Line Graph of Mean Ratings of Beliefs by Practice Ranking

Mean Ratings of Beliefs by Practice Ranking
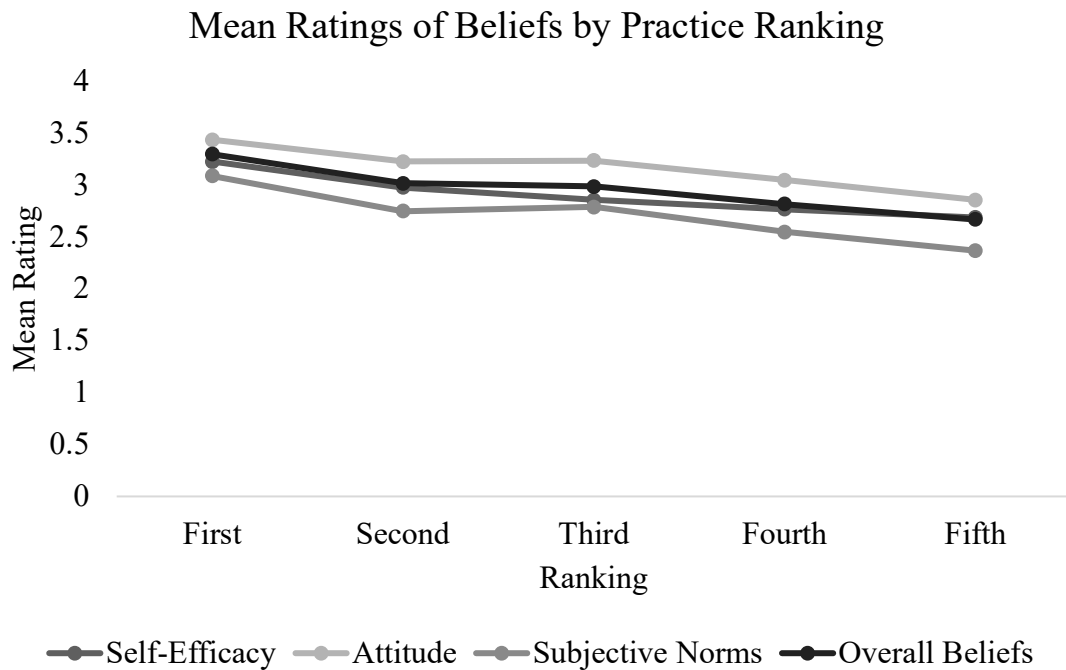
There was a negative linear trend between each factor and Overall Beliefs rating for its associated practice such that mean ratings increased as ranking decreased. Participants' highest mean rating for any given factor corresponded with their first choice practice. This pattern emerged for all rankings.

Associations Between Assigned Rank and Beliefs by Practice

The researcher calculated Spearman's Rho correlations to explore potential relations between how a participant ranked a practice their beliefs about a practice (see Table 16).

Table 16.

Associations Between Assigned Rank and Beliefs by Practice

Practice	Spearman's Rho	
	r	SE
Discrete Trial Teaching	-.275***	0.062
Naturalistic Intervention	-.428***	0.062
Peer-Mediated Instruction and Intervention	-.270***	0.068
Scripting	-.399***	0.058
Social Narratives	-.284***	0.061

Note. * = *p* <.05, ** = *p* <.01, *** =*p* <.001

Across practices, a participants' ranking significantly associated with how positive their beliefs were. As their rankings were higher (i.e., a practice was closer to the first selected), their beliefs were more positive.

Multinomial Logit Modeling to Predict Practice Selection

Testing Model Assumptions. Linearity of the predictors and the predicted probability was checked using the ggplot package in R (Wickham, 2016) for both base and built models. Each Overall Beliefs score for a practice showed a linear relation with the predicted probability that the associated practice was selected (see Appendix C). To assess multicollinearity of the predictors. The correlations between predictors revealed relatively low multicollinearity, these are presented in Table 17.

Table 17.

Pearson's Correlations Between Overall Beliefs Scores for Each Practice

Practice	Pearson's Correlations for Beliefs			
	SN	DTT	Scripting	PMII
Naturalistic Intervention	0.1370	0.0557	0.1873	0.3376
Peer-Mediated Instruction and Intervention	0.0234	0.0462	0.0416	
Scripting	0.1739	0.1287		

Note. SN = Social Narratives, DTT = Discrete Trial Teaching, PMII = Peer-Mediated Instruction and Intervention, Degrees of Freedom = 220

The correlations reveal weak correlations between participants' ratings of beliefs for each practice, with the exception of a moderate association between participants' beliefs ratings for peer-mediated instruction and intervention and naturalistic intervention ($r = .3376$, $df = 220$). These findings suggest that the multicollinearity of predictors was not a concern for these models.

Models Predicting Selection. Given that beliefs correlated with ranking and all the models met all assumptions, the researcher used two multinomial logit models to determine if beliefs about a practice predicted practice selection. The first model tested whether beliefs about practices predicted which practice was selected to try first, and the second model predicted which practice participants selected as their last choice. The following model was used to predict which practice participants' selected to try first.

$$\varphi_{tryfirst} = \beta_0 + \beta_{NIBeliefs} + \beta_{DTTBeliefs} + \beta_{SNBeliefs} + \beta_{PMIbeliefs} + \beta_{ScriptBeliefs}$$

The researcher built the same model to predict which practice ECSE teachers would select as their last choice.

$$\varphi_{lastchoice} = \beta_0 + \beta_{NIBeliefs} + \beta_{DTTBeliefs} + \beta_{SNBeliefs} + \beta_{PMIbeliefs} + \beta_{ScriptBeliefs}$$

Table 18 displays the results of these models.

Table 18.

Multinomial Logit Regression Results for Practice Selection

Selection of Practice to Try	Beliefs for Selected Practice		Beliefs for Reference Group (NI)	
	β	SE	β	SE
DTT	0.9526*	0.4020	-3.0977***	0.5598
PMII	3.6137***	0.7403	-4.5111***	0.7183
Scripting	1.9906***	0.4244	-2.7307***	0.5284
SN	1.4588	0.5717	2.4507***	0.6049
Selection of Practice as Least	**β**	**SE**	**Beliefs for Reference Group (DTT)**	
			β	SE
NI	-1.3887***	0.0498	0.6300	0.4450
PMII	-0.5926	0.3165	0.6280	0.3275
Scripting	-1.6740***	0.4824	1.0292*	0.475
SN	-1.6347***	0.4095	0.804*	0.3542

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

Prediction of Practice Selected to Try First. Multinomial logit modeling allows for comparing the effects of predictors on the outcome relative to a reference group. Given that the plurality of participants selected naturalistic intervention (NI) as the practice to try first, NI served as the reference group for all comparisons. Therefore, this model predicts participants' selection of a specific practice relative to NI. A participants' log odds of selecting discrete trial teaching (DTT), peer-mediated instruction and intervention (PMII), or scripting to try first over NI significantly increased for every one-unit increase in the associated Beliefs rating for those other practices. In other words, participants with more positive beliefs about a different practice (i.e., higher beliefs scores) were more likely to select that other practice over NI (PMII: $\beta = 3.6137$, $SE = 0.7403$, $p < .001$; scripting: $\beta = 1.9906$, $SE = .04244$, $p < .001$; DTT: $\beta = 0.9526$, $SE = 0.4020$, $p < .05$). This effect was not found for beliefs about social narratives ($\beta = 1.4588$, $SE = 0.5717$). These findings suggest that ECSE teachers'

beliefs about some practices predict whether those practices are selected to try first. If a teacher holds more positive beliefs about DTT, PMII, or Scripting as compared to another practice, they are more likely to select that practice for use.

Because NI was the reference group, the research also interpreted the effects of a participants' beliefs about NI on selection. Across all practices, with every one unit decrease in Overall Beliefs ratings for naturalistic interventions, the log odds of selecting another practice over NI significantly increased (PMII: $\beta = -4.511$, $SE = 0.718$, $p < .001$; 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' beliefs about NI predict the selection of NI. Participants with more positive beliefs about NI were more likely to select NI than other available practices, but as those beliefs became less favorable, the greater the likelihood of a teacher selecting 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. In this case, comparing the Beta values for each practice choice shows that a participant's beliefs about peer-mediated instruction and interventions had the strongest effect ($\beta = 3.6137$) on their selection of PMII as compared to the effects of beliefs on other practice choices. This finding suggests how positively a participant feels about PMII may be more meaningful in predicting their selection of PMII or NI than the beliefs about other practices. Likewise, the effects of a teacher's beliefs about naturalistic intervention on selecting any practice other than naturalistic intervention was strongest for the selection of PMII ($\beta = -4.5111$).

125

Prediction of Practice Selected as Last Choice

Given that the plurality of participants selected discrete trial teaching (DTT) as the practice they were least likely to try for the child in the vignette, DTT served as the reference group for all comparisons. Therefore, this model predicts participants' selection of a specific practice relative to DTT. There were significant effects of practice beliefs on the selection of their last choice for scripting, naturalistic intervention, and social narratives. 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 sScripting: $\beta = -1.6740,\ SE = 0.4824,\ p < .001$; NI: $\beta = -1.3887,\ SE = 0.0498,\ p < .001$; SN: $\beta = -1.6347,\ SE = 0.4095,\ p < .001$). In other words, participants with more negative beliefs about social narratives, naturalistic interventions, or scripting (i.e., lower beliefs ratings) were more likely to select that practice as their last choice than DTT. There was not this effect was for participants' beliefs about peer-mediated instruction and intervention ($\beta = -0.5926,\ SE = 0.3165$). These findings suggest that if ECSE teachers hold negative beliefs about some practices, they are less likely to select them for use as compared to other practice options.

Because DTT was the reference group, the researcher interpreted the effects of an ECSE teachers' beliefs about DTT on selection of their last choice. A participant's beliefs about DTT only predicted whether they would select another practice over DTT for scripting and social narratives. With every one unit increase in an ECSE teachers' beliefs about DTT (i.e., more positive beliefs), the log odds of selecting scripting instead of DTT as their last choice significantly increased ($\beta = 1.022,\ SE = 0.475, p < .05$). In addition, with every one unit increase in beliefs about DTT (e.g., more positive beliefs),

the log odds of selecting social narratives as their last choice increased ($\beta = 0.804$, $SE = 0.354, p < .05$). These findings suggest that, of the array of practice choices, if a teacher holds the most negative beliefs about DTT, it is likely they will select DTT as their last choice. As beliefs about DTT improve, it less likely that a teacher selects DTT as last, and they are more likely to select social narratives and scripting as their last choice. This might suggest that negative beliefs about a practice predict the likelihood of selecting that practice and that there may be commonalities across certain practices such that beliefs about one may predict selection of others.

Strength of Effects. Comparing the Beta values for each practice choice shows that a participant's beliefs about scripting had the strongest effects ($\beta = -1.6741$, $SE = 0.4823$) on their selection of scripting as their last choice as compared to the effects of beliefs on other practice choices. 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 as their last choice ($\beta = 1.0219$, $SE = 0.4750$).

Chapter 5 - Discussion

Although there is a plethora of EBPs available to ECSE teachers (Wong et al., 2015) with enhanced dissemination efforts across the past decade (Purper et al., 2016; Sam et al., 2019), students with ASD are not making sufficient skills gains (Brock et al., 2019). The research-to-practice gap in the use of EBPs for children with ASD spans preschool through grade twelve (Brock et al., 2019; McNeill, 2019). This study addressed some shortages in the research through examining ECSE teachers' individual-level determinants (familiarity, current use, and beliefs) of practice selection decisions in an effort to advance efforts to enhance implementation of EBPs. Eventually, by having this information, researchers and professional development providers may be able to facilitate teachers' use of practices that they like and are likely to improve outcomes for young children with ASD.

This discussion is organized by the broader aims of the investigation to portray how this study fills critical gaps in the research and has implications for future implementation efforts and research by (a) explaining ECSE teachers' familiarity with and current use of EBPs and unsubstantiated practices, (b) describing ECSE teachers' practice selections, and (c) identifying determinants of those selections (beliefs). Finally, future research directions are proposed that consider study limitations for tailoring implementation supports to facilitate teachers' selection and use of practices that align with their beliefs and enable teachers' beliefs to support the use of specific EBPs.

Characterizing the Implementation Gap in ECSE: Familiarity and Use of Practices

Researchers must discern at what stage of the implementation process (e.g., Exploration, Preparation, Implementation, Sustainment; Aarons et al., 2011)

128

implementation supports can reduce the research-to-practice gap. Familiarity with EBPs for students with ASD has been considered a possible, unexplored, explanation of discrepant findings between EBP survey studies (Brock et al., 2019; Hess et al., 2008; Hugh et al., in press). As described in the Transtheoretical Model of Change, during the *contemplation stage* a teacher is comparing their current behavior or practice use to practices under consideration (Prochaska & Velicer, 1997). However, in order to consider a practice a teacher must be familiar with it. Regrettably, teachers' low familiarity with some EBPs, as documented in this study, shows that the research-to-practice gap may begin at the earliest phase of implementation, the dissemination of practice information (Dingfelder & Mandell, 2011; Lyon, 2017). Pre-service training, personal experience, research, and media expose teachers to practices used for students with ASD (Cook & Odom, 2013; Guckert et al., 2016; Hsiao & Peterson, 2018). Nevertheless, these learning avenues may provide unreliable materials, may be dissimilar between teachers (Barnhill et al., 2016; Hsiao & Peterson, 2018; Rosenberg et al., 2004), and teachers may favor specific sources over others (Guckert et al., 2016; Hugh et al., in press; Knight et al., 2018; Landrum et al., 2002; Merk et al., 2017; Metz et al., 2015; Van Boekel et al., 2017). This study sheds light on the potential for some teachers to be aware of EBPs and others not to be, thereby diminishing opportunities for some students with ASD to access EBPs.

Exploring Current Use of EBPs and Unsubstantiated Practices

To understand some of the possible explanations of poor or infrequent implementation of specific practices, it is necessary to understand the shared components of EBPs to highlight the differences between them. The core features of all EBPs include

the use of a prompting procedure, providing high-frequency opportunities for learning, incorporating modeling or visual supports as needed, using reinforcement, progress-monitoring, and adapting those components based on the child's progress (Duffy & Healey, 2010; Goldstein, 2002). These foundational FIPs can be used in tandem through individualized design based on an applied behavioral analytic approach, or within developed FIPs that systematize their combined use (e.g., discrete trial teaching, peer-mediated instruction and intervention, naturalistic intervention, picture exchange communication systems; Wong et al., 2015). These core features may be implemented in different ways; within the context of a child-led activity or adult-led instruction (Carta et al., 1991). Despite these commonalities, the use of more complex EBPs reflects some differences that may influence how a teacher contemplates them and their beliefs about and use of a practice. These include the interaction between the practice and needed resources, procedural components of the practice, and a teacher's pedagogy.

Differences in EBPs as Highlighted by Underused EBPs. Although the majority of participants were at least somewhat familiar with certain practices, relative to this, very few indicated they currently used other EBPs, providing further evidence that familiarity and training alone do not result in implementation (Fishman et al., 2018; Guckert et al., 2016). As is true for the implementation of other practices, ECSE teachers' lower degree of familiarity with and infrequent use of specific practices for students with ASD may be the consequence of resource constraints (Schreck & Mazur, 2008). Researchers have documented that technology requirements (Bellini et al., 2011), demands on time and planning (Klingner et al., 2003; Mirabal, 2018; Simpson, 2005; Sturmey, 2011), and costs associated with certification requirements (Holbrook Ebrahim,

130

2009; Wilson & Landa, 2019) have served as barriers to implementing practices. Another needed resource for implementation of certain practices that teachers may lack depending on their classroom context is peer models, such as with peer-mediated instruction and intervention (PMII). Teachers may feel that PMII necessitates a particular classroom model (i.e., inclusive, Barton et al., 2012) as its use relies on a peer to be responsive to the prompting, modeling and reinforcement needs of their classmate with ASD (Battaglia & Radley, 2014; Carla & Donald, 2002). Because a quarter of the teachers in this study served in only self-contained settings, without typically developing peers, their perception of the feasibility of PMII and resulting use may be limited. Therefore, teachers may perceive some of these practices as infeasible as a result of the resources required to implement them (McNeill, 2019; Waltz et al., 2019; Wilson & Landa, 2019), which may obstruct their implementation from the very start of the implementation process (Proctor et al., 2011).

Process of implementing the practice. When considering a practice to use, in addition to contemplating the needed resources, practitioners contemplate the process of actual implementation (Beutler et al., 2002). Practices that were underused in this study may be considered complex to implement. The process of implementing any given EBP for a student with ASD varies based on the number of steps of implementing (Brock et al., 2019) and the procedural complexity (Wilson & Landa, 2019). Processes for implementing some of the EBPs identified as underused in this study demand different levels of ASD expertise (e.g., pivotal response training; Wilson & Landa, 2019; Scheurmann et al., 2016), pacing of the prompting and reinforcement (e.g., discrete trial teaching; Wong et al., 2015), and preparation before implementing (e.g., video modeling,

Bellini et al., 2011). Recognizing that an ECSE teachers' EBP implementation may vary as a result of the process of implementation (Wilson & Landa, 2019) and that researchers are the developers and implementers of EBPs in efficacy studies (Johnson et al., 2017; Steinbrenner et al., 2020), this study further substantiates the need for researchers to consider the complexity of interventions as they are developed. Given the limited use of practices such as discrete trial teaching and video modeling as documented in this study despite participants' familiarity, this study shows there are practices that may not be considered feasible by implementers due to complex processes of research-designed interventions (McNeill, 2019). By ensuring feasibility through research studies, researchers may promote ease of use of some of these practices by school-based implementers (Proctor et al., 2011; Wilson & Landa, 2019).

Teaching pedagogy. In addition to factors specific to each practice, such as needed resources, there are also individual teacher factors that may influence the use of certain practices. One of these individual teacher factors may be their teaching pedagogy. Special Educators receive training based on specific pedagogies that explain teaching and learning (Boe et al., 2007; Carta et al., 1991). Disagreements exist between developmental (i.e., the works of Piaget and Vygotsky; Shayer, 2003) and behavioral (Baer, Wolf & Risley, 1968) explanations of learning. While possibly magnifying a false or unnecessary dichotomy, these differences may also contribute to the absence of the use of these and other behavioral practices (Ringdahl et al., 2009) by teachers whose pedagogical beliefs do not align with this pedagogy (Jennett et al., 2003). In this study, the incongruity between the proportion of teachers familiar with and those reporting current use of discrete trial teaching combined with the similar proportions of familiarity

and use of naturalistic intervention may represent that teachers' pedagogy aligned with a developmental approach that is grounded in child-led learning opportunities (Carta et al.,1991). Recognizing that teachers as early as in their pre-service programs have been shown to believe in and support the use of practices that align with their pedagogies (Merk et al., 2017), teachers may be less apt to use practices that do not align with their teaching philosophy (Jennett et al., 2003).

Current Use of Unsubstantiated Practices

Though rarely documented (Brock et al., 2015; McNeill, 2019), ECSE teachers' reported current use of unsubstantiated practices shows what possible ineffective practices are absorbing teachers' resources (Zane et al., 2008) and sheds light on the need for researchers to better support teachers' discernment between research-based information and other types of communication (Beutler et al., 2002; Hugh et al., in press; Waltz et al., 2019). Teachers may use sensory integration therapies as a way to address what they deem to be the "underlying causes of ASD" including noted differences in sensory processing (Schaaf et al., 2013; Travers, 2017), despite the demonstrated non-effects of many of the components of this practice (e.g., weighted vests; Barton et al., 2015; Reichow et al., 2009). Approximately one-third of teachers reported currently using FloorTime™, Gentle Teaching™, or facilitated communication, although due to cost, training in the use of these practices is restrictive (Barnhill et al., 2016; Greenspan, 2020; Schlosser et al., 2014; Zane et al., 2008). This reported practice use and that in previous research (Hess et al., 2008) may represent poor construct validity of the practice descriptions (Brock et al., 2019) as there is overlap between both of these practices and EBPs: teachers may perceive facilitated communication as a way of using a prompting

procedure, or FloorTime™ and Gentle Teaching™ as a naturalistic intervention. Thus, researchers and professors of education need to focus on supporting students' discernment between the practices and their sources (Fleury & Johnson, 2015).

Describing ECSE Teachers' Practice Selections

Knowing that there is an EBP implementation gap for young students with ASD, it is imperative to understand what practices teachers would choose to use and factors may influence that decision. Using Discrete Choice Analysis in the first known application within the education field, this study documented individual teachers' selections to examine the effects of individual differences in beliefs that can be used to tailor implementation supports (Ben-Akiva et al., 1997; Lyon et al., 2019). In this section, ECSE teachers' practice selections of key EBPs are described by first explicating the set of key EBPs from which they chose to support the validity of this task. Then, unfolding the observed patterns of selection relative to the research on teachers' behavioral intention offers insight into teachers' contemplation of key EBPs, and possible mechanisms that promote implementation (Ajzen, 1991).

Teachers' Contemplation of Key Evidence-Based Practices Made Available for Selection

For this study, practice options included five key EBPs that the researcher hypothesized were candidates for promotion of implementation to spur young children's social communication outcomes based on a few features of the practices. Given kindergarten-twelfth-grade educators' limited use of the included practices and the continued poor outcomes for students with ASD, certain practices held promise for improved implementation (Brock et al., 2019; McNeill et al., 2019). In addition, to avoid

the influence of resource needs that may function as barriers to implementation (Wilson & Landa, 2019), the available practices did not rely heavily on external resources (e.g., technology, funds). Each of these practices is evidence-based, has the same core features (Wong et al., 2015), and would be a realistic and suitable option for addressing the skills identified for the student portrayed in the vignette. The practice features differ, highlighting the influence of beliefs on a teacher's contemplation (Duffy & Healey, 2010).

Variability in ECSE Teachers' Practice Selections

Supporting the idea that EBP implementation should be examined at the individual practice level, rather than as a group of practices that are associated in a certain way (e.g., evidence-based, behavioral, emergent), there were both individual differences and group trends in ECSE teachers' practice selection. Although all practices were represented at each rank, some differences in rates of rankings emerged that support the notion that EBPs are distinct practices from one another (Fishman et al., 2018), and multiple practices may be suitable to address certain skills. Specifically, the differences in rankings and selection of first and last choice support the idea that there may be varying strengths of intentions to use specific practices (Ajzen, 1991) as observed in other studies on the implementation of EBPs for students with ASD (Fishman et al., 2018) and other community-based implementers (Bonetti et al., 2005). Beyond noting differences between teachers' likelihood to select certain practices, the variability calls attention to potentially achieving the same outcome for a child through promoting specific practices that may have better alignment to a teacher's reported intentions and beliefs (Carta et al., 1991; Kretlow & Helf, 2013, Proctor et al., 2011; Schreck & Mazur, 2008).

Describing ECSE Teachers' Patterns in Practice Selection

ECSE teachers most often selected to try naturalistic intervention first and discrete trial teaching 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), in the eyes of a teacher who is choosing which practice to use, different ways in which the practices apply these principles (e.g., in adult-led or child-led activities) may magnify their differences. Highlighting the divergence between naturalistic intervention and discrete trial teaching 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 selections (Jennett et al., 2003). These practices represent opposing anchors of two different instructional continua: the degree to which each practice is adult or child-directed and the degree to which embedding the practice in natural activities is required. As in the name, Naturalistic intervention entails the adult capitalizing on child-led activities and motivations and embedding learning trials into existing routines and activities using existing and natural reinforcement (Harjusola-Webb & Robbins, 2012; Mancil, 2009). In contrast, discrete trial teaching is adult-directed, structured, and prescriptive. Although there have been efforts to embed discrete trial teaching into play-based activities (Geiger et al., 2012), the practice has a history of being considered unnatural (Mesibov et al., 2005). When teachers form their beliefs about these practices and make selection decisions, they may consider these factors.

Although, as a group, ECSE teachers tended to select naturalistic intervention more often than discrete trial teaching to try first, a portion of this sample selected discrete trial teaching first, and naturalistic intervention last, perhaps revealing individual differences in teachers' beliefs about each of these approaches. Consistent with some research on providers' perceptions of discrete trial teaching (Schreck et al., 2018), some teachers who selected discrete trial teaching last reasoned that the repeated trials seemed difficult and did not prefer teaching the skill outside of the natural context. However, other participants in this and another study highlighted those same features, prescriptive nature, dosage, and embedded instruction, as reasons for the use of a practice (Barnett et al., 2017). These findings stress the need for an inquiry into how these features may interact with beliefs to influence their selection decisions.

Determinants of ECSE Teachers' Practice Selections: Beliefs

Given the distinctive practice features and that there were individual differences in teachers' selections, beliefs may serve as a critical determinant of selection that represents how teachers perceive practice features when making practice decisions (Wills & Holmes-Rovner, 2006). The findings from this study underscore the influences of beliefs on teachers' selection decisions and considerations about five key EBPs. ECSE teachers' selections of first and last choice to use for a vignette student were dependent on how positive their beliefs were about each practice. Consistent with demonstrations that intention relates to implementation (Bonetti et al., 2005; Prenger & Schildkamp, 2018), teachers may have improved practice implementation for practices that they select about which they hold positive beliefs. If a teacher is struggling to use a practice, gathering information about their beliefs (self-efficacy, attitude, and subjective norms) may be an

initial step to tailoring implementation support for that teacher (Bonetti et al., 2005; Fishman et al., 2018; Kretlow and Helf; 2013).

In this study, teachers' ratings of their beliefs (self-efficacy, attitude, and subjective norms) often differed significantly between practices. This difference was always the case between the group's highest-rated and lowest-rated practices. These findings are consistent with others that confirm the meaningfulness of the TPB beliefs in predicting intention to use a practice together and separately (Ajzen, 1991; Fishman et al., 2018; Lyon et al., 2019; Prenger & Schildkamp, 2018; Ruble et al., 2018). Each belief factor may provide unique information for the development of implementation supports (Cook et al., 2015) and may serve to focus on stimulating the use of a few key EBPs about which teachers hold positive beliefs rather than burdening teachers with the expectation of using all EBPs (Locke et al., 2018). Therefore, the following section provides a discussion of how information about each belief factor relative to specific practices may be useful to implementation efforts.

Self-efficacy. Self-efficacy is one's belief in their ability to perform a specific task, in this case, implement each of the five practices, thereby improving students' outcomes (Ajzen, 1991; Bonetti et al., 2005). Building on teachers' self-efficacy is a necessary, but likely insufficient means of promoting more positive beliefs and the likelihood of selecting and using a practice (Fishman et al., 2018; Ruble et al., 2018). Although special educators servings students with ASD may have high general teaching self-efficacy (Guo et al., 2014), their self-efficacy in their ability to address the needs of students with ASD may be dependent on other things, such as receiving ASD specific training (Corona et al., 2016; Wilson & Landa, 2019) or their commitment to a teaching

138

philosophy (Jennett et al., 2003; Siu & Ho, 2010). This study expands previous self-efficacy examinations by focusing on ECSE teachers' self-efficacy regarding a few specific EBPs.

Although ECSE teachers rated their self-efficacy similarly across practices, there were significant differences in their ratings between practices, consistent with previous research (Brock et al., 2015). Though Brock et al. (2019) suggest that the number of implementation steps may be a good indicator of complexity and thereby teachers' beliefs about their abilities to implement, this study did not fully support that assertion. In this study, based on the implementation checklists available from the NPDC, Scripting had the fewest implementation steps within the self-efficacy section of the Autism Practice Intentions Scales (APIS; $N = 5$) but the lowest self-efficacy rating. Closer examination of the self-efficacy ratings may instead show that teachers may consider specific implementation steps as more or less complicated, regardless of the number of actual steps (Wilson & Landa, 2019). The difficulty of implementing each of these practices has yet to be evaluated empirically. Future research could explore Item Response Modeling of the Autism Practice Intentions Scales to determine if the self-efficacy scores that represent the difficulty in implementing a practice are representative of how a teacher considers their ability to implement increasingly difficult components of a practice (Ruble et al., 2013). With this information, researchers could identify if these resulting self-efficacy ratings are predictive of a self-efficacy score and selection (Rudolph, 2019).

Attitude. A teachers' attitude toward a practice is the degree to which they find a practice important and approve of it (Ajzen, 1991; Klingner et al., 2003; Prenger & Schildkamp, 2018; Rudolph, 2019). Substantial research attention has been paid to

identifying practitioners' attitudes about EBPs (Barnett et al., 2019), but the connection between attitudes, decision-making and use remains limited (Bonetti et al., 2005; Carson, 2015). Attitudes toward other educational practices, such as data collection, have proven to be variable and, though associated with implementation, insufficient in explaining implementation (Ruble et al., 2018). Although attitude has primarily been studied related to ASD EBPs as a category and has shown to be differentially predictive of implementation in some cases (Barnett et al., 2017; Carson, 2015; Locke et al., 2018; McNeill, 2019), there is evidence that an implementer's attitude toward a specific EBP relates to practice use (Becker-Haimes et al., 2017; Hugh et al., in press). Empowered with the knowledge that teachers' attitudes towards different practices vary, and that they are malleable (Cook et al., 2015), attitudes may be a target for implementation supports (Brookman-Frazee et al., 2019; Lyon et al., 2019).

Subjective Norms. A teacher's subjective norms about a practice represent the degree to which they feel that their colleagues and administrators value the use of a practice and the pressure they feel to use the practice (Ajzen, 1991). Like for self-efficacy, in this study, teacher's ratings of subjective norms varied little between practices. Other researchers have established the role that administrators play in facilitating or hindering the implementation of EBPs (Green & Aarons, 2011; Brock et al., 2015), which has primarily been considered after a selection decision has been made (Locke et al., 2019). Therefore, it is remarkable to find that when selecting an EBP from a given array, teachers' perceptions of subject norms did not appear to contribute in unique ways to differentiating practice selections. The one exception may be with the practice selected least likely to select for use, discrete trial teaching, which teachers also

rated as the least valued by their colleagues and administrators. Although this study did not capture other information relating to administrative or collegial support that may enable intention and implementation (Brookman-Frazee et al., 2019; Locke et al., 2019), teachers' perceived support in using practices is worthy of further investigation. In the contemplation stage, a teacher may consider administrative and collegial support of a specific practice as a pro, or positive attribute associated with, a practice over the use of another. In this case, they would hold positive subjective norms about a practice and could then shift into the action stage of using the selected practice, with the understanding that their peers and administrators are likely to find the practice important. Future research should capture both a teachers' perception of the organizational context in which they are making decisions relative to the choices that they make, and whether this perceived support is a mechanism of implementation (Prenger & Schildkamp, 2018).

Overall Beliefs As A Positive or Negative Valence for Selection Decisions

Because the TPB explains how all three of these belief factors predict intention, the researcher calculated an Overall Beliefs score that represents the degree of positive beliefs participants held about each practice (Ajzen, 1991). Consistent with the conceptualization of the TPB (Ajzen, 1991) and recent demonstrations that each of the TPB beliefs separately and together predicted elementary school teachers' intention to use and reported use (Prenger & Schildkamp, 2018), ECSE teachers' beliefs were highly correlated with practice ranking and were predictive of practice selection for first and last choice. These findings suggest that beliefs may serve as mediators of practice selection, which may influence implementation (Cook et al., 2015; Prenger & Schildkamp 2018).

The valence of positive and negative beliefs in this study predicting the first

choice and last choice provides evidence of beliefs as determinants of selection that can

be used to identify practices which may be more easily adopted (naturalistic intervention)

and those that may benefit from tailoring implementation supports (discrete trial

teaching) to promote their use. Despite a relatively low percentage of ECSE teachers

being familiar with naturalistic intervention, their beliefs were supportive of it, and it was

often selected, showing that it was well-received by the ECSE teachers in this study.

Accordingly, it is plausible that increasing teachers' familiarity with it through pre-

service and in-service training may facilitate an increase in its use, perhaps more so than

for a practice for which they held more negative beliefs (e.g., discrete trial teaching).

Naturalistic interventions may serve as a prime candidate for promoting its

implementation.

The role of negative beliefs. In this study, as ratings for beliefs about any

practice decreased (i.e., were more negative), their likelihood of selecting that practice as

their last choice increased. Furthermore, discrete trial teaching 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 for this student. Teachers' beliefs about discrete trial

teaching predicted whether they would select another practice as their last choice.

Negative beliefs may explain some of the limited implementation of discrete trial

teaching (Downs & Downs, 2013) or other practices despite substantial professional

development supports (Alexander et al., 2015; Fishman et al., 2018). These findings carry

implications that are twofold: first, if it is essential to use discrete trial teaching for

specific skill acquisition and situations, which ASD researchers and teacher educators

have argued (Sturmey, 2011), then implementation supports should be designed to address teachers' negative beliefs about the practice. Although there are no empirical evaluations of the effects of implementation supports on negative beliefs, other studies have shown that without implementation supports, beliefs have deteriorated and become negative (Cook et al., 2015; Farrell et al., 2013). If teachers are considering using discrete trial teaching, implementation supports may be necessary to both train teachers to use the practice and promote their beliefs about it. Extending this logic beyond discrete trial teaching, the findings may inform professional development providers and researchers to consider the role of negative beliefs in implementation of other practices. When a teacher holds negative beliefs about any practice that they are promoting for use, efforts to counteract negative beliefs that have been shown to relate to implementation and fidelity, may improve implementation (Farrell et al., 2013; Fishman et al., 2018; Haney et al., 1996; Lyon et al., 2019).

Limitations

This study's limitations are rooted in methodological decisions made to balance a pragmatic approach with rigorously answering the research questions. There are a few overarching limitations and then two specific areas of limitations that warrant consideration. First, the decision to use self-reported data rather than observational presents questions about how self-reported selections and use may represent an actually observed selection and use (Fishman et al., 2018). Given that these were novel research questions, the self-reported information provides the basis for future studies to determine specific practices to target for observation and whether teachers' reported use of a practice is recognizable in the way researchers define the practice (Guckert, Mastropieri

& Scruggs, 2016). In addition, although individual factors predict practice selection, decision-making and implementation do not occur in a vacuum, and future research would benefit from exploring individual and organizational level factors and their possible composite and dynamic interactions (Cook et al., 2015; Fishman et al., 2018; Kamau, 2015; Locke et al., 2018). The final overarching limitation is that the sampling procedure did not guarantee a random sample from the entire nation (Nardi, 2014). Beyond these considerations, there are limitations in interpreting the findings from this study specific to the self-reported data and the analytic approaches.

Limitations related to construct validity. The reliance on self-report data presents a few considerations when interpreting these findings and developing future research questions. First, this study asked participants to report their practice use, which does not take into account actual use demonstrated by intervention fidelity (Klingner et al., 2003). Knowing that is often challenging for school-based implementers to achieve or maintain fidelity (Alexander et al., 2015; Klingner et al., 2013) in ways that fully represent the use of a practice as intended, reported use may not represent observed use. Therefore, investigating teachers' actual use of practices that they reported frequent use of still demands attention (e.g., Reinforcement, Modeling, Visual Supports). This call is made more urgent in light of the findings that both ECSE and kindergarten-twelfth-grade teachers report high-frequency use of these practices; however, students do not gain the skills they need (Brock et al., 2019).

Second, because these questionnaire items were not validated beyond Think-Aloud protocols with former ECSE teachers, there may be threats to both convergent and discriminant validity (Agarwal, 2011). An issue of poor convergent validity between this

study's practice definition and that of others may have led to discrepant findings. ECSE teachers and researchers may have a different understanding of the practice descriptions and what use of any given practice looks like. In this study, ECSE teachers were slightly less familiar with prompting procedures than other studies, a practice that other teachers have reported frequently using (Brock et al., 2019) and has high social validity (Brock et al. McNeill, 2019). This inconsistency may be a result of differing practice definitions of prompting procedures used in studies. The original, abbreviated description from the NPDC was ambiguous. After Think-Aloud sessions, the researcher reframed the abbreviated NPDC definition of prompting procedures to include the "systematic" component of planning and using different types of prompts. Although this description represents the NPDC definition and the studies that have provided the evidence-base for the practice (Strain et al., 2011; Wolery & Hemmeter, 2011; Wong et al., 2015), this modification may have led some teachers to indicate they are not familiar with or do not currently use the practice than the proportion that has reported using it in previous studies (Brock et al., 2019; McNeill et al., 2019). However, these data may more accurately represent ECSE teachers' familiarity with the practice as researchers define it and as has been shown effective in the research (Doyle et al. 1988).

There may also have been threats to discriminant validity (Agarwal, 2011) related to specific practices and their accompanying descriptions. Participants may not have distinguished between some practices such as scripting and visual supports. Due to variations in the application of terms in intervention efficacy studies, these practices merged into just the category of visual supports in the NPDC's most recent EBP review (Steinbrenner et al., 2020). In this study, this potential limitation of poor discriminant

validity may explain how, despite ECSE teachers holding more negative beliefs about scripting, it was still frequently selected. Picture exchange communication systems (PECS) is another practice that may have been difficult to discriminate from visual supports. PECS requires specific certification that is unlikely to be accessed by the majority of teachers given resource constraints (Pyramid Educational Consultants, 2020). Consequently, it is improbable that this percentage of teachers has obtained training and used the practice with sufficient fidelity to earn certification. In the future, researchers may consider combining these practices, consistent with the NPDC review, or providing a more detailed description of scripting and PECS that includes more of the implementation steps and confirming that they are distinguishable with more Think-Aloud participants.

Limitations in the analytic approach. The analytic methods used in this study align with the specific research questions, though there is room for different approaches to be used in the future to explicate the findings of this study further. The use of Discrete Choice Analysis and Multinomial Logit Modeling was appropriate for these data. Due to the limited sample size, it was not prudent to test the full theoretical model described by the researcher, which included participants' familiarity with and their current use of practices. Instead, the researcher protected power to detect any real effects of beliefs (Cohen, 1977) by using the most parsimonious model that isolated the effects of beliefs. Knowing that beliefs may relate to familiarity with and current use of practices, collecting a larger sample can allow a researcher to test whether beliefs predict selection above and beyond the effects of these other variables, and in consideration of their potential interaction effects.

Future Directions for Research and Implementation Practice

This study contributes distinctive knowledge linking the implementation gap in ECSE to teachers' practice selection. 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 more effective and efficient skill acquisition, adapting implementation interventions to a teacher's needs, preferences, and beliefs may be a means to lessening resource waste and quickening adoption and implementation and EBPs (August et al., 2010; Wills & Holmes-Rovner, 2006). Researchers and professional development providers ought to integrate teachers' beliefs about practices throughout intervention development, from building an evidence-base to disseminating an intervention. Mixed methods approaches can help to render all potential factors (e.g., classroom context, child needs, organizational context) that may serve as tailoring variables for designing implementation supports (Brookman-Frazee et al., 2019; Klingner & Boardman, 2011; Palinkas et al., 2011; Stadnick et al., 2019; Waltz et al., 2019; Wills & Holmes- Rovner, 2006).

Tailoring an intervention is the process of systematic individualization of implementation supports by matching supports to specific factors or variables observed in the population (August et al., 2010; Cook et al., 2019). Effective tailoring may operate on the "homogeneity within the heterogeneity" (Cook, 2020) observed in this study; teacher factors that, despite the individual variation, may be leveraged to individualize interventions for specific subgroups of the ECSE teachers based on detected group propensities for selecting specific practices. The variables identified in this study,

familiarity, current use, and beliefs, may serve as tailoring variables in future studies stimulating the implementation of EBPs for students with ASD (Cook et al., 2015). Based on the findings of this study, the researcher proposes the following research directions as means to tailor implementation supports in an effort to reduce the implementation gap, (a) incorporating selection into professional development and intervention efficacy research, (b) developing tailored dissemination and implementation interventions by capitalizing on teachers' beliefs about key EBPs, and (c) focusing on the current use of practices to attend to de-implementation alongside implementation.

Incorporating teachers' selections into professional development and research.

Behavioral intent is a robust predictor of implementation, particularly when an individual is selecting a practice over others (Ajzen, 1991). Consistent with other researchers' assertions that one must increase intention (or selection) to increase implementation (Fishman et al., 2018), allowing teachers to select a practice may be a means to boost EBPs usage effectively and efficiently. If our intent as researchers and professional development providers is to facilitate a shift in practice implementation such that effective practices are being used appropriately, with fidelity, in the long-term, we need to consider beliefs and incorporate teachers' decision-making into research. Concentrating research attention on practice selection is both practical for teachers and leverages the principles of human behavior to improve implementation (August et al., 2010). This idea is described below by first outlining the practicality of incorporating selection into intervention and implementation research and by describing the principles of human behavior that support this claim.

The practicality of focusing on selection. In practice, teachers often make their own practice selection decisions without the help of professional development providers or researchers. Teachers of students with ASD report that identifying an appropriate practice to teach a student with ASD a specific skill is a primary reason for the difficulty in addressing students' IEP goals (Brock et al., 2019). Selection is a proxy for intention that is both likely to relate to implementation (Hagger & Łuszczyńska, 2014) and is a component of an initial stage in the implementation process (Aarons et al., 2011) when an individual shifts from considering behavior change to deciding upon a practice to use (Prochaska & Velicer, 1997). The subsequent implementation phases may improve by supporting teachers in selecting appropriate practices from the beginning of their implementation process (Aarons et al., 2011). In conjunction with the knowledge that teachers may be using practices with limited or no effects (e.g., FloorTime™, Sensory Integration Therapies), and the poor outcomes observed for students with ASD (Brock et al., 2019), there is a need to shift our research approach from prescribing practices to teachers and testing their use, to support teachers in making effective practice selections (August et al., 2010; Beutler et al., 2002). Information is needed regarding how and under what conditions teachers make selection decisions. Combined with the findings of this study, this information would empower implementation researchers with the necessary knowledge to teach a selection decision process that incorporates a child's needs, resource needs, the context, and a teacher's beliefs about available EBPs (Wills & Holmes-Rovner, 2006).

Applying the principles of human behavior to facilitate implementation.
Implementation scientists' desire to promote effective practice in community-based

149

settings drives study development and professional development efforts (Lyon, 2017; Mandell, 2020; Odom, Cox & Brock, 2013; Powell et al., 2019). Yet, research studies are often designed to test the implementation of a researchers' chosen practice, perhaps impairing school-based implementation from the start. With the many Focused Intervention Practices (FIPs) available to ASD practitioners, furthering the high-quality implementation of a small set of FIPs may function to improve children's outcomes. Rather than researchers and professional development providers deciding which practice a teacher should use, perhaps with unsustained use as a consequence, they should provide choice to implementers when possible. Johnson and colleagues (2014) tested the effects of providing teachers choices and demonstrated that teachers who had a choice in practices maintained fidelity of implementing their chosen practice without coaching more often than teachers who were prescribed a practice. Like the beliefs constructs of the Theory of Planned Behavior, preference and choice act on motivation. Behavioral research has long exhibited that people are more likely to take action on something they prefer than they are for alternatives (Ajzen, 1991; Cooper, Heron & Heward, 2020). In effect, when presented with options, teachers can exert their preference and may be more motivated to use their selected practice, with better fidelity, sustainably (Johnson et al., 2014; Wills & Holmes-Rovner, 2006). One prospective blending of these social-cognitive and behavioral methods with the potential to improve implementation is to provide practice choices to implementers is allowing the implementer to exert their preference and act on their beliefs within research or professional development circumstances (August et al., 2010).

Tailoring Dissemination and Pre-Implementation Interventions by Capitalizing on Beliefs

To effectively tailor, there must be recognized tailoring variables. The increasing evidence that beliefs vary by individual and facilitate or hinder selection reinforces the theory that ECSE teachers' beliefs may function as tailoring variables in future studies (Cook et al., 2015; Fishman et al., 2018; Locke et al., 2018; Lyon et al., 2019). Future research should examine the unique contributions of each belief factor (self-efficacy, attitude, subjective norms) to selection and subsequent use to tailor based on the beliefs variables in this study (Prenger & Schildkamp, 2018; Rudolph, 2019). Empowered with this information, researchers may differentiate implementation supports based on how the belief factors individually contribute to teachers' selection. Specifically, self-efficacy may increase with Behavioral Skills Training (Brock & Carter, 2017; Corona et al., 2017), subjective norms may escalate by soliciting Opinion Leaders and peers to describe the benefits of their use of the practice (Merk et al., 2017; Rogers, 2005; Waltz et al., 2019), and attitudes may rise with social persuasion (Cook et al., 2015).

When endeavoring to stimulate the use of EBPs that are new to teachers, it may befit researchers to capture teachers' current use of practices to tailor their implementation supports based on that use. Teachers are probably using practices about which their beliefs are supportive. If a teacher uses or has beliefs that support the use of a particular set of practices based on specific teaching philosophy, they may be more committed to using those and similar practices (Jennett et al., 2013). In this study, there were potential groupings of practices that are naturalistic (naturalistic intervention, peer-mediated instruction and intervention) and those that are structured and adult-directed

(scripting, discrete trial teaching, functional communication training). Dissemination and implementation researchers, professional development providers, and faculty in institutes of higher education may uncover and explicate the commonalities of specific sets of practices (e.g., that they all use antecedent-behavior-consequence learning trials) to help support buy-in to the other subset of practices.

Attending to de-implementation and divergence. Although this study concentrated on identifying beliefs as explicit influences on selection, practice selections are not made by considering only one practice. In addition to their beliefs, teachers are likely considering their current use of other practices. This study characterized what practices ECSE teachers are currently using and simulated a selection decision but did not explore any commingled effects of these factors. Whether the use of a particular FIP predicts what other practices a teacher may consider for use remains undetermined. This study offers insight into potential groups of ECSE teachers that may be best served by supports tailored to the factors hypothesized in this study. It stands to reason that beliefs are formed by exposure (i.e., familiarity) and experiences (i.e., current use) that a teacher has with specific practices. Therefore, these factors may be components on which implementation supports can be tailored. To improve children's outcomes, conducting cluster analyses of data like those collected in this study to identify potential groupings that may be best served by specific implementation supports targeted toward an individual's needs (Cook, 2020; Cook et al., 2019) may aid research.

There may be practices with which teachers are familiar but that they do not use because their beliefs are not supportive of their use. In such cases, substitution de-implementation is necessary to replace the use of unsubstantiated and ineffective

practices with a new practice (Upvall & Bourgault, 2018; Wang et al., 2019). In this application, implementation efforts must embed de-implementation strategies that counter misinformation about both the currently used and the new practice (Lyon et al., 2019; van Bogedom-Vos et al., 2017) in ways that overcome confirmation bias (Travers, 2017; Upvall & Bourgault, 2018). ECSE teachers' current use of different practices (e.g., Sensory Integration Therapies) in this study reveals the need for countering some of the pseudoscientific information teachers receive (Travers, 2017) that may impede their adoption of some EBPs (Foxx, 2008; Metz et al, 2015). Demonstrating that the new practice has relative advantage over the presently used practice may be pivotal in supporting de-implementation and implementation (Damschroder et al., 2009; Rogers, 2005).

Conclusion

EBPs are only effective if, and when implemented. Although teachers in this and other studies report high-frequency use of some EBPs, they report limited familiarity with and use of others (Brock et al., 2019; McNeill, 2020). Because students with ASD are not making adequate progress in their social communication development (Brock et al., 2019), focusing attention on how to support 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 ECSE teachers' toolboxes are dependent on individual factors above and beyond the evidence-base of any given practice. Just as teachers should consider student and contextual fit of interventions, professional development providers and implementation researchers should explore tailoring their

implementation supports to individual teachers based on their beliefs (Cook, 2020; Fishman et al., 2018). By doing so, teachers will be motivated to use effective interventions for young children with ASD to cultivate the skills that help them access the opportunities and activities they deserve (Goldstein et al., 1992).

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Practice Selection for Students with Autism

Q142 As early childhood special educators who serve students with autism spectrum disorder (ASD), you have to have many strategies and tools in your toolbox. Researchers at the University of Minnesota are interested in learning what practices are useful to you when you work with students with ASD. The information gathered from this survey will help inform our professional development practices when teaching teachers to use strategies for students with ASD.

 We are doing a web-survey to be able to learn about what practice you use and would consider using to help young students ASD develop social communication skills. We will provide you a scenario and we ask that you please respond to the questions. If you have any questions, please contact Maria Hugh at LEMLE008@umn.edu.

Q2.1 **Informed Consent**
Please carefully read the information below. You are invited to participate in a survey being conducted by Maria Hugh and Dr. LeAnne Johnson from the University of Minnesota. The purpose of this survey is to learn how early childhood special education teachers select practices for young students with autism spectrum disorder (ASD) in their classrooms. Your participation in the survey will contribute to a greater understanding of ECSE teachers' preferences and other factors associated with practice selection. We

estimate that the survey will take about 25-30 minutes to complete.
 You are eligible to complete this survey if you:

- Speak and read English

- Are an early childhood special education teacher

- Serve at least one student with ASD this school year AND

- Are 18 years old or older.

Your participation in this survey is voluntary. You may decline to answer any question and you have the right to withdraw from participation at any time without penalty. If you wish to withdraw from the study, simply cease filling in the survey items. Risks tied to participation in this survey are considered minimal.

Survey enhancements to increase data integrity

- *Speeding*: Participants who complete the study impossibly fast (e.g., 5, 10 minutes) will be flagged.

- *"Bot Protection"*: We include the "bot protection" provided by Qualtrics. You will be asked to complete a captcha before you are able to access the survey questions. We also use Qualtrics "ballot stuffing" protections to prevent individuals from completing the survey more than once. Qualtrics will collect the location of where each survey is completed, this information will be removed from the dataset to retain anonymity.

- *Incomplete Responses*: You may save the survey and complete it up to 7 days after first starting the survey. If you choose to do the survey in more than one sitting, the same device must be used to complete the same survey.

- *Redundancy*: Participants will be asked two questions more than once to check for convergence. Participants with inconsistent responses will be flagged.

- *Personalized links*: Only responses accessed via the unique link sent to you will be included. You may only use this link one time.

- *Forced responses for open-ended questions*: A large number of false responses in our past study were detected through the open-ended questions in the survey. Therefore, participants will now be required to respond to 3 of the open-ended questions included in the survey.

- *Logic/attention questions*: You will be asked to respond to logic questions to help us protect against BOTS.
  All survey responses will be gathered anonymously. Those who complete the survey accurately and in an appropriate time,

however, will be given an opportunity to submit an email address to receive an electronic Amazon gift card for $30. If you choose to submit your email address, please know that it will be immediately deleted from the dataset containing survey responses and will be kept in a separate file, such that it will not be possible to link your responses to any identifying information.

The researcher(s) conducting this study are: Maria Lemler Hugh and Dr. LeAnne Johnson. If you have questions, you are encouraged to contact Maria Hugh (250 Education Sciences Building, 56 East River Rd., Minneapolis, MN, 55455) at 224-406-4525, or lemle008@umn.edu or Dr. LeAnne Johnson at 612-626-3457 or leannj@umn.edu. This research has been reviewed and approved by an IRB within the Human Research Protections Program (HRPP). To share feedback privately with the HRPP about your research experience, call the Research Participants' Advocate Line at 612-625-1650 (Toll Free: 1-888-224-8636) or go to z.umn.edu/participants.
 You are encouraged to contact the HRPP if:
● Your questions, concerns, or complaints are not being answered by the research team.
● You cannot reach the research team.
● You want to talk to someone besides the research team.
● You have questions about your rights as a research participant.
● You want to get information or provide input about this research.

Q141 Please click on the box below to verify your ability to participate in this study.

Q175 This school year, have you served a student with autism for whom you make instructional decisions?

○ Yes (1)

○ No (2)

Skip To: End of Survey If This school year, have you served a student with autism for whom you make instructional decisions? != Yes

✱

Q2.4 Do you consent to participate in this survey?

○ Yes (4)

○ No (5)

Skip To: End of Survey If Do you consent to participate in this survey? != Yes

Q145 Thank you for completing those questions. There are four sections to this survey: Autism Practice Use Questionnaire   Practice Selection Task   Autism Practice Intentions Scales   About You!

End of Block: Informed Consent

Start of Block: ASD Practice Use Questionnaire

Q3.1
ASD Practice Use Questionnaire
 The questions below include a list of <u>specific practices used for students with ASD</u> along with their descriptions.

 Please read the <u>practice name and description carefully.</u> Then, check the corresponding box(es) to indicate your:
- **Familiarity** with that practice
- **Current use** of that practice
- **Training** experience with that practice

Please select <u>any and all of the boxes</u> that are true for you.

Here is an example:
Sam is trained in Early Start Denver Model, as part of the training from their district. They heard about the practice, observed others

use it in early intervention services, have used it, and currently use it.

Here is what Sam selects to represent their familiarity, current use, and training experience.

	I have not heard of it.	I have heard of it.	I have observed others use it.	**I have used** it in my own teaching.	I have used it this school year.	I received training from my teacher preparation program on it.	I received professional development through my work as a teacher on it.
Early Start Denver Model A relationship-based therapy involving parent-training and play-based approaches to teaching skills.	☐	☑	☑	☑	☑	☐	☑

Please select <u>any and all of the boxes</u> that are true for you.

	I have **not heard** of it. (9)	I have **heard** of it. (1)	I have **observed others use** it. (8)	I **have used** it in my own teaching. (7)	I have **used it this school year.** (2)	I received training from my **teacher preparation program** on it. (3)	I received **professional development through my work as a teacher** on it. (4)
Differential Reinforcement A systematic procedure for providing reinforcement for desired behaviors, while inappropriate behaviors are ignored. (4)	☐	☐	☐	☐	☐	☐	☐
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. (5)	☐	☐	☐	☐	☐	☐	☐
Extinction A procedure whereby a behavior that was formerly reinforced is no longer reinforced. (6)	☐	☐	☐	☐	☐	☐	☐

Facilitated Communication (FC) A specific technique in which a facilitator physically supports another person and helps them to point at pictures or words. (7)

As a reminder, please be sure to **select <u>any and all of the boxes</u> that are true** for you.

FloorTime A relationship-based approach in which the caregiver takes an active, developmental role in spontaneous and fun activities that are directed by the child's interests and actions. (9)

Functional Behavior Assessment (FBA) A systematic set of strategies used to determine the underlying function or purpose of a behavior so that an effective intervention plan can be developed. (10)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Functional Communication Training (FCT) A positive behavior support intervention designed to reduce problem behaviors by replacing them with meaningful or functional communication, whether verbal or gestural. The emphasis of the communication is on functionality as opposed to form. (11)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Gentle Teaching A specific non-violent approach for helping people with special needs and sometimes challenging behaviors. It focuses on four primary goals of caregiving for the learner/partner to; 1) feel safe, 2) feel loved, 3) be loving, 4) feel connected to the caregiver. (12)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Integrated Movement Therapy An individual and group therapy approach that combines speech-language pathology, behavioral and mental health counseling, and yoga. (13)

☐ ☐ ☐ ☐ ☐ ☐ ☐

As a reminder, please be sure to **select <u>any and all of the boxes</u> that are true** for you. **Modeling** A specific demonstration of a desired target behavior that results in imitation of the behavior by the learner and leads to the acquisition of the imitated behavior. (14)

☐ ☐ ☐ ☐ ☐ ☐ ☐

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' interests by building more complex skills that are naturally reinforcing and appropriate to the interaction. (15)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Parent-Implemented Intervention Parents directly using individualized intervention practices with their child to increase positive learning opportunities and acquisition of important skills. (35)

☐　　☐　　☐　　☐　　☐　　☐　　☐

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. (17)

☐　　☐　　☐　　☐　　☐　　☐　　☐

Picture Exchange Communication System (PECS) A specific alternative/ augmentative communication system. It is used to teach learners to communicate through systematic prompting, error correction, and reinforcement procedures across six phases. (18)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Pivotal Response Training A specific approach that builds on learner initiative and interests, enhancing the pivotal learning variables: motivation, responding to multiple cues, self-management, and self-initiations of social interactions. (19)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Prompting Procedures (PP) Systematic use of supports that provide help to the learner that assists them in becoming independent in using a specific skill. (20)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Rapid Prompting Method (RPM) A form of augmentative or alternative communication that involves a therapist using constant, fast-paced questioning, prodding, and engaging of the person with a disability. (21)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Reinforcement Something that is done or provided after a behavior that increases the likelihood that the target behavior/skill will occur again in the future. (22)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Response Interruption/Redirection (RI-R) A procedure that inolves introduction of a prompt, comment, or other distractors when an interfering behavior is occurring. The distractor is designed to divert the learner's attention away from the interfering behavior and results in its reduction. (23)	☐	☐	☐	☐	☐	☐	☐
Scripting A visual or auditory cue that supports learners to initiate or sustain communication with others. (24)	☐	☐	☐	☐	☐	☐	☐
Self-Management (SM) Teaching learners to discriminate between appropriate and inappropriate behavior, accurately monitor and record their own behaviors, and reward themselves for appropriate behavior or use of skill. (25)	☐	☐	☐	☐	☐	☐	☐

Sensory Integration Therapy (SI) A collection of strategies and supports designed to help children with poor sensory integration. Sensory integration is the ability to receive, process, and make sense of multiple sensory inputs at the same time. (26)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Social Skills Training (SST) A specific form of group or individual instruction designed to teach learners ways to appropriately interact with peers, adults, and other individuals. (27)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Social Stories/Narratives (SN) A description of social situations for learners by providing relevant cues, explanation of the feelings and thoughts of others, and descriptions of appropriate behavior expectations. (28)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Structured Play Groups The specific arrangement of small group activities with a defined area, activity, theme, and roles with typically developing peers and an adult scaffolding as needed to support the learner's performance. (29)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Task Analysis The process of breaking a skill into smaller, more manageable steps in order to teach the skill. (30)

☐ ☐ ☐ ☐ ☐ ☐ ☐

As a reminder, please be sure to **select <u>any and all of the boxes</u> that are true** for you. **Technology-Aided Instruction and Intervention (TAII)** Instruction or interventions in which technology is the central feature supporting the acquisition of a goal for the learner. (31)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Time Delay (TD) A practice that focuses on systematically fading the use of prompts during instructional activities. (32)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Video Modeling (VM) A mode of teaching that uses video recording and display equipment to provide a visual model of the targeted behavior or skill. (33)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Visual Supports (VS) Concrete supports used to support a learner's understanding or expression. (34)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Antecedent-Based Interventions (ABI) Modifying the environment to decrease an identified interfering or inappropriate behavior and increase engagement. (44)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Animal Therapies A group of interventions that incorporate animals using a formal, structured set of sessions to help people reach specific goals in their treatment. (45)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Auditory Integration Training A person listening to a selection of music or other sounds that have been electronically modified. (46)

☐ ☐ ☐ ☐ ☐ ☐ ☐

Teaching Please select "I have not heard of it" to show you are human. (47)

☐ ☐ ☐ ☐ ☐ ☐ ☐

End of Block: ASD Practice Use Questionnaire

Start of Block: Best practice

JS

Q179 Check your understanding, which of these practices is best?

○ DTT (1)

○ Naturalistic Intervention (2)

○ PMII (3)

Q4.1
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.

Q4.2
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 ⅚ times across three consecutive data collection days.

Q146 The following questions are about what practice you would use for this student. **There are no right or wrong answers.**

⤬

Q155 Which of the below practices are you *least likely to select to use* at all 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' interests by building more complex skills that are naturally reinforcing and appropriate to the interaction. (1)

○ **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. (2)

○ **Scripting** A visual or auditory cue that supports learners to initiate or sustain communication with others. (3)

○ **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. (4)

○ **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. (5)

Carry Forward Unselected Choices from "Which of the below practices are you least likely to select to use at all for the student?"

X→

Q156 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' interests by building more complex skills that are naturally reinforcing and appropriate to the interaction. (1)

○ **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. (2)

○ **Scripting** A visual or auditory cue that supports learners to initiate or sustain communication with others. (3)

○ **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. (4)

○ **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. (5)

- -

Carry Forward Unselected Choices from "Which of the below practices will you select to try first for the student?"

⤨ X→

Q4.6 Please rank the remaining practices in the order you are likely to select them for use with this student *(1 being most likely to 3 being least likely)*.

_____ **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' interests by building more complex skills that are naturally reinforcing and appropriate to the interaction. (1)

_____ **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. (2)

_____ **Scripting** A visual or auditory cue that supports learners to initiate or sustain communication with others. (3)

_____ **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. (4)

_____ **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. (5)

Q4.5 Please select any or all of the practices you would **not choose to try** for this student.

☐   **Naturalistic Intervention (NI)** A collection of practices designed to encourage specific target behaviors based on learners' interests. It occurs within the typical settings, activities, and/or routines in which the learner participates. (1)

☐   **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. (2)

☐   **Scripting** A visual or auditory cue that supports learners to initiate or sustain communication with others. (3)

☐   **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. (4)

☐   **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. (5)

☐   I would try all of these practices, if needed. (6)

Page Break

Q4.7 Please briefly describe (in one to five sentences) why you selected to try <u>Naturalistic Intervention (NI)</u> *first*.

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Q132 Please briefly describe (in one to five sentences) why you selected to try <u>Discrete Trial Teaching (DTT)</u> *first*.

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Q130 Please briefly describe (in one to five sentences) why you selected to try <u>Scripting</u> *first*.

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Q134 Please briefly describe (in one to five sentences) why you selected to try <u>Peer-Mediated Intervention and Instruction (PMII)</u> *first*.

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Q136 Please briefly describe (in one to five sentences) why you selected to try <u>Social Stories/Narratives (SN)</u> *first*.

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Q4.8 Please briefly describe (in one to five sentences) why you indicated you would be *least* likely to use <u>Naturalistic Intervention (NI)</u>.

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Q137 Please briefly describe (in one to five sentences) why you indicated you would be *least* likely to use <u>Social Stories/Narratives (SN)</u>.

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Q135 Please briefly describe (in one to five sentences) why you indicated you would be *least* likely to use <u>Scripting</u>.

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Q133 Please briefly describe (in one to five sentences) why you indicated you would be *least* likely to use Discrete Trial Teaching (DTT).

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Q131 Please briefly describe (in one to five sentences) why you indicated you would be *least* likely to use <u>Peer-Mediated Intervention and Instruction (PMII)</u>.

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Q4.9 Is there another practice that was not listed that you would have selected to try first?

○ **Yes** *(please write in the name of the practice you would have tried first in the box)* (1)

_____

○ **No** (2)

Page Break

Q150 The next section of the survey consists of the **Autism Practice Intentions Scales**. You will be asked about each of the practices that were included in the Practice Selection Task.

Q17.1 The following 2 questions relate to **your beliefs about the norms present within your ECSE program** that impact <u>your use of Scripting.</u>

As a reminder, "Scripting" refers to a visual or auditory cue that supports learners to initiate or sustain communication with others.

Q17.2 How important, if at all, is <u>using Scripting</u> to these people?

	Very important (1)	Mostly important (2)	Slightly important (3)	Not at all important (4)
ECSE leadership in your district (i.e., coordinator, program lead, and professional development coaches) (Q4.2_1)	○	○	○	○
Your coworkers (i.e., other ECSE teachers and related service providers) (Q4.2_2)	○	○	○	○

Q17.4 How often, if ever, do you observe someone in an ECSE leadership role (i.e., coordinator, program lead, professional development coach) in your district engage in these behaviors?

	Monthly (1)	Quarterly (2)	Yearly (3)	Never (4)
Communicate with you about using Scripting (Q4.5_1)	○	○	○	○
Observe you using Scripting (Q4.5_2)	○	○	○	○
Acknowledge you for your use of Scripting (Q4.5_3)	○	○	○	○

End of Block: Scripting - Subjective Norms

Start of Block: Scripting- Attitude

Q18.1 The following 3 questions relate to your beliefs about the **importance** of using Scripting.

As a reminder, "Scripting" refers to a visual or auditory cue that supports learners to initiate or sustain communication with others.

Q18.2 How **important**, if at all, is it to use <u>Scripting</u>?

○ Very important (1)

○ Mostly important (2)

○ Slightly important (3)

○ Not at all important (4)

Q18.4 To what extent, if at all, do you <u>agree</u> that **using Scripting improves these things**?

	Strongly agree (1)	Agree (2)	Disagree (3)	Strongly disagree (4)
Quality of my design of communication supports (Q3.4_1)	○	○	○	○
Quality of my training of communication partners (Q3.4_2)	○	○	○	○
Quality of my social communication instruction (Q3.4_3)	○	○	○	○
My students' outcomes (Q3.4_6)	○	○	○	○

Q174 What's the answer to this question?
Select "B" to show you are still paying attention. Thank you!

○ A (1)

○ B (2)

○ C (3)

- -

Q18.5 To what extent, if at all, do you <u>agree</u> that **thinking about using Scripting gives you a positive feeling?**

○ Strongly Agree (1)

○ Agree (2)

○ Disagree (3)

○ Strongly Disagree (4)

End of Block: Scripting- Attitude

Start of Block: Scripting- Self-Efficacy

Q19.1 The following question relates to **your confidence in your ability** to use Scripting.

*As a reminder, "Scripting" refers to a visual or auditory cue that supports learners to initiate or sustain communication with others.

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Q19.3 How **confident**, if at all, are you in your ability to implement these components of Scripting?

	Extremely confident (1)	Mostly confident (2)	Somewhat confident (3)	Not at all confident (4)
Determine the type and length of the script (1)	○	○	○	○
Develop the script (2)	○	○	○	○
Identify and train communication partners as appropriate (3)	○	○	○	○
Teach the script to the learner (4)	○	○	○	○
Support the learner to use script with identified communication partners (5)	○	○	○	○

Q14.1 The following 2 questions relate to **your beliefs about the norms present within your ECSE program** that impact <u>your use of Naturalistic Intervention (NI)</u>.

As a reminder, "Naturalistic Intervention" is 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' interests by building more complex skills that are naturally reinforcing and appropriate to the interaction.

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Q14.2 How important, if at all, is using <u>Naturalistic Intervention (NI)</u> to these people?

	Very important (1)	Mostly important (2)	Slightly important (3)	Not at all important (4)
ECSE leadership in your district (i.e., coordinator, program lead, and professional development coaches) (Q4.2_1)	○	○	○	○
Your coworkers (i.e., other ECSE teachers and related service providers) (Q4.2_2)	○	○	○	○

- -

Q14.4 How often, if ever, do you observe someone in an ECSE leadership role (i.e., coordinator, program lead, professional development coach) in your district engage in these behaviors?

	Monthly (1)	Quarterly (2)	Yearly (3)	Never (4)
Communicate with you about using Naturalistic Intervention (NI) (Q4.5_1)	○	○	○	○
Observe you using Naturalistic Intervention (NI) (Q4.5_2)	○	○	○	○
Acknowledge you for your use of Naturalistic Intervention (NI) (Q4.5_3)	○	○	○	○

End of Block: Naturalistic Intervention (NI)- Subjective Norms

Start of Block: Naturalistic Intervention (NI)- Attitude

Q15.1 The following 3 questions relate to your beliefs about the **importance of using** Naturalistic Intervention (NI).

As a reminder, "Naturalistic Intervention" is 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' interests by building more complex skills that are naturally reinforcing and appropriate to the interaction.

Q15.2 How **important**, if at all, is it to use <u>Naturalistic Intervention (NI)</u>?

○ Very important (1)

○ Mostly important (2)

○ Slightly important (3)

○ Not at all important (4)

Q15.4 To what extent, if at all, do you <u>agree</u> that **using Naturalistic Intervention (NI) improves these things**?

	Strongly agree (1)	Agree (2)	Disagree (3)	Strongly disagree (4)
Quality of my environmental arrangement (Q3.4_1)	○	○	○	○
Quality my use of natural reinforcement (Q3.4_2)	○	○	○	○
Quality of my social communication instruction (Q3.4_3)	○	○	○	○
My students' outcomes (Q3.4_6)	○	○	○	○

Q15.5 To what extent, if at all, do you <u>agree</u> that **thinking about using Naturalistic Intervention gives you a positive feeling?**

○ Strongly Agree (1)

○ Agree (2)

○ Disagree (3)

○ Strongly Disagree (4)

Q16.1 The following question relates to **your confidence in your ability** to use <u>Naturalistic Intervention (NI).</u>

 As a reminder, "Naturalistic Intervention" is 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' interests by building more complex skills that are naturally reinforcing and appropriate to the interaction.

Q16.3
How **confident**, if at all, are you in your ability to implement these components of Naturalistic Intervention?

	Extremely confident (1)	Mostly confident (2)	Somewhat confident (3)	Not at all confident (4)
Identify routines and/or activities to target the behavior (1)	○	○	○	○
Determine naturally occurring reinforcers during routines/activities (2)	○	○	○	○
Arrange the environment to elicit the target behavior (3)	○	○	○	○
Engage the learner (4)	○	○	○	○
Use the planned strategies with the learner (5)	○	○	○	○
Provide naturally occurring reinforcement as appropriate (6)	○	○	○	○

Q11.1 The following 2 questions relate to your beliefs about the **norms present within your ECSE program** that impact your use of Peer-Mediated Instruction and Intervention (PMII).

As a reminder, "Peer-Mediated Instruction and Intervention (PMII)" is 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.

Q11.2 How **important,** if at all, is using Peer-Mediated Instruction and Intervention (PMII) to these people?

	Very important (1)	Mostly important (2)	Slightly important (3)	Not at all important (4)
ECSE leadership in your district (i.e., coordinator, program lead, and professional development coaches) (Q4.2_1)	○	○	○	○
Your coworkers (i.e., other ECSE teachers and related service providers) (Q4.2_2)	○	○	○	○

Q11.4 How often, if ever, do you observe someone in an ECSE leadership role (i.e., coordinator, program lead, professional development coach) in your district engage in these behaviors?

	Monthly (1)	Quarterly (2)	Yearly (3)	Never (4)
Communicate with you about using Peer-Mediated Instruction and Intervention (PMII) (Q4.5_1)	○	○	○	○
Observe you using Peer-Mediated Instruction and Intervention (PMII) (Q4.5_2)	○	○	○	○
Acknowledge you for your use of Peer-Mediated Instruction and Intervention (PMII) (Q4.5_3)	○	○	○	○

End of Block: Peer-Mediated Intervention (PMI) - Subjective Norms

Start of Block: Peer-Mediated Instruction and Intervention (PMII)- Attitude

Q12.1 The following 3 questions relate to your beliefs about **the importance** of using Peer-Mediated Instruction and Intervention (PMII).

As a reminder, "Peer-Mediated Instruction and Intervention (PMII)" refers to practices used to provide social learning opportunities through peer interaction, peer modeling, and peer reinforcement as a way to improve social reciprocity in more natural social

contexts.

Q12.2 How **important**, if at all, is using <u>Peer-Mediated Instruction and Intervention (PMII)</u>?

   ○ Very important (1)

   ○ Mostly important (2)

   ○ Slightly important (3)

   ○ Not at all important (4)

Q12.4 To what extent, if at all, do you <u>agree</u> that **using Peer-Mediated Instruction and Intervention (PMII) improves these things**?

	Strongly agree (1)	Agree (2)	Disagree (3)	Strongly disagree (4)
Quality of my training of the learner's peers (Q3.4_1)	○	○	○	○
Quality my selection of times or activities for learning the target skill (Q3.4_2)	○	○	○	○
Quality of my social communication instruction (Q3.4_3)	○	○	○	○
My students' outcomes (Q3.4_6)	○	○	○	○

Q12.5 To what extent, if at all, do you <u>agree</u> that **thinking about using Peer-Mediated Instruction and Intervention (PMII) gives you a positive feeling?**

○ Strongly Agree (1)

○ Agree (2)

○ Disagree (3)

○ Strongly Disagree (4)

Q13.1
The following question relates to your **confidence in your ability** to use <u>Peer-Mediated Instruction and Intervention (PMII)</u>.

 As a reminder, "Peer-Mediated Instruction and Intervention (PMII)" refers to practices used to provide social learning opportunities through peer interaction, peer modeling, and peer reinforcement as a way to improve social reciprocity in more natural social contexts.

Q13.3 How **confident**, if at all, are you in your ability to implement these components of Peer-Mediated Instruction and Intervention?

	Extremely confident (1)	Mostly confident (2)	Somewhat confident (3)	Not at all confident (4)
Identify times when social interactions naturally occur (1)	○	○	○	○
Identify and recruit peers (2)	○	○	○	○
Introduce target skill or strategy to peers (3)	○	○	○	○
Develop scripts for peers (4)	○	○	○	○
Use role play with peers (5)	○	○	○	○
Assign peers to learner with autism (ASD) (6)	○	○	○	○
Provide support and periodic feedback to peers (7)	○	○	○	○

End of Block: Peer-Mediated Intervention (PMII) Self-Efficacy

Q8.1 The following 2 questions relate to your beliefs about the **norms present within your ECSE program** that impact your use of Social Stories/Narratives (SN).

As a reminder, "Social Stories/Narratives (SN)" refers to narratives that describe social situations for learners by providing relevant cues, explanation of the feelings and thoughts of others, and descriptions of appropriate behavior expectations.

Q8.2 How **important**, if at all, is using Social Stories/Narratives (SN) to these people?

	Very important (1)	Mostly important (2)	Slightly important (3)	Not at all important (4)
ECSE leadership in your district (i.e., coordinator, program lead, and professional development coaches) (Q4.2_1)	○	○	○	○
Your coworkers (i.e., other ECSE teachers and related service providers) (Q4.2_2)	○	○	○	○

Q8.4 How often, if ever, do you observe someone in an ECSE leadership role (i.e., coordinator, program lead, professional development coach) in your district engage in these behaviors?

	Monthly (1)	Quarterly (2)	Yearly (3)	Never (4)
Communicate with you about using Social Stories/Narratives (SN) (Q4.5_1)	○	○	○	○
Observe you using Social Stories/Narratives (SN) (Q4.5_2)	○	○	○	○
Acknowledge you for your use of Social Stories/Narratives (SN) (Q4.5_3)	○	○	○	○

End of Block: Social Stories/Narratives (SN)- Subjective Norms

Start of Block: Social Stories/Narratives (SN)- Attitude

Q9.1 The following 3 questions relate to your beliefs about the **importance** of using Social Stories/Narratives (SN).

As a reminder, "Social Stories/Narratives (SN)" refers to narratives that describe social situations for learners by providing relevant cues, explanation of the feelings and thoughts of others, and descriptions of appropriate behavior expectations.

Q9.2 How **important**, if at all, is using <u>Social Stories/Narratives (SN)</u>?

   ○ Very important (1)

   ○ Mostly important (2)

   ○ Slightly important (3)

   ○ Not at all important (4)

Q9.4 To what extent, if at all, do you <u>agree</u> that **using Social Stories/Narratives (SN) improves these things**?

	Strongly agree (1)	Agree (2)	Disagree (3)	Strongly disagree (4)
Quality of my descriptions of social situations and expectations (Q3.4_1)	○	○	○	○
Quality my design of my students' communication supports (Q3.4_2)	○	○	○	○
Quality of my social communication instruction (Q3.4_3)	○	○	○	○
My students' outcomes (Q3.4_6)	○	○	○	○

Q9.5 To what extent, if at all, do you <u>agree</u> that **thinking about using Social Stories/Narratives (SN) gives you a positive feeling?**

○ Strongly Agree (1)

○ Agree (2)

○ Disagree (3)

○ Strongly Disagree (4)

Q10.1 The following questions relate to your **confidence in your ability** to use <u>Social Stories/Narratives (SN)</u>.

 As a reminder, "Social Stories/Narratives (SN)" refers to narratives that describe social situations for learners by providing relevant cues, explanation of the feelings and thoughts of others, and descriptions of appropriate behavior expectations.

Q10.3 How **confident**, if at all, are you in your ability to implement these components of Social Stories/Narratives?

	Extremely confident (1)	Mostly confident (2)	Somewhat confident (3)	Not at all confident (4)
Identify the social situation for the intervention (1)	○	○	○	○
Select type of social narrative (e.g., descriptive, directive, perspective, affirmative, control, or cooperative) (2)	○	○	○	○
Write social narrative following criteria for selected type (3)	○	○	○	○
Design the appropriate display for the social narrative (pictures, number of sentences per page) (4)	○	○	○	○
Introduce and read the social narrative to/with learner (5)	○	○	○	○
Review key concepts with learner (6)	○	○	○	○

Provide feedback on
learner's participation in
the social situation (7)

   ○   ○   ○   ○

Q5.1 The following 2 questions relate to your beliefs about the **norms present within your ECSE program** that impact your use of Discrete Trial Teaching (DTT).

As a reminder, "Discrete Trial Teaching (DTT)" refers to 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.

Q5.2 How **important**, if at all, is using <u>Discrete Trial Teaching (DTT)</u> to these people?

	Very important (1)	Mostly important (2)	Slightly important (3)	Not at all important (4)
ECSE leadership in your district (i.e., coordinator, program lead, and professional development coaches) (Q4.2_1)	○	○	○	○
Your coworkers (i.e., other ECSE teachers and related service providers) (Q4.2_2)	○	○	○	○

Q5.4 How often, if ever, do you observe someone in an ECSE leadership role (i.e., coordinator, program lead, professional development coach) in your district engage in these behaviors?

	Monthly (1)	Quarterly (2)	Yearly (3)	Never (4)
Communicate with you about using Discrete Trial Teaching (DTT) (Q4.5_1)	○	○	○	○
Observe you using Discrete Trial Teaching (DTT) (Q4.5_2)	○	○	○	○
Acknowledge you for your use of Discrete Trial Teaching (DTT) (Q4.5_3)	○	○	○	○

End of Block: Discrete Trial Teaching (DTT)- Subjective Norms

Start of Block: Discrete Trial Teaching (DTT)- Attitude

Q6.1 The following 3 questions relate to your beliefs about the **importance** of using Discrete Trial Teaching (DTT).

As a reminder, "Discrete Trial Teaching" refers to 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.

Q6.2 How **important**, if at all, is using <u>Discrete Trial Teaching (DTT)</u>?

○ Very important (1)

○ Mostly important (2)

○ Slightly important (3)

○ Not at all important (4)

Q6.4 To what extent, if at all, do you <u>agree</u> that **using Discrete Trial Teaching (DTT) improves these things**?

	Strongly agree (1)	Agree (2)	Disagree (3)	Strongly disagree (4)
Quality of my feedback based on the learner's performance (Q3.4_1)	○	○	○	○
Quality of my instruction/antecedent for a specific skill (Q3.4_2)	○	○	○	○
Quality of my social communication instruction (Q3.4_3)	○	○	○	○
My students' outcomes (Q3.4_6)	○	○	○	○

Q6.5 To what extent, if at all, do you <u>agree</u> that **thinking about using Discrete Trial Teaching (DTT) gives you a positive feeling?**

○ Strongly Agree (1)

○ Agree (2)

○ Disagree (3)

○ Strongly Disagree (4)

Q7.1 The following question relates to your **confidence in your ability** to use <u>Discrete Trial Teaching (DTT)</u>.

 As a reminder, "Discrete Trial Teaching (DTT)" refers to 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.

Q7.3 How **confident**, if at all, are you in your ability to implement these components of using Discrete Trial Teaching (DTT)?

	Extremely confident (1)	Mostly confident (2)	Somewhat confident (3)	Not at all confident (4)
Obtain the learner's attention (1)	○	○	○	○
Select a reinforcer with the learner (9)	○	○	○	○
Provide instruction or other discriminative stimulus (antecedent) and wait for a response (2)	○	○	○	○
Provide feedback based on learner's response (e.g., reinforcement, corrective feedback, prompt, or provide another trial) (3)	○	○	○	○
Repeat same instruction for targeted number of trials (4)	○	○	○	○
Reviewed mastered steps (maintenance trials) once or twice during each session (5)	○	○	○	○
Present new stimulus and fade prompts (7)	○	○	○	○
Present distractor stimulus in the periphery, give the instruction, elicit the behavior, and reinforce (6)	○	○	○	○

Teach generalized use of the skill or concept (8)	○	○	○	○

Display This Question:

*If If 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’ interests by building more complex skills that are naturally reinforcing and appropriate to the interaction. Is Selected*

Q157 Would you still choose to select <u>Naturalistic Intervention</u> to **try first** for this student?

○ Yes (1)

○ No *(please describe why in the corresponding box)* (2) _____

○ I'm not sure (3)

- -

Display This Question:

*If If Which of the below practices will you select to try first for the student? <span style="font-size:13px;">Peer-Mediated Instruction and Intervention (PMII)
 Explicitly training peers to provide social learning opportunities*

Q158 Would you still choose to select <u>Peer-Mediated Instruction and Intervention (PMII)</u> to **try first** for this student?

○ Yes (1)

○ No *(please describe why in the corresponding box)* (2) _____

○ I'm not sure (3)

Q160 Would you still choose to select <u>Scripting</u> to **try first** for this student?

○ Yes (1)

○ No *(please describe why in the corresponding box)* (2) _____

○ I'm not sure (3)

Q161 Would you still choose to select <u>Social Stories/Narratives (SN)</u> to **try first** for this student?

○ Yes (1)

○ No *(please describe why in the corresponding box)* (2) _____

○ I'm not sure (3)

Q162 Would you still choose to select <u>Discrete Trial Teaching (DTT)</u> to **try first** for this student?

○ Yes (1)

○ No *(please describe why in the corresponding box)* (2) _____

○ I'm not sure (3)

Display This Question:

    If Which of the below practices are you least likely to select to use at all 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' interests by building more complex skills that are naturally reinforcing and appropriate to the interaction.

Q165 Would you still be **least likely to select** <u>Discrete Trial Teaching (DTT)</u> to try for this student?

○ Yes (1)

○ No *(please describe why in the corresponding box)* (2) _____

○ I'm not sure (3)

Q166 Would you still be **least likely to select** Peer-Mediated Instruction and Intervention (PMII) to try for this student?

○ Yes (1)

○ No *(please describe why in the corresponding box)* (2) _____

○ I'm not sure (3)

Q167 Would you still be **least likely to select** Scripting to try for this student?

○ Yes (1)

○ No *(please describe why in the corresponding box)* (2) _____

○ I'm not sure (3)

Q168 Would you still be **least likely to select** <u>Social Stories/Narratives (SN)</u> to try for this student?

○ Yes (1)

○ No *(please describe why in the corresponding box)* (2) _____

○ I'm not sure (3)

Q169 Would you still be **least likely to select** <u>Naturalistic Intervention (NI)</u> to try for this student?

○ Yes

○ No *(please describe why in the corresponding box)*   _____

○ I'm not sure

Q20.1 Now, just a few questions about you!

Q20.2 What range best describes the **number of hours are you contracted to work each week**?

○ Less than 10

○ 10-20

○ 21-30

○ 31-40

Q143 Please indicate which ECSE classroom models you have worked in this school year.

☐ Co-Taught Inclusive (general and special educator share responsibilities and make decisions together)

☐ ECSE Inclusive (classroom led by special education teacher, classroom includes students with and without disabilities)

☐ ECSE Self-Contained (only students with disabilities)

☐ General Education/Early Education- Inclusive (e.g. "push-in" special education services in a general education or daycare setting)

☐ Other _____

Q20.3 What range best describes the **number of students (<u>birth through age 6</u>) on your current caseload**?

○ 1-5

○ 6-10

○ 10-15

○ 16-20

○ 21-25

○ More than 25

Q153 What portion of your students are English Language Learners?

○ None

○ Less than half

○ About half

○ More than half

○ All

Q20.4 Approximately how often are you in a **classroom setting** with at least **one child who has autism spectrum disorder**?

○ 5 days each week

○ 4 days each week

○ 3 days each week

○ 2 days each week

○ 1 day each week

○ less than 1 day each week

Q151 What was your **initial teacher license**? (Select all that apply)

☐ Early Childhood Special Education

☐ Autism Spectrum Disorder

☐ Learning Disabilities

☐ Emotional/Behavior Disorders

☐ Moderate/Severe Disabilities

☐ General Education

☐ Low Incidence Disabilities

☐ High Incidence Disabilities

☐ Deaf/Hard of Hearing

☐ Other _____

Q20.5 How many years have you been employed as a *licensed special education teacher for early childhood* (e.g., ECSE teacher, PK-12 license)?

○ Less than 1 year (1)

○ 1-3 years (2)

○ 4-8 years (3)

○ 9-13 years (4)

○ 14-18 years (5)

○ 19-23 years (6)

○ More than 23 years (7)

Q20.6 Of those years, how many were spent working with **3 to 5-year olds in classroom settings**?

○ Less than 1 year (1)

○ 1-3 years (2)

○ 4-8 years (3)

○ 9-13 years (4)

○ 14-18 years (5)

○ 19-23 years (6)

○ More than 23 years (7)

Q20.7 Please write in the name of the state where you currently work.

_____

Q170 If you would like, you may provide your gender identity here:

○ Male (1)

○ Female (2)

○ Non-Binary/ Third Gender (4)

○ Transgender (5)

○ I prefer not to say (6)

○ I prefer to self-describe (7) _____

Q171 If you would like, you may provide your race(s)/ethnicity/ies here:

☐ American Indian or Alaska Native (1)

☐ Asian (2)

☐ Black or African American (3)

☐ Hispanic or Latino/a/x (4)

☐ Native Hawaiian or Other Pacific Islander (5)

☐ Caucasian/White (6)

☐ I prefer to self-describe (7) _____

End of Block: Demographics

Start of Block: Comments & Email Entry for Gift Card

Q21.1 If there is any additional information you want the researcher to know about practice use for students with autism in ECSE, please include it below.

_____

_____

_____

_____

_____

Q21.2 Please write in your full email address below to receive your electronic $30 Amazon gift card.

Note: Your email will be separated from your responses so that responses remain anonymous.

_____

Q152
Thank you for participating in the survey!

Follow updates by checking out the study website here: https://z.umn.edu/autismpracticeselection

Questions? Email Maria Hugh at LEMLE008@umn.edu

Appendix B
Beliefs Factors and Overall Beliefs Density Plots

Overall Beliefs Scores

Probability Density Plot of Overall Beliefs Scores for Naturalistic Intervention
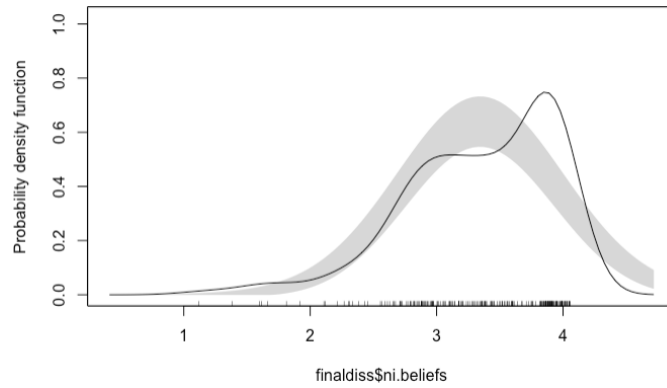
Probability Density Plot of Overall Beliefs Scores for Discrete Trial Teaching
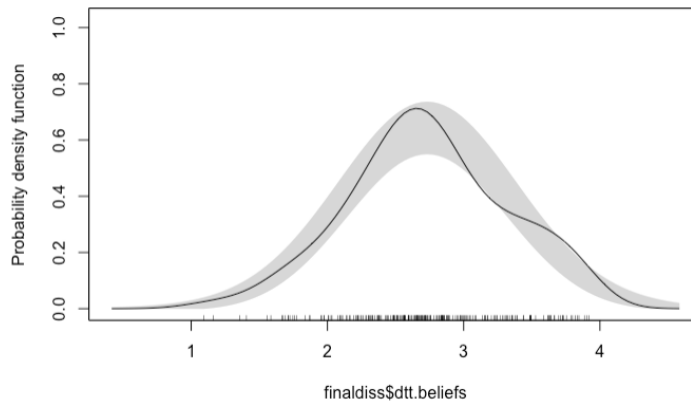
Probability Density Plot of Overall Beliefs Scores for Discrete Trial Teaching
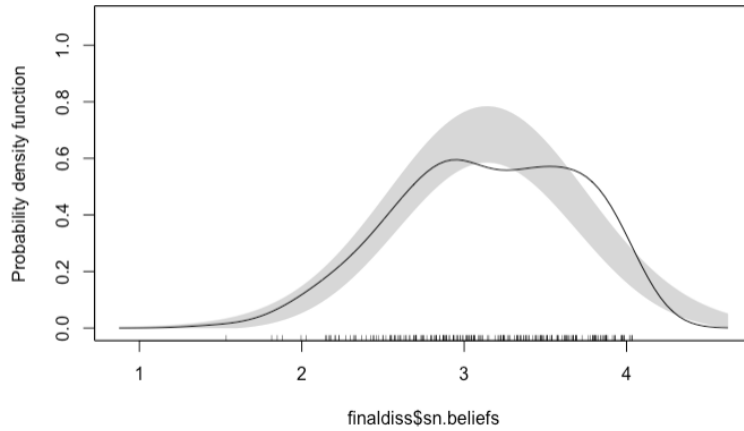
Probability Density Plot of Overall Beliefs Scores for Peer-Mediated Instruction and Intervention
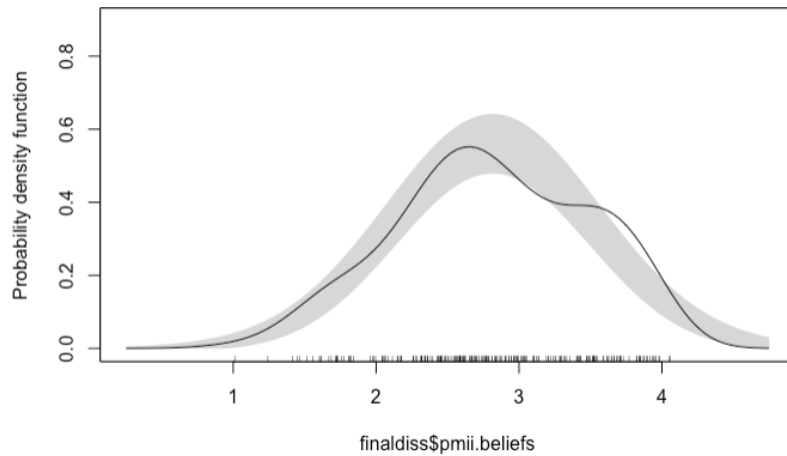
Probability Density Plot of Overall Beliefs Scores for Scripting
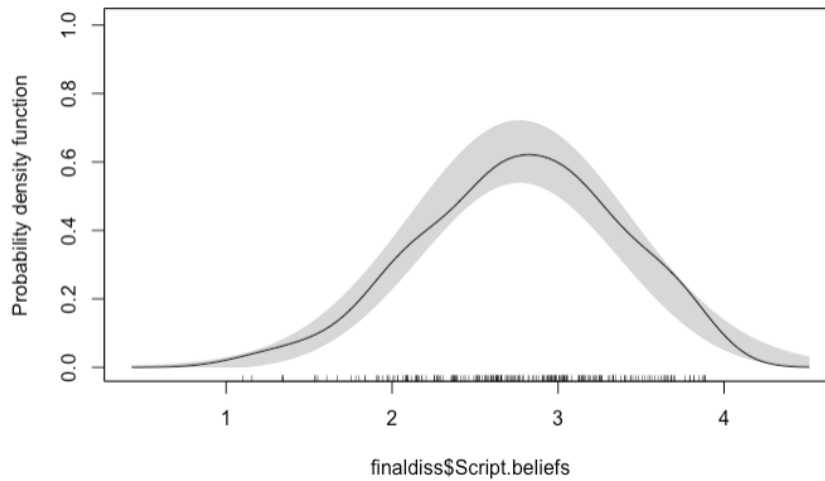
Self-Efficacy Ratings

Probability Density Plot of Self-Efficacy Ratings for Naturalistic Intervention
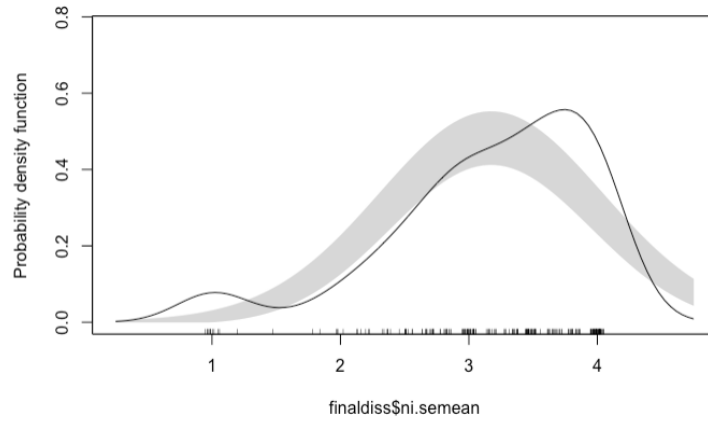
Probability Density Plot of Self-Efficacy Ratings for Discrete Trial Teaching
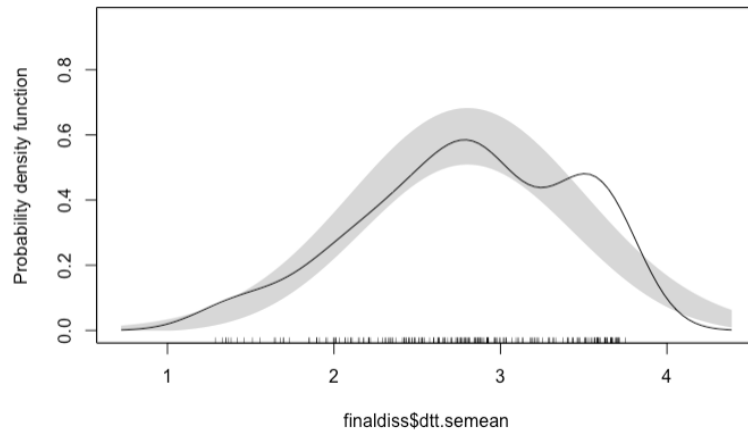
Probability Density Plot of Self-Efficacy Ratings for Peer-Mediated Instruction and Intervention
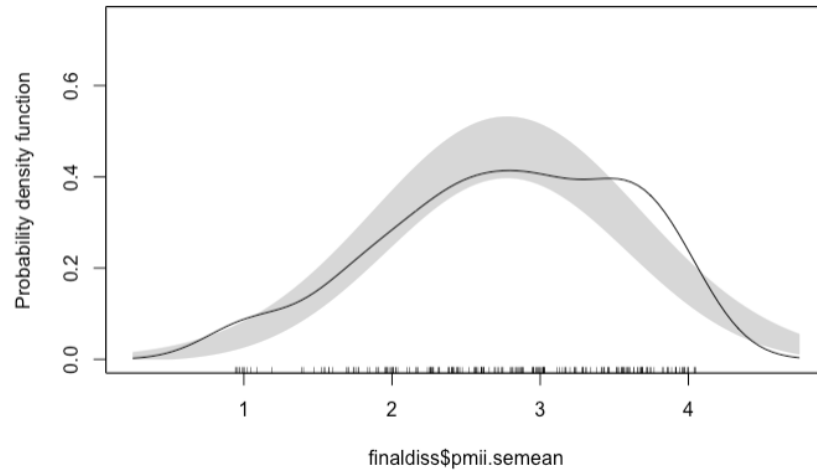
Probability Density Plot of Self-Efficacy Ratings for Social Narratives
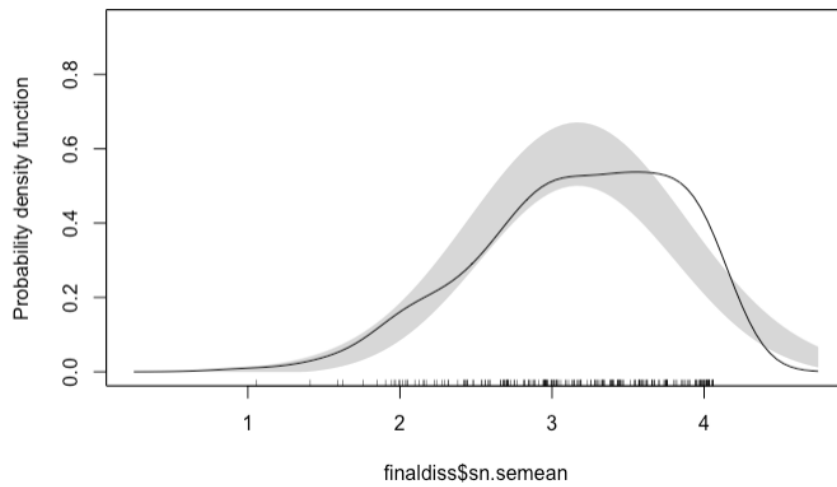
Probability Density Plot of Self-Efficacy Ratings for Scripting
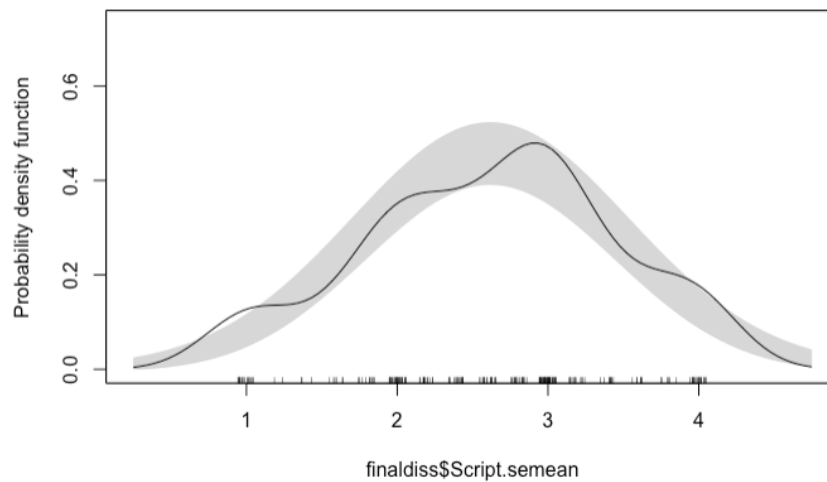
Subjective Norms Ratings

Probability Density Plot of Subjective Norms Ratings for Naturalistic Intervention
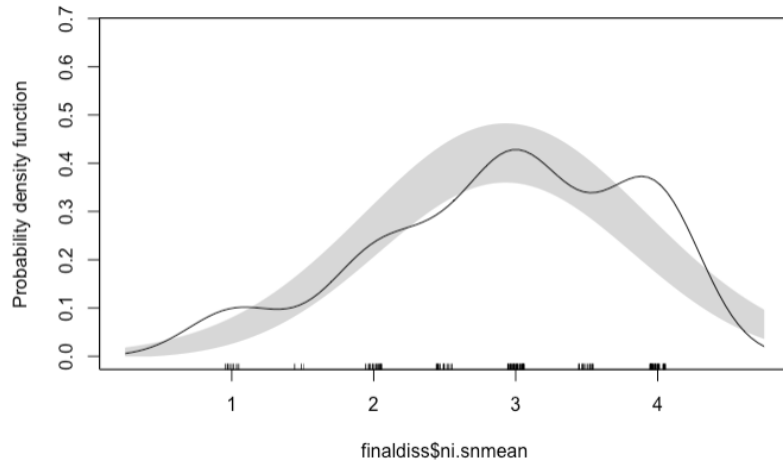
Probability Density Plot of Subjective Norms Ratings for Peer-Mediated Instruction and Intervention
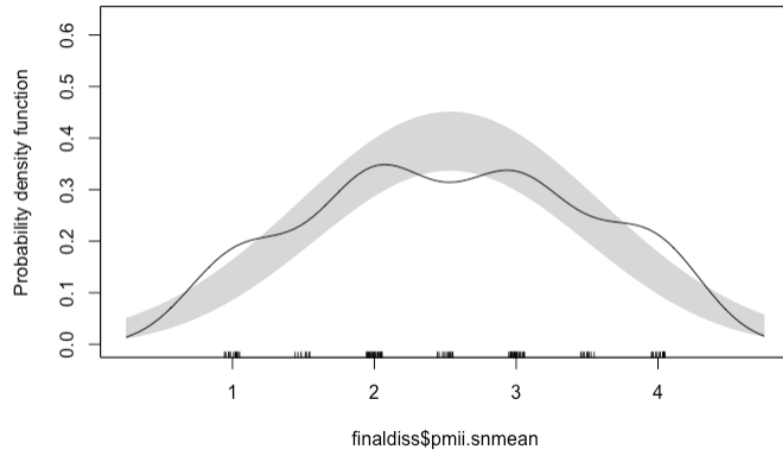
Probability Density Plot of Subjective Norms Ratings for Discrete Trial Teaching
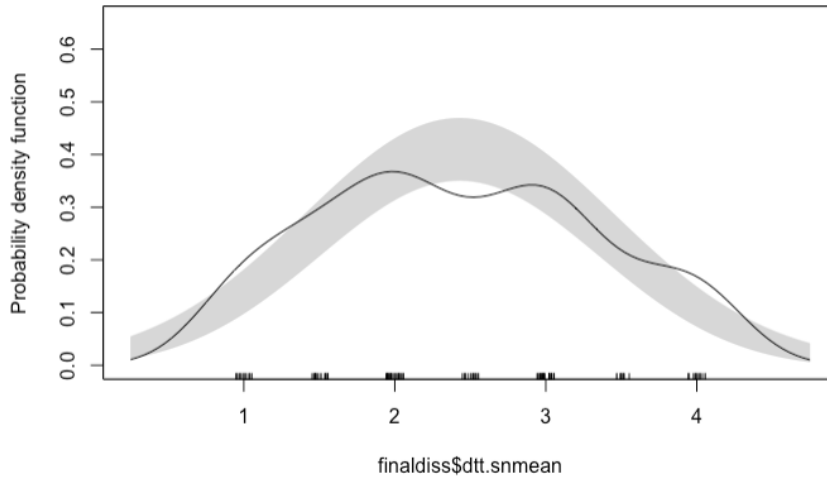
Probability Density Plot of Subjective Norms Ratings for Social Narratives
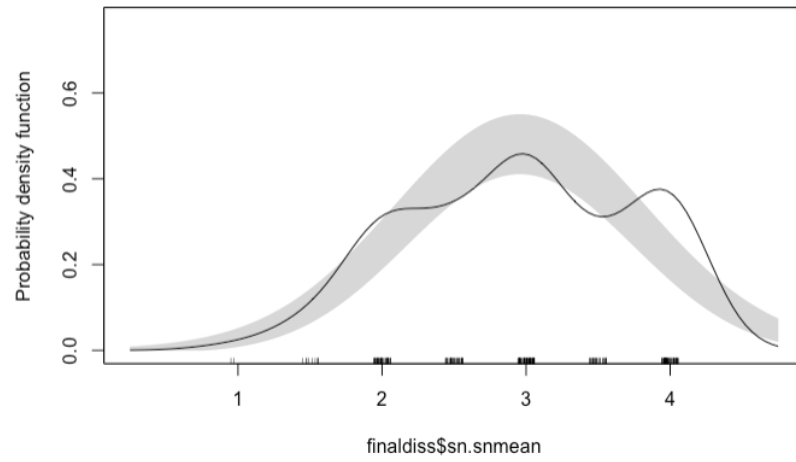
Density Plot of Subjective Norms Ratings for Scripting
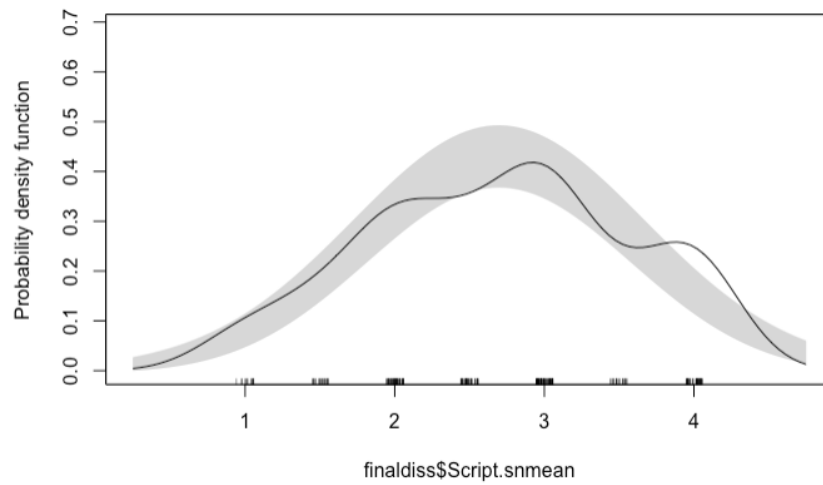
Attitude Ratings

Probability Density Plot of Attitude Ratings for Naturalistic Interventions
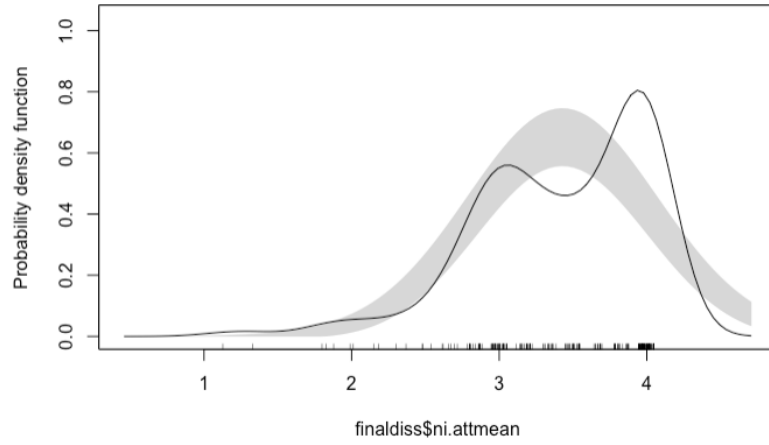
Probability Density Plot of Attitude Ratings for Discrete Trial Teaching
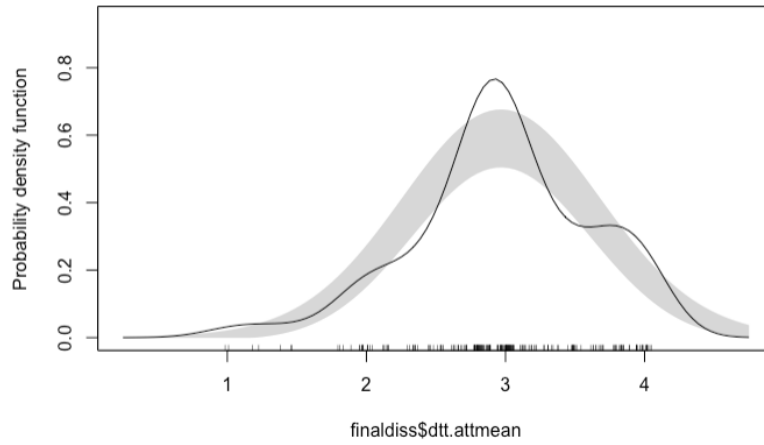
Probability Density Plot of Attitude Ratings for Peer-Mediated Instruction and Interventions
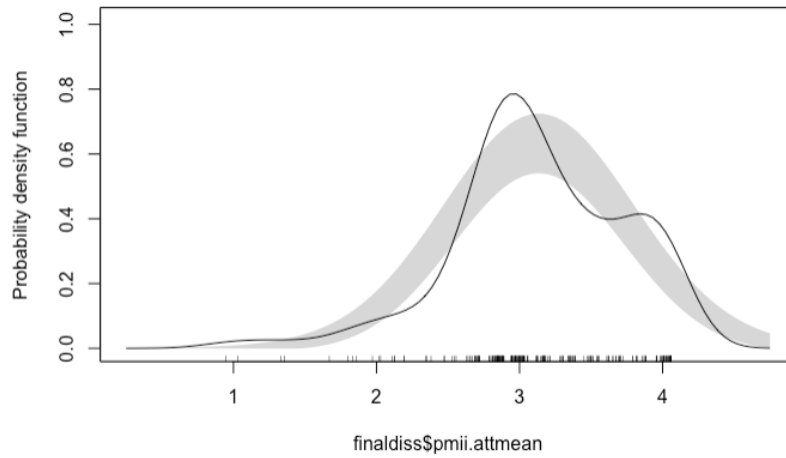
Probability Density Plot of Attitude Ratings for Social Narratives
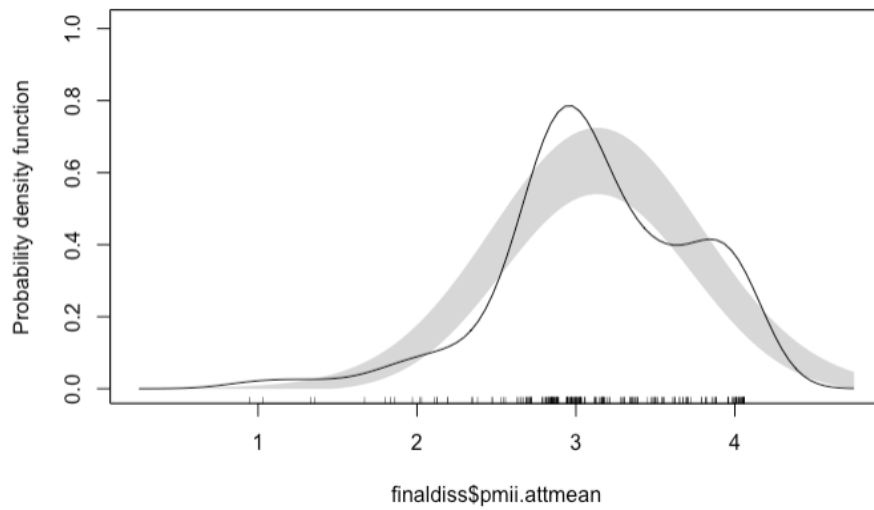
Probability Density Plot of Attitude Ratings for Scripting
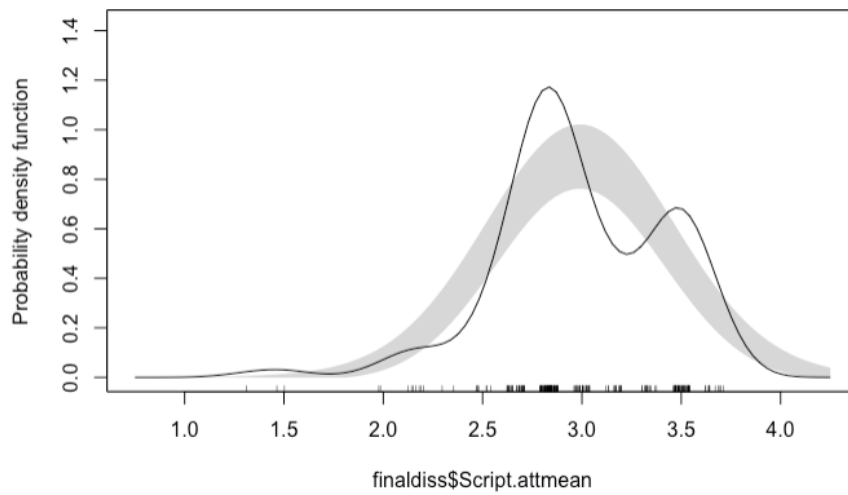
Appendix C

Plots Depicting Linear Associations between Dependent Variables and Predictors

Models Predicting Practice Selected to Try First
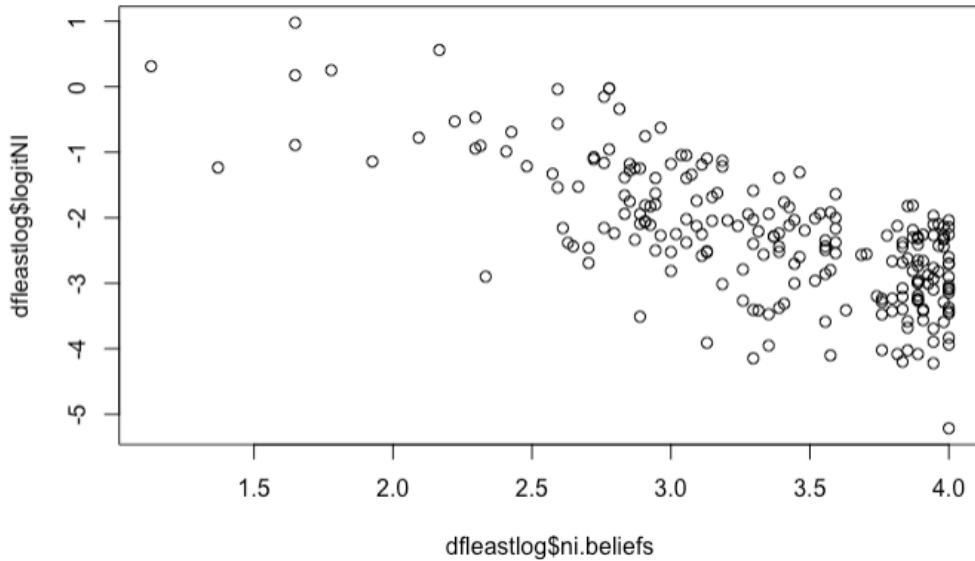
Relation Between Peer-Mediated Instruction and Intervention Beliefs Score and
Predicted Probability of Selecting Peer-Mediated Instruction and Intervention to Try First
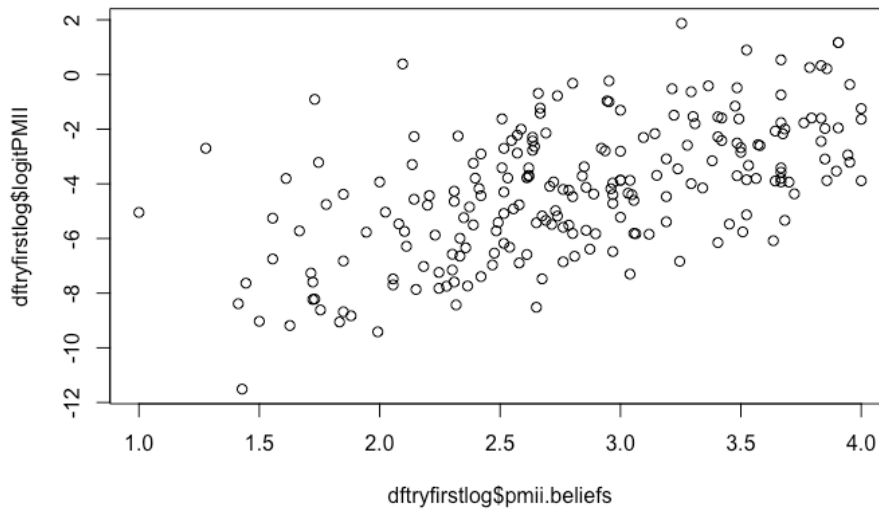
Relation Between Social Narratives Beliefs Score and Predicted Probability of Selecting
Social Narratives to Try First
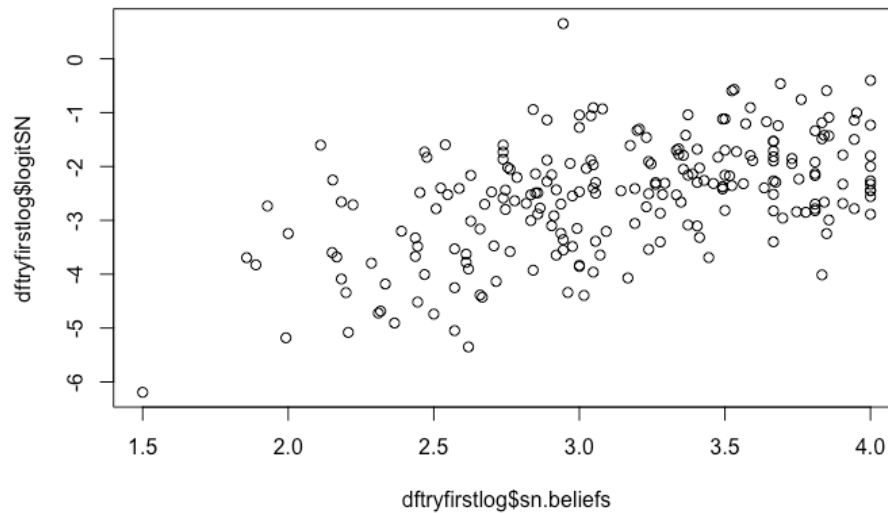
Relation Between Discrete Trial Teaching Beliefs Score and Predicted Probability of Selecting Discrete Trial Teaching to Try First
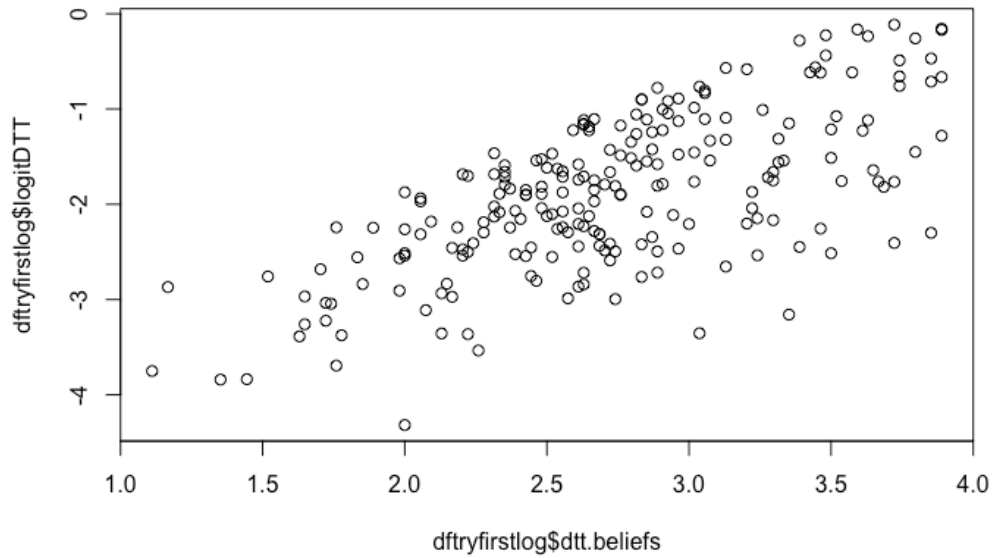
Relation Between Naturalistic Intervention Beliefs Score and Predicted Probability of Selecting Naturalistic Intervention to Try First
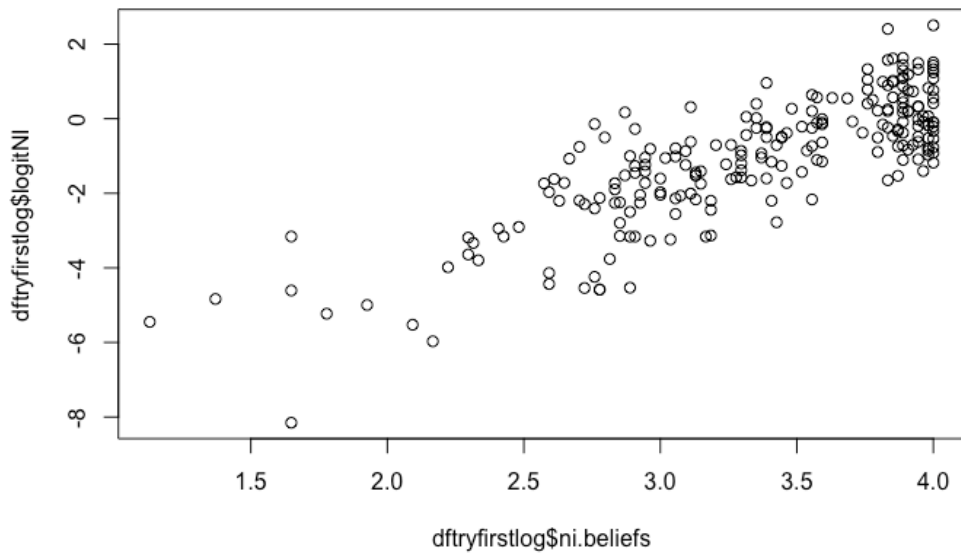
Relation Between Peer-Mediated Instruction and Intervention Beliefs Score and
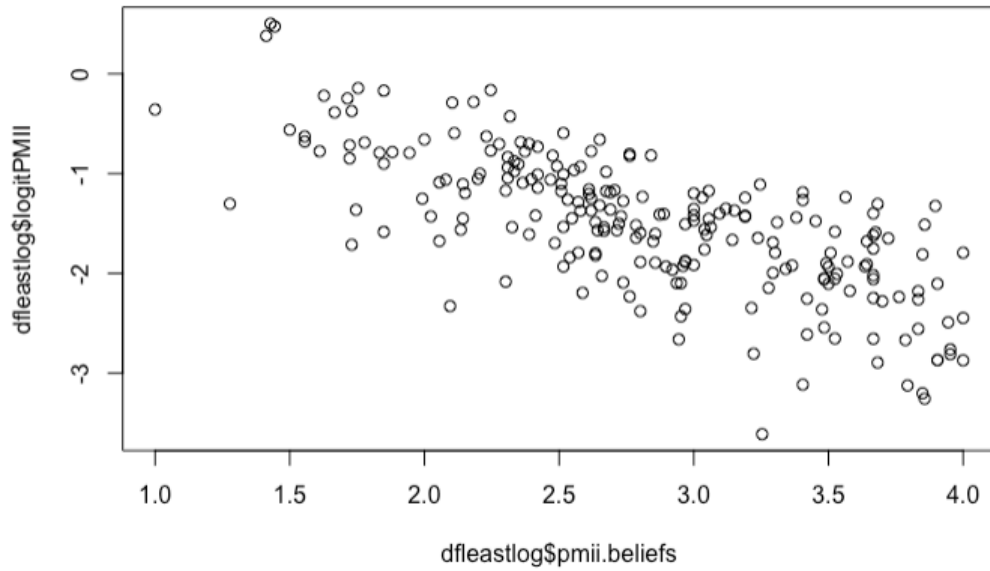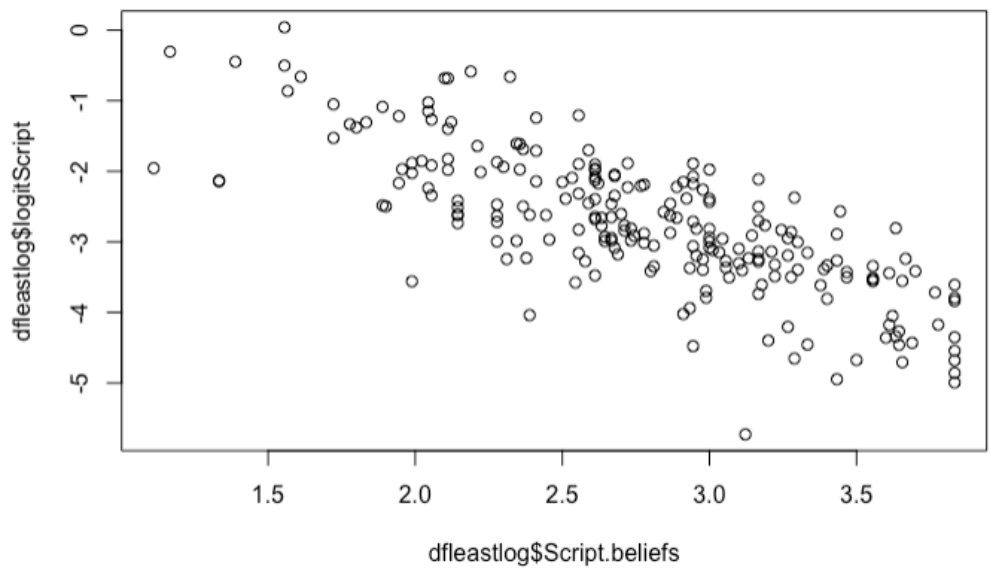Predicted Probability of Selecting Peer-Mediated Instruction and Intervention to Try First
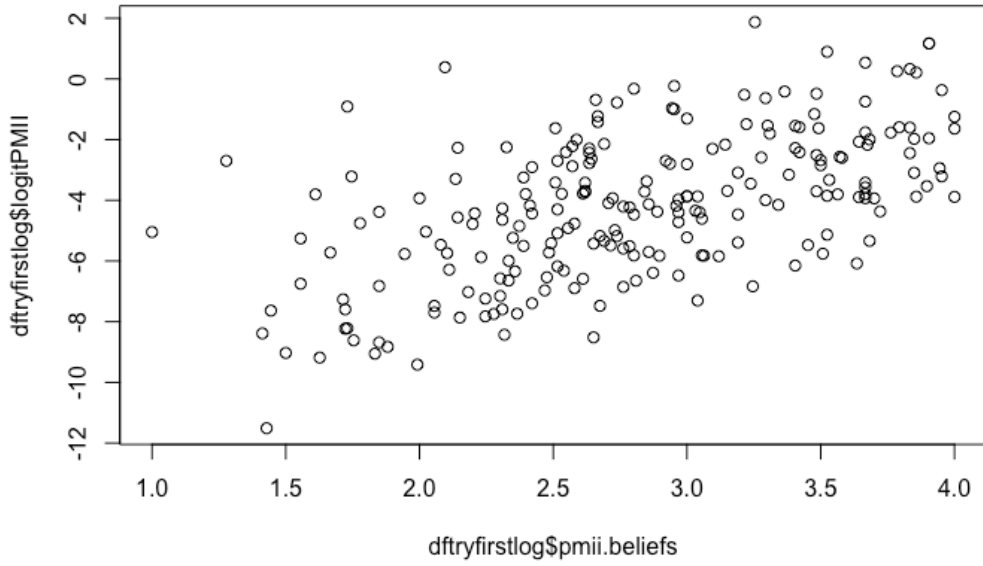
Models Predicting Practice Selected to Try Last

Relation Between Naturalistic Intervention Beliefs Score and Predicted Probability of
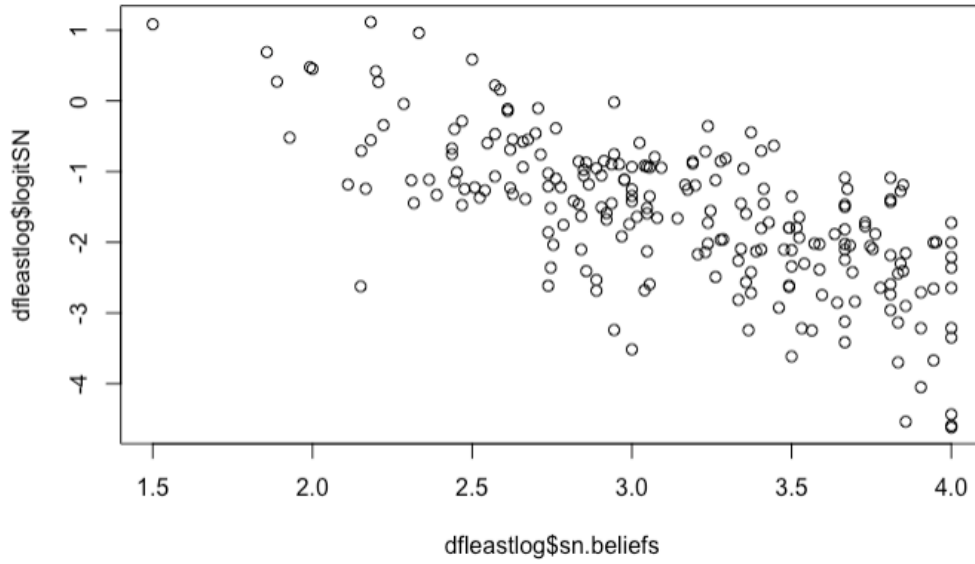Selecting Naturalistic Intervention to Try Last

Relation Between Peer-Mediated Instruction and Intervention Beliefs Score and
Predicted Probability of Selecting Peer-Mediated Instruction and Intervention to Try Last

Relation Between Scripting Beliefs Score and Predicted Probability of Selecting
Scripting to Try Last

Relation Between Social Narratives Beliefs Score and Predicted Probability of Selecting Social Narratives to Try Last

Relation Between Discrete Trial Teaching Beliefs Score and Predicted Probability of Selecting Discrete Trial Teaching to Try Last