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Practices of professionals providing services to children with autism spectrum disorders: Testing the theory of planned behavior in predicting use of evidence-based interventions and family-centered care

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PRACTICES OF PROFESSIONALS PROVIDING SERVICES TO CHILDREN WITH AUTISM SPECTRUM DISORDERS: TESTING THE THEORY OF PLANNED BEHAVIOR IN PREDICTING USE OF EVIDENCE-BASED INTERVENTIONS AND FAMILY-CENTERED CARE

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University

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Abstract

PRACTICES OF PROFESSIONALS PROVIDING SERVICES TO CHILDREN WITH AUTISM SPECTRUM DISORDERS: TESTING THE THEORY OF PLANNED BEHAVIOR IN PREDICTING USE OF EVIDENCE-BASED INTERVENTIONS AND FAMILY-CENTERED CARE

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Autism spectrum disorders (ASDs) are chronic and pervasive developmental disorders; children with ASDs require more multidisciplinary services than children with other developmental, behavioral, and emotional disorders (Kogan et al., 2008). Little research has been done on the practices and perspectives of the professionals providing services to children with ASDs. Evidence-based practice (combining use of evidence-based interventions [EBIs], family-centered care [FCC] respecting patient/family values, and clinical expertise) leads to the best outcomes for children with ASDs (APA Presidential Task Force on Evidence-Based Practice, 2006). The aim of this study was to assess the extent to which psychological constructs (attitudes, subjective norms, perceived behavioral control) within the Theory of Planned Behavior (Ajzen, 1991) are helpful for understanding the behavior of professionals in regards to two areas of evidence-based practice: recommending and/or providing EBIs and using a FCC approach to care with children

with ASDs. Professionals (*N*=709) providing direct services to children with ASDs were recruited from different disciplines (Education, Medicine/Nursing, Occupational and Physical Therapy, Psychology, Social Work, Speech Language Pathology/Audiology) and were asked to fill out an Internet or paper survey including measures on TPB constructs and EBI and FCC behavior. Participants were recruited from a convenience Internet sample and a stratified random sample of online provider listings (from professional and autism-specific organizations). Professionals' attitudes and familiarity with EBIs significantly predicted their self-reported recommendation and provision of EBIs in the positive direction. Professionals' attitudes, perceived-behavioral control, and years in practice significantly predicted self-reported use of an FCC approach with children with ASDs in the positive direction. There was a trend for explicit training on EBI or FCC to predict professionals' behavior, but these findings did not reach conventional levels of significance. Subjective norms did not significantly predict EBI or FCC behavior. Discipline membership did not moderate the relationship between TPB and EBI and FCC self-reported behavior measures. The TPB is a useful framework for better understanding professionals' evidence-based practice behavior. This study sheds light on practices and perspectives of professionals working with children with ASDs and highlights areas for future research and training with this population.

Practices of professionals providing services to children with autism spectrum disorders: Testing the theory of planned behavior in predicting use of evidence-based interventions and family-centered care

Statement of the Problem

For a family whose child has been diagnosed with an autism spectrum disorder (ASD), the road from diagnosis to effective intervention is often a long and confusing one. ASDs are complex and pervasive conditions that impact multiple areas of development. As families search for ways to help their children with ASDs, they may receive information about interventions to try from multiple resources. There are many potential intervention options for ASDs, ranging from interventions that have demonstrated evidence for improving certain outcomes for children with ASDs via peer-reviewed research studies (evidence-based interventions, EBIs), to interventions that have not been studied or that have been studied and for which efficacy has not been demonstrated. ASD interventions target different areas of ASDs, and may have their origins in medical, behavioral, educational, speech/language, sensory, or psychosocial domains, or a combination of these.

Choosing interventions can be a challenging prospect, and families want to do whatever they can to help their children. From a chronic disorder care perspective, better care for chronic developmental or medical conditions, such as ASDs, occurs when the family has a supportive team of professionals with whom to discuss intervention options. In this study, the term 'professionals' refers to those individuals who have received specific training and a degree in their professional discipline commensurate with the expectations of the discipline (e.g., receiving a M.Ed. in special education or an M.D. in medicine), and who are actively engaged in a direct provider role in their discipline. From an ecological systems perspective, professionals working

with children and families are an important system of influence for the individual child/family as they journey through the process of choosing interventions. Given the many domains of impairment in ASDs, the field of autism intervention is by necessity a multidisciplinary one. Each discipline brings unique expertise to the provision of interventions for a child with autism. Professionals may directly provide interventions themselves or may make recommendations to families about interventions that may be outside of their professional discipline.

For professionals across disciplines, it is important to critically appraise evidence for various interventions and direct families towards interventions that have demonstrated efficacy (those classified as EBIs), but as well as to practice in a fashion that takes into account child and family characteristics and values (i.e., family-centered care, FCC). These concepts are echoed in guidelines and literature on evidence-based practice, which is defined as "the integration of the best available research with clinical expertise in the context of patient characteristics, culture, and preferences" (APA Presidential Task Force on Evidence-Based Practice, 2006). The literature review of this dissertation defines EBIs for ASDs and FCC and describes their theoretical importance within the evidence-based practice movement. Although defining these constructs is debated within and between professional disciplines, it is generally accepted that using interventions with evidence for their efficacy in a fashion that takes into account child/family values and individual characteristics leads to better outcomes for children with ASDs (Reichow & Volkmar, 2011).

There is little research that examines the behavior and perceptions of professionals working with children with ASDs. Current literature suggests that children with ASDs receive range of interventions. Yet we do not know the extent to which EBIs are being provided and recommended to families of children with ASDs by professionals. Further, little work has been

done to examine psychological constructs that may contribute to professionals' recommendation and provision of EBIs for ASDs. There is a paucity of published information in the ASD field on the extent to which professionals are using FCC approaches to care.

This study provides information on professionals' self-reported use of EBIs (as defined by a review of systematic reviews of the literature) and self-reported use of a FCC approach to care with children/youth with ASDs. As ASD intervention is a strongly multidisciplinary field, of particular interest in this study is studying the role of professional discipline in understanding professionals' behavior. Finally, this study examines psychological constructs that predict professionals' use of EBIs and FCC approaches, drawing from the theoretical framework of the Theory of Planned Behavior (TPB; Ajzen, 1991, 2005, n.d.), a well-researched theory originating in social psychology. According to the TPB, a person's behavior (as well as a person's intention or motivation to engage in the behavior) is a function of three factors: (1) the individual's *attitude* toward the behavior (i.e., the degree to which a person has a favorable evaluation of doing the behavior); (2) *subjective norms* regarding the behavior (i.e., perception of social pressure to perform the behavior); and (3) *perceived behavioral control* regarding the behavior (i.e., whether a person feels in control of the behavior and perceptions of how easy it is to perform the behavior; Ajzen, 1991, 2005; Francis et al., 2004). This study assesses the extent to which the TPB is a useful framework for predicting professionals' self-reported behaviors in their work with children with ASDs; understanding the contribution of TPB constructs may provide helpful directions for supporting professionals' use of evidence-based practices.

Dissertation Structure

This dissertation is structured in the following fashion. First, in the literature review, an overview of ASD symptoms is provided to illustrate the complexities and heterogeneity of these

disorders. Next, ASD interventions are considered from a chronic disorder healthcare perspective and an ecological systems perspective to highlight the importance of studying professionals' perspectives and behavior. Next, an overview of each of the professional disciplines under study in this dissertation is provided. The evidence-based practice movement is introduced, and the areas of evidence-based practice are discussed in relation to the current study (especially EBIs and FCC). Classification of EBIs for ASDs is discussed, and different types of interventions and intervention characteristics are briefly presented. The construct of FCC is described and current approaches to measurement of FCC are reviewed. Select research on professionals in the ASD field is presented. Next, the Theory of Planned Behavior (TPB; Ajzen, 1991, 2005) is presented as a mode of studying psychological constructs underlying professionals' behavior. The literature review concludes with a presentation of the study's specific aims and hypotheses.

In the Methods section the procedures (recruitment, measure development, etc.) for this study are presented. The Results section covers: data preparation procedures, psychometrics of study measures, descriptive data, tests of non-equivalence tests, intercorrelations between study variables, and assumption testing for multiple regression. These sections build a foundation for the presentation of the results of testing each of the study hypotheses. Finally, in the Discussion section, the findings of the study are discussed in the context of the current literature. Implications for practice and future research and limitations of the study are presented.

Literature Review

Introduction to Autism Spectrum Disorders

An appreciation of the heterogeneous presentation of ASDs provides a helpful background for understanding challenges in selecting interventions and in appreciating the need

for multidisciplinary involvement in intervention. This section will provide the reader with an overview of the symptoms of each of the ASDs.

ASDs[1] are complex developmental disorders involving multiple domains of impairment (*Diagnostic and statistical manual of mental disorders* [4th ed., text rev.], American Psychiatric Association, 2000). Approximately one child in every 88 in the United States is classified as having an ASD (Autism and Developmental Disabilities Monitoring Network, 2012). Under the ASD diagnostic umbrella are the diagnoses of autistic disorder, Asperger's disorder, and pervasive developmental disorder not otherwise specified (PDD-NOS; DSM-IV-TR, 2000)[2]. The diagnosis of ASDs as early as two years of age has been found to be relatively reliable and stable, yet early diagnosis is not yet the norm (Moore & Goodson, 2003; Mandell, Novak, & Zubritsky; 2005). It is thought that a number of genes interact with environmental factors to produce the constellation of ASD symptoms, but definitive causes have not been fully clarified (Johnson, Myers, and the Council on Children With Disabilities, 2007).

ASDs are developmental disorders because they are typically diagnosed in childhood, and early symptoms impact subsequent development; symptom presentation changes over the course of development. Delays in one area of development (e.g., initiation of joint-attention) can impact development in other areas (e.g., early social learning and language development; Mundy & Burnette, 2005) in an interactive fashion (Ozonoff, Goodlin-Jones, & Solomon, 2005). As will be discussed later in the literature review, certain interventions have been shown to ameliorate the symptoms of ASDs (e.g., evidence-based interventions; Rogers & Vismara, 2008; Reichow

[1] I use the term "autism" interchangeably with the term "autism spectrum disorders" in this dissertation to refer to the broad category of autism spectrum disorders.

[2] The broader diagnostic category of pervasive developmental disorders in the DSM also includes the less common and extremely rare Rett's disorder and childhood disintegrative disorder (CDD), which involves a regression in development and skills after a period of typical development (*DSM-IV-TR*, 2000). These two disorders differ from ASDs in important ways (Volkmar & Klin, 2005; Klin, McPartland, & Volkmar, 2005), and are not discussed further in this dissertation.

& Volkmar, 2011). However, even given the change of presentation of ASDs across an individual's development or with efficacious intervention, ASDs are not curable conditions; they have a chronic course over the lifetime of the individual.

It has been more than 60 years since Dr. Leo Kanner (1943) first described symptoms of what he termed 'early infantile *autism*' in a set of case reports on 11 children. Kanner (1943, p. 249) observed that children with autism had distinct social dysfunction, unusual responses to the environment, and that their "activities and utterances are governed rigidly and consistently by the powerful desire for aloneness and sameness." Current diagnostic criteria and associated symptoms of ASDs have refined aspects of Kanner's original definition of autism in many ways (e.g., highlighting the heterogeneity in symptom presentation and the relationship between ASDs and intellectual disability; Carter, Davis, Klin, & Volkmar, 2005; Volkmar & Klin, 2005), yet the core deficits that Kanner initially described are still components of the construct of 'autism' (Carter et al., 2005).

ASD symptom domains. A thorough understanding of the domains of difference of ASDs provides an important foundation prior to discussing treating ASDs and the role of professionals in ASD intervention. A description of each domain of impairment in ASDs is presented below, including diagnostic features ("primary" features; i.e., *DSM-IV-TR* criteria) and associated ("secondary") features, followed by descriptions of specific ASD diagnoses, to provide the reader with a sense of the landscape of ASDs and the opportunity for involvement from professionals trained in a range of professional disciplines. Table 1 summarizes the primary diagnostic criteria and symptoms of ASDs. ASD interventions are generally designed to treat one or more of the primary symptom domains, but may also address secondary symptoms.

Table 1

DSM-IV-TR criteria for ASD domains of impairment (table modeled after Ozonoff et al., 2005)

Domains of Impairment and Specific Symptoms	Autistic disorder	Asperger's disorder	PDD-NOS
(1) *Social Domain: Qualitative impairments in social interaction* (a) Impaired use of nonverbal behaviors to regulate social interaction (b) Failure to develop age-appropriate peer relationships (c) Little seeking to share enjoyment with other people (d) Limited social or emotional reciprocity	At least 2 symptoms in this domain required for diagnosis	At least 2 symptoms in this domain required for diagnosis	At least 1 symptom required in this domain; may also be atypical or sub-threshold symptoms
(2) *Communication Domain: Qualitative impairments in communication* (a) Delay in or absence of spoken language (b) Difficulty with conversational reciprocity (c) Idiosyncratic or repetitive language (d) Imitation or pretend play deficits	At least 1 symptom in this domain required for diagnosis	No clinically significant delay in language (single words used by age 2, and communicative phrases used by age 3 years)	At least 1 symptom required in either domain (2) or (3); may not meet criteria for other ASDs due to atypical or sub-threshold symptoms
(3) *RRBI Domain: Restricted repetitive and stereotyped patterns of behavior, interests, and activities* (a) Encompassing preoccupation with restricted and unusual interests that are abnormal in intensity or focus (b) Inflexible adherence to routines/rituals (c) Stereotyped & repetitive motor mannerisms (d) Preoccupations with parts or sensory qualities of objects	At least 1 symptom in this domain required for diagnosis	At least 1 symptom in this domain required for diagnosis	At least 1 symptom required in either domain (2) or (3); may not meet criteria for other disorders due to atypical or sub-threshold symptoms
Total from (1), (2), and (3)	6 or more symptoms causing impairment in functioning	3 or more symptoms from domains (1) & (3) causing impairment in functioning	Symptoms cause impairment in functioning
Age of Onset	Delay in at least 1 of these areas prior to age 3: (1) social interaction, (2) language used in social communication, (3) symbolic or imaginative play	Not diagnostic requirement, but may not be diagnosed until later in childhood	No diagnostic requirement. However, may meet criteria for Autistic Disorder but may have late age of onset.
Cognitive Development	No diagnostic requirement, but high comorbidity with intellectual disability (ID)	No significant delay in cognitive development, adaptive behavior, etc.	No diagnostic requirement. High degree of variability in this domain.

***Social interaction*.** A necessary requirement for inclusion on the autism spectrum based on current diagnostic criteria is that the individual have a qualitative and sustained impairment in social interaction (*DSM-IV-TR*, 2000). Kanner (1943) first described this difference in the following fashion:

> "The outstanding, 'pathognomonic,' fundamental disorder is the children's *inability to relate themselves* in the ordinary way to people and situations from the beginning of life. Their parents referred to them as having always been 'self-sufficient'; 'like in a shell'; 'happiest when left alone'; 'acting as if people weren't there'; 'perfectly oblivious to everything around him'; 'giving the impression of silent wisdom'; 'failing to develop the usual amount of social awareness'; 'acting as if hypnotized'" (Kanner, 1943, p. 242).

Individuals with ASDs have severe impairments in social interactions, which may be evidenced by a number of different symptoms leading to impairment in social, educational, occupational, or other areas of functioning (*DSM-IV-TR*, 2000). Social deficits may vary a great deal based on the individual's age and developmental level (Carter et al., 2005).

Individuals with ASDs may exhibit impairment in non-verbal behaviors used to regulate social interactions (e.g., facial expression, gestures). Decreased eye contact is evident in children with autism as early as two years of age, and is not found in children with intellectual disabilities or developmental delays without concomitant autism (Carter et al., 2005). Many children with ASDs demonstrate a lack of *joint attention* (JA) skills, or the use of nonverbal behaviors to coordinate attention with another person to share the experience of an object or event (Mundy, Sigman, & Kasari, 1994; Carter et al., 2005). Children with ASDs may lack JA entirely or may demonstrate unusual JA, where eye contact and gestures are not fluidly coordinated with what is said verbally (Carter et al., 2005). People with ASDs may use *protoimperative* gestures (to request or obtain a specific object or outcome, e.g., something high up on a shelf), but rarely use *protodeclarative* gestures (to call another person's attention to something without an instrumental purpose, e.g., a toy of interest; Carter et al., 2005). Individuals with ASDs may lack

the desire to share things with others (e.g., enjoyment, achievements, or interests). Younger children with ASDs may fail to show, bring, or point out objects they find interesting to others. Adolescents and adults may point out things they find interesting without allowing the other person to share (i.e., talking pedantically about a topic that does not hold the conversation partner's interest). This may be due to the individual not having an understanding of the social conventions necessary to share information in an appropriate fashion (*DSM-IV-TR*, 2000).

A lack of social engagement is characteristic in the play of children with ASDs (Carter et al., 2005). Children with ASDs have delayed imitation skills, which may impact development of other skills such as reciprocal social play (e.g., peek-a-boo) and symbolic play (e.g., using a cup to feed a doll; Carter et al., 2005). Children with ASDs may not engage in imaginary and/or social/imitative play; play that does occur may be rote or mechanical, involving others in activities only as "tools or 'mechanical' aids" (*DSM-IV-TR*, 2000, p. 70). Many individuals with ASDs do not have developmentally appropriate peer relationships (*DSM-IV-TR*, 2000). A lack of empathy for others and social/emotional reciprocity may be present, including having trouble recognizing emotions in others and difficulty displaying affect in a fashion appropriate to a given situation (Carter et al., 2005). Individuals with ASDs may have difficulty understanding social norms or a listener's feelings (Carter et al. 2005; e.g., remarking to a peer, "You've got marks on your face," in reference to the peer's acne). Children with ASDs may be easy targets for teasing and bullying due to their naïveté and social differences (Attwood, 2007).

***Communication*.** Language deficits and unusual patterns of speech development may be the first symptoms that cause parents to become concerned about their child's development (Tager-Flusberg, Paul, & Lord, 2005). Kanner (1943, p. 243-244) described the communication of individuals with ASDs as being "parrot-like" and characterized by "literalness." However not

all individuals with ASDs exhibit the same language differences (Tager-Flusberg et al., 2005); communication deficits are extremely diverse.

In contrast to those with autistic disorder, individuals with Asperger's disorder must have demonstrated use of single words to communicate by age two years, and meaningful phrase speech by age three years (*DSM-IV-TR*, 2000). Individuals with autistic disorder may evidence significant delays or deviance in the acquisition of language (*DSM-IV-TR*, 2000). Language differences are noted across ASDs, but delays in language acquisition are "not necessary or sufficient" for an ASD diagnosis (Tager-Flusberg et al., 2005). Communication impairments are evident in verbal and nonverbal communication skills (including receptive and expressive language). Individuals with Asperger's disorder do not have delays in language acquisition but may show differences in social communication (e.g., differences in social reciprocity and the "give-and-take" in language; *DSM-IV-TR*, 2000).

For some individuals, there is a delay or entire lack of development of spoken language, without any compensation via alternative means of communication (e.g., gestures; *DSM-IV-TR*, 2000). Individuals with autistic disorder who develop speech may use language in an idiosyncratic (i.e., familiar only to that individual or those close to them) or in a stereotyped or repetitive fashion (*DSM-IV-TR*, 2000). Some individuals exhibit echolalia, where words or phrases are repeated regardless of meaning (*DSM-IV-TR*, 2000; similar to Kanner's, 1943, description of "parrot-like" speech). Individuals with ASDs may repeat what is said to them immediately after it is said (*immediate echolalia*; e.g., if a parent greets their child, "Hello Frank," and the child repeats back the greeting with the same intonation), or they may repeat something they heard in the past (*delayed echolalia*; e.g., a child who repeats phrases of a movie or television shows; Tager-Flusberg et al., 2005). Starting and maintaining conversations can be

extremely difficult for individuals with ASDs, as can understanding and using language pragmatically (i.e., when language is used in a social fashion; *DSM-IV-TR*, 2000). Examples of pragmatic language use deficits may be evident in individuals with ASDs when words are integrated with gestures (e.g., pointing at someone when referring to them), when humor or irony are used (e.g., common jokes or puns), or when metaphor or phrases with implied meaning are used (e.g., the phrase "it's raining cats and dogs" may be interpreted literally by a young child with autistic disorder). Individuals with ASDs may have unusual vocal prosody (intonation), abnormal pitch, rate, and/or rhythm of speech (*DSM-IV-TR*, 2000).

Restricted and repetitive behaviors and interests (RRBIs). Kanner (1943, p. 245) first described the characteristic rigidity in a child with autism: "The child's behavior is governed by an anxiously obsessive desire for the maintenance of sameness... Changes of routine, of furniture arrangement, of a pattern, of the order in which everyday acts are carried out, can drive him to despair." Today, diagnostic criteria reflect some of the core aspects initially noted by Kanner (1943). The *DSM-IV-TR* (2000, pp. 75, 84) describes that individuals with ASDs exhibit "restricted, repetitive, and stereotyped patterns of behavior, interests, and activities," referred to here as *RRBIs*; at least one symptom in this domain is necessary for a diagnosis of autistic disorder and Asperger's disorder. Yet similarly to the other core symptom domains, there is a great deal of heterogeneity in RRBI symptom presentation.

Broadly, individuals with ASDs may exhibit stereotyped and restricted behaviors, or may be absorbed in one particular area of interest (ranging from objects such as heat pumps or toilets to a particular domain of information, such as dates or telephone numbers) and may be able to cite specific facts regarding this interest. This circumscribed interest may be fervently pursued (*DSM-IV-TR*, 2000). Some individuals with ASDs are described as having a 'need for sameness'

in the form of routines and rituals (Baron-Cohen & Belmonte, 2005a) and may be distressed when even small changes are made in their environments. Routines and rituals may be nonfunctional, impractical, or rigidly adhered to even when other options are present. Other individuals may not exhibit distress over trivial changes, but may be able to note changes in the environment in great detail (Happé & Frith, 2006). Stereotyped and repetitive movements may also be observed in individuals with ASDs, ranging from whole body movements (e.g., rocking) to moving one's hands in an abnormal fashion (e.g., hand flapping), or differences in posture (e.g., toe walking; *DSM-IV-TR*, 2000). An individual may exhibit repetitive behavior in the form of lining things up repeatedly or repeating mimicking speech or actions. Finally, individuals with ASDs may exhibit RRBIs in the form of preoccupations and fascination with parts of objects (*DSM-IV-TR*, 2000). Children with ASDs may be interested in parts of play objects (e.g., spinning wheels of a car) rather than playing with toys as they were designed to be used.

Cognitive development. Cognitive development is an important domain to consider in differential diagnosis, as certain behaviors and symptoms characteristics of ASDs may also be explained by intellectual disability, including social impairments (Baron-Cohen, Leslie, & Frith, 1985). Yet the extent of social deficits in ASDs is above and beyond what one might expect in an individual with intellectual impairments. Cognitive development represents an area of differentiation between the specific disorders on the autism spectrum, in particular between autistic disorder and Asperger's disorder. The *DSM-IV-TR* (2000, p. 80) stipulates that individuals with Asperger's disorder do not evidence any clinically significant delays in cognitive development in the first three years of life "as manifested by expressing normal curiosity about the environment or in the acquisition of age-appropriate learning skills and adaptive behavior (other than in social interaction)." This contrasts with autistic disorder criteria.

Sometimes individuals with autistic disorder have unique profiles leading to special skills (e.g.. memory for dates), but a majority of individuals diagnosed with autistic disorder have a comorbid diagnosis of mild to profound intellectual disability (ID; *DSM-IV-TR*, 2000; Schalock et al., 2007). An individual meets criteria for an ID when his full-scale intelligence quotient (IQ) is less than or equal to a standard score of 70 points, or two standard deviations below the mean, and he has impairments in at least two areas of adaptive functioning (*DSM-IV-TR*, 2000). Current estimation of the rate of ID in individuals with ASDs overall is between 38 percent (Autism and Developmental Disabilities Monitoring Network, 2012) and 41 percent (Rice, 2009). Cognitive functioning is cited as one of the best predictors for improvements in outcomes following intervention for individuals with ASDs (Harris & Handleman, 2000; Ben-Itzchak & Zachor, 2007).

***Associated ("secondary") symptoms*.** Individuals with ASDs may exhibit a range of associated "secondary" symptoms. They may exhibit particular neuropsychological profiles and cognitive strengths and weaknesses (e.g., Tsatsanis, 2005). Many individuals with ASDs also have epilepsy (Rapin & Tuchman, 2008; DSM-IV-TR, 2000). In addition, individuals with ASDs may exhibit peculiar sensory characteristics or motor differences (Rapin & Tuchman, 2008; Baranek, Parham, & Bodfish, 2005). They may have increased visual and auditory responsiveness, and appear clumsy or have difficulty in motor planning (Rapin & Tuchman, 2008; Baranek et al., 2005). Sensory/motor features are heterogeneous within ASDs and are not currently part of diagnostic criteria. A full review of these features is outside of the scope of this dissertation (see Baranek et al., 2005). However, it should be noted that many ASD interventions seek to target these sensory domains (e.g., sensory integration therapy) either along with or in addition to the core symptom domains.

Corresponding ASD diagnoses. ASDs are diagnosed based on specific behavioral criteria within three potential areas of impairment: social, communicative, and restricted and repetitive behaviors and interests. Table 1 provides an outline of the *DSM-IV-TR* (2000) diagnostic criteria for each disorder. Across diagnoses, individuals on the autism spectrum share at minimum, the following characteristics: 1) a qualitative impairment in the social domain and 2) an enormous amount of variability in symptoms. Social impairment is the thread that connects diverse phenotypic presentations of ASDs; the specific symptoms of social impairment differ a great deal in their expression between individuals. The diverse manifestations of ASD symptoms can have a major impact on intervention outcomes (Ben-Itzchak & Zachor, 2007).

Autistic disorder requires at least two symptoms in the social domain, at least one symptom in the communication domain, and at least one symptom in the RRBI domain, with some evidence of symptoms prior to three years of age. Retrospective analyses of home videotapes have indicated that children with autistic disorder exhibit differences from typically developing children (and children with intellectual disability) as early as one year of age, such as reductions in: responses to their name, pointing to request, and frequencies of looking at faces (Palomo, Belinchón, & Ozonoff, 2006). At age two, children with autistic disorder show decreased rates of sharing experiences, interests, or attention with others (e.g., pointing or showing; Palomo et al., 2006). Asperger's disorder requires at least two symptoms in the social domain and at least one symptom in the RRBI domain, and there is a requirement of no delayed communication. Individuals with Asperger's disorder do not have delays in cognitive development. PDD-NOS is the most heterogeneous of the ASDs and requires at least one symptom in the social domain associated with at least one symptom from either the communication domain or the RRBI domain. A subset of children with ASDs have a

"regressive" onset of symptoms, in which they appear to have been developing typically for the first year or two of life, and then begin to lose previously acquired skills and have slowed acquisition of new skills (*DSM-IV-TR*, 2000; Lord, Shulman, & DiLavore, 2004; Goin-Kochel & Myers, 2005). In sum, core symptoms are required for an ASD diagnosis, but symptom presentation may differ a great deal from one individual with an ASD to the next.

ASDs: An Increased Need for Services and Interventions

The diversity of the phenotypic expression of ASDs, both *within* individuals across their own developmental course and *between* individuals, represents one of the great challenges to properly assessing, diagnosing, and treating disorders on the autism spectrum (Johnson, Myers, & the Council on Children with Disabilities, 2007). Highly diverse clinical presentations lead to a need for individualized interventions (Cuvo & Vallelunga, 2007). A recent study (Fountain, Winter, & Bearman, 2012) made an effort to identify common developmental trajectories for children with ASDs across symptom domains using a longitudinal approach (N= 6975). Fountain et al. (2012) identified six common trajectories that children with ASDs may take, ranging from children who were very low-functioning over time to those children who were "bloomers" in one area of development or another, such that they made rapid gains over time. This heterogeneity is only beginning to be quantified and understood across symptom domains. The diverse clinical presentation within ASDs makes intervention a challenge.

Additionally, impairments across domains (both primary and secondary symptoms) make the field of autism one in which multiple disciplines become involved. Children with ASDs receive interventions from multiple disciplines across multiple settings, including school, medical environments, and home (Thomas, Morrissey, & McLaurin, 2007b). "ASD is not a disorder of solitude, despite the social interaction deficits that are primary to the disorder. It

affects the person's family on multiple levels and requires interdisciplinary care" (White, 2012, p. 434). A plethora of different intervention options are available for ASDs, with varying levels of empirical support, making choosing interventions a challenging task. The following section will outline some global issues related to ASD intervention.

Children with ASDs present with specialized needs and generally "require health and related services of a type or amount beyond that required by children generally… [such as] medical care, mental health, or educational services or needs for specialized therapy or prescription medications" (Kogan, Strickland, & Newacheck, 2009, p. S333; Newacheck et al., 1998). The literature on intervention utilization shows that children with ASDs use more services than typically developing children, and also require more intervention than children with other developmental and medical conditions. For example, services received by children with ASDs were compared to services received by children with other special healthcare needs (e.g., children with chronic illnesses, other emotional or behavioral problems, etc.) in a large sample of children with autism (*N*=2123) from the 2005-06 National Survey of Children with Special Healthcare Needs (Montes, Halterman, & Magyar, 2009). Compared to children with other special healthcare needs, children with ASDs were significantly more likely to need physical, occupational, or speech therapy (76.2% in children with ASDs versus 26.5% in other groups). Children with ASDs were significantly more likely to need more medical care, mental health services, and/or educational services than children with other special healthcare needs (89.6% in children with ASDs versus 41.1% in other groups; Montes et al., 2009). Based on parental report of intervention use, children with ASDs have been estimated to use, on average, between four (Goin-Kochel, Myers, & Mackintosh, 2007) to seven (Green, Pituch, Itchon, Choi, O'Reilly, & Sigafoos, 2006) interventions at any given point in time.

Within the autism spectrum, there is a wide range of variability in terms of the type and intensity of interventions that are utilized. The number and type of interventions sought have been found to vary by diagnosis. Children with ASDs who have more severe symptoms and more limited cognitive abilities tend to need a higher level of and more intensive intervention (Jensen & Spannagel, 2010; Goin-Kochel et al., 2007). Parents of children with Asperger's disorder report trying significantly more pharmacological treatments than those with children with diagnoses of autistic disorder or PDD-NOS, while those with autistic disorder and PDD-NOS report trying more behavioral, educational, and alternative treatments than those with Asperger's disorder (Goin-Kochel et al., 2007). When children are described as having autistic disorder, their parents report using more treatments than those children who are described as having Asperger's disorder (Green et al., 2006; Goin-Kochel et al., 2007). Rates of using different services and interventions for ASDs may also vary based on age. One study found that families with children with ASDs in North Carolina between the ages of five and eight tend to use a wider range of services than those families of either younger or older children (Thomas, Ellis, McLaurin, Daniels, & Morrissey, 2007a). Parents with higher levels of reported stress also have higher odds of using more services (Thomas et al., 2007a). Use of interventions is also influenced by the child's insurance coverage. When Medicaid or public insurance covers children's services, children are more likely than children with private insurance to use medically related interventions (e.g., medication) and therapeutic interventions (e.g., speech/language, etc.; Thomas et al., 2007a).

Overall, families of children with ASDs report seeking interventions to alleviate chronic, long-term problems related to their child's autism diagnosis, rather than acute problems (Smith & Antolovich, 2000). Confronted with a heterogeneous disorder and many different intervention

options, families of children with ASDs must make decisions about which interventions to utilize. Families may piece together different combinations of treatments with a variety of professionals to treat their child. Schreck and Mazur (2008, p. 201) have termed this piecemeal method the "buffet approach" to ASD intervention. While multiple professionals recommend interventions or provide interventions, often the families act as the care coordinators for their children. One qualitative study (Carbone, Behl, Azor, & Murphy, 2010) on families' and physicians' perspectives on coordination of care and the medical home outlined some of the perspectives of families on coordinating multiple interventions: "One father commented, 'My wife is the medical home—she gets referrals and coordinates between physicians, two OTs, two SLPs, teachers at school, consultant, a behavioral specialist'" (p. 319). This study also identified that parents wanted more from the professionals they worked with (in this case, pediatricians) and identified a number of unmet needs in their interactions with professionals ranging from desiring help picking out interventions, information regarding community resources, and feeling like partners in their child's care (Carbone et al., 2010).

In conclusion, children with ASDs need and receive more services and interventions than children with other special healthcare needs and chronic conditions. As children with ASDs receive interventions, they interface with many disciplines. Parents want to be interactive partners with professionals as they assemble intervention packages. The partnership between professionals and families is an important component of care for children with ASDs.

The Role of Professionals in ASD Intervention: Chronic Disorder Care and Ecological Systems Theoretical Perspectives

In this section, two theoretical perspectives (a chronic disorder healthcare framework and an ecological systems framework) will be discussed. These perspectives underscore the need for focusing on professionals providing services and interventions to children with ASDs.

Chronic disorder healthcare models. Considering ASD intervention from a chronic disorder healthcare perspective highlights the importance that professionals can play in working with children with ASDs. A chronic disorder is considered to be any condition that an individual has that requires the individual and his/her family to engage in ongoing adjustments and interactions with the health care system (Improving Chronic Illness Care, 2011). Chronic conditions can include both physical health/medical conditions (e.g., asthma, diabetes, cystic fibrosis) and mental health conditions (e.g., bi-polar disorder, attention-deficit/hyperactivity disorder, autism, etc.; McDowell & Klepper, 2000). Individuals with chronic conditions present with a common set of challenges (e.g., dealing with ongoing symptoms, disability, lifestyle adjustments) regardless of whether the individual's symptoms are primarily physical, behavioral, or psychosocial (Wagner, 2001). Chronic conditions place a different set of demands on children and their families than do acute conditions. Parents of children with autism report that regardless of the interventions they have chosen to use, "the problems they sought to alleviate were longstanding concerns rather than acute crises" (Smith & Antolovich, 2000, p. 93). It is helpful to shift the lens through which one views ASD intervention to accommodate this view: interventions may make meaningful contributions to improving a child's life. However, there is no cure for ASDs, and the individual must adjust to their condition across the lifespan.

A 'chronic disorder healthcare model' for service delivery has been discussed in the pediatric literature as appropriate in conceptualizing the clinical care requirements for childhood disabilities, including ASDs (McDowell & Klepper, 2000). Specifically, the care for children

with chronic conditions "extends the intended clinical outcomes… to long time-frames," and often involves multiple clinical problems (reflecting the core domains of deficit in ASDs) as well as a need for service delivery from a range of different providers (McDowell & Klepper, 2000, p. 563). In addition, Wagner and colleagues (2005, p. S-8) have argued that "large proportions of people with chronic illness [or disability] do not receive either proven biomedical or behavioral interventions or adequate information and support for self-management. These deficiencies in care produce unacceptably high rates of… preventable exacerbations and complications." This perspective highlights the need for individuals with chronic conditions to receive interventions that have been demonstrated to be efficacious, and adequate information and support to manage the condition. This is a shift from the traditional medical model, where the professional's role is as the expert; chronic conditions require the child and their family to play a large role in the management of the child's care (Gabovitch & Curtin, 2009).

The Chronic Care Model (CCM; Wagner, 2001; Wagner, Austin, & Von Korff, 1996), initially developed as an effort to improve the care for individuals with chronic conditions, highlights the importance of turning our attention to the professionals working with children with ASDs. The CCM says that service systems should include certain essential elements in order to facilitate the best possible outcomes for individuals with chronic conditions. Key elements in the CCM are community resources, health systems, self-management support, delivery system design, decision support, and clinical information systems (Wagner, Austin, Davis, Hindmarsh, Schaefer, & Bonomi, 2005). These elements allow for "productive interactions" to occur between an "informed, active patient [and family]" and a "prepared, proactive team" (Wagner, Bennett, Austin, Greene, Schaefer, & VonKorff, 2005, p. S9). Effective management of chronic conditions such as ASDs involves multiple team members and specialties.

There are two especially relevant elements of chronic disorder care models that informed this study. First, *decision support* involves professionals providing and recommending interventions that have been shown to be the "most effective" as determined by rigorous evaluation of scientific evidence, practicing interventions using specific guidelines, and ensuring that one has the expertise and knowledge to provide the intervention (Wielawski, 2007, p. 6; Wagner et al., 2005). Second, the concept of *self-management support* involves professionals collaborating with patients and their families, taking into account the family's preferences, encouraging patient and family participation in setting goals to activate or empower patients, and tailoring treatments to patient/family preferences. Children with ASDs will often need supports throughout their lifetimes and it is important for professionals to support the families of children with ASDs in selecting, tailoring, and implementing interventions (Gabovitch & Curtin, 2009).

In sum, chronic disorder care perspectives highlight the important role that professionals play in helping children and families manage of chronic conditions, such as ASDs. Better care for chronic conditions occurs when the family has a supportive team of professionals with whom to discuss options for efficacious interventions and who involve the family as active participants in the child's care. It is important to focus attention on professionals to assess the extent to which they are providing elements of high quality chronic disorder care to children with ASDs.

Ecological systems models. An ecological systems perspective also emphasizes the importance of studying professionals who work with children with ASDs. Ecological systems theory positions professionals as an important system of influence on the development of a child with an ASD. Bronfenbrenner (1977, 2005) asserts that a child's development is best understood by examining continually changing relationships between the individual child and the multilevel

ecology in which he or she is embedded. Changes in one level of the ecology may have a 'trickle-down' effect through the other levels and will eventually influence the child.

According to Bronfenbrenner (1977, 2005), an individual's ecology is composed of a number of different systems (or levels). The level that is most proximate to the child is the *microsystem*, or the immediate setting of the person and the interactions that occur within this surrounding (e.g., interactions with family, professionals, etc.). The *mesosystem* refers to the connections and interactions between sets of microsystems (e.g., parents [one microsystem] communicating with a speech-language pathologist [another microsystem] about their child's intervention plan). More distally, within the *exosystem*, are the contexts and influences of the surrounding community, systems in which a child may not be involved directly (e.g., school board) but nevertheless impact the child's development (e.g., local availability of particular interventions). An even more distal system is the *macrosystem*, which refers to the overall culture, government, economy, etc. in which microsystems, mesosystems, and exosystems are embedded (e.g., within this system are elements of public policy, economic influences, and insurance policies regarding interventions for ASDs). Mandell and Novak (2005) and Ravindran and Myers (2012) provide excellent reviews of the role of culture in treatment decision-making for ASDs. Finally, the *chronosystem* refers to the time in history or life course of the child in which events occur and impact the direction of the child's development (Bronfenbrenner, 1977, 2005). Current social and historical (chronosystem) factors related to treatments for ASDs include difficulties with reimbursement for particular types of interventions and political and legal controversy over whether particular interventions should be publicly funded and/or funded through educational systems (Shattuck & Grosse, 2007).

Bronfenbrenner and Ceci's (1994) conceptualization of the bioecological model further focuses in on the interaction between individuals' genotypes and their environmental systems. According to this model, genetic information within the individual does not lead to crystallized traits, but rather, genes interact with the environment to produce an individual's phenotype, or a person's observable characteristics (Bronfenbrenner & Ceci, 1994). Proximal processes are the interactions between an individual and the environment and are mechanisms for "actualizing genetic potential" (Bronfenbrenner & Ceci, 1994, p. 572). Enhancing proximal processes (i.e., the interaction between the individual and their environment) can help to increase "actualized genetic potentials for developmental competence" (Bronfenbrenner & Ceci, 1994, p, 568). For instance, an early and efficacious behavioral intervention (a proximal process) may enhance a child's interactions with her environment, altering the child's phenotype (or outward symptoms of ASDs). To understand a child's development, we must look at genetic influences within the child, as well as influences from both the immediate and more distal environments. Professionals play an important role within the immediate environment of the child with an ASD.

According to ecological systems theory, the dynamic impact of receiving interventions and information from various professionals across the lifetime of a child will filter down to influence the individual's outcomes and experiences. Over time, intervention has the potential to change early neural and behavioral development to lead to decreased impact of ASD symptoms (Dawson, 2008). Even small improvements to the delivery of interventions can impact outcomes for children with ASDs.

> "When the various levels of ecology all operate simultaneously in a manner that is facilitative of development, more optimal outcomes can be obtained… this suggests that parents and service providers should work collaboratively in their microsystems to form a mesosystem and implement services in a coordinated manner" (Cuvo & Vallelunga, 2007, p. 167).

Consideration of the multidirectional impact of each player within the child's ecology is crucial (Cuvo & Vallelunga, 2007). Within a transactional systems perspective, we are not just concerned with the impact of each unidirectional influence (e.g., speech-language therapy's impact on child's language skills), but also with the impact of transactions between different systems of the ecology over the child's life (Cuvo & Vallelunga, 2007). For example, improvements in a child's language skills after a focused speech-language therapy intervention (one system) may lead that child to more actively participate in his school classroom and thus stimulate learning (another system), and potentially open the door later to that child being involved in play and friendships (yet another system). Changes in one area of development will naturally impact the child's interactions with other levels of the system. These transactions occur reciprocally between different microsystems within the child's ecology (e.g., parents, professionals) and the child.

This ecological systems perspective applied to this study is diagramed in Figure 1. In this figure, the child with an ASD and his/her family are depicted in the center, as the "hub of the wheel" for ASD interventions. The different professional disciplines that a child may receive services from are depicted in shaded shapes in the microsystem level. These professional disciplines may interface with families and children in a variety of ways. A professional's positive and respectful interactions with the family in terms of provision of efficacious interventions or by giving recommendations about efficacious interventions to the family can have a trickle-down effect leading to more positive outcomes for the child over time. Similarly, tailoring interventions to meet the needs of that child and family will further facilitate adaptive development in the child. These potential means of interface between professionals and the family (and child) are depicted with dark arrows. The other levels of a child's ecological system

are depicted in the large ovals; their trickle-down impact on the child is depicted with non-shaded arrows. In sum, an ecological systems perspective positions professionals as an important microsystem of influence for a child and family as they journey through the process of choosing interventions. The next section provides an overview of the professional disciplines under study in this dissertation.

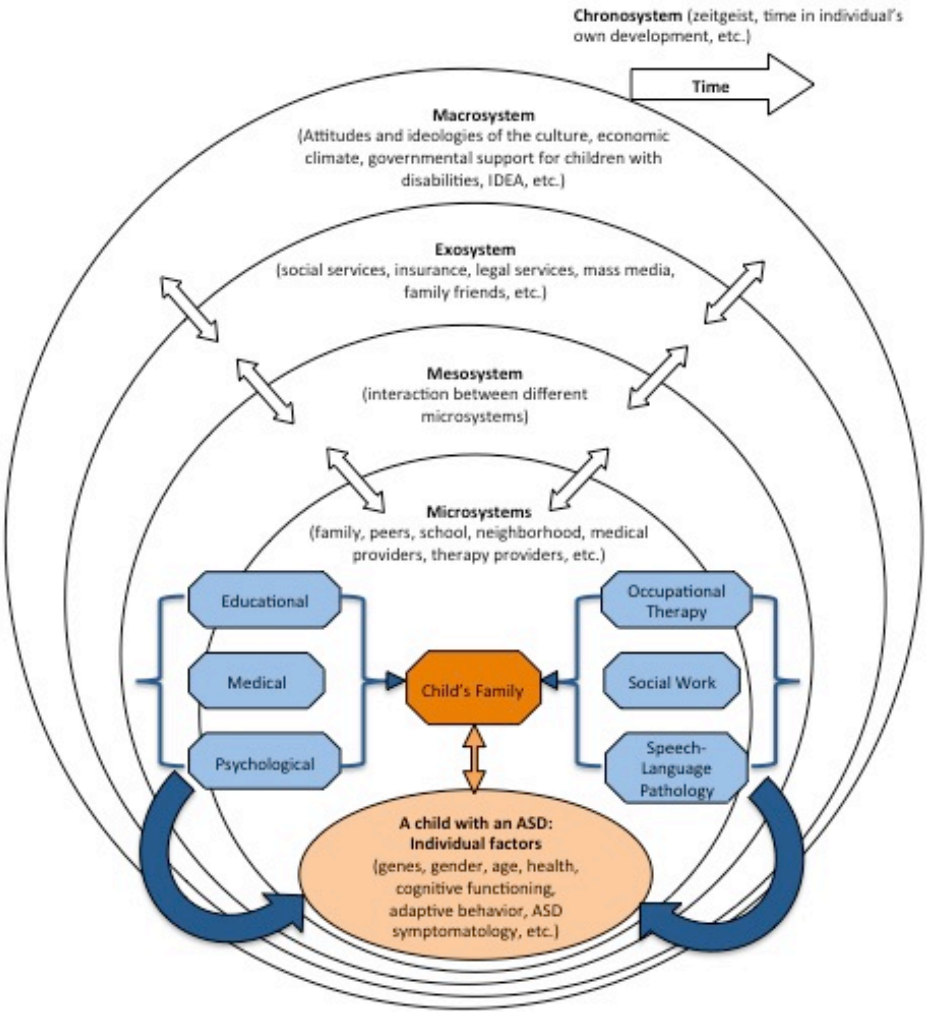

Figure 1. Ecological systems perspective illustrating the role of professionals in terms of their potential impact on a child with an ASD and his or her family.

Roles of Professionals Working with Children with ASDs

This section provides a brief overview of the role of each professional discipline and specific areas of expertise in intervention for children with ASDs. Discussing these roles highlights the unique characteristics within each discipline. Over time, families of children with ASDs will likely find themselves interacting with multiple specialized professionals for interventions for their children, including most frequently speech-language pathologists, occupational therapists and physical therapists, general and special education teachers, physicians (developmental pediatrics, psychiatry, etc.), psychologists, social workers, etc. (Smith & Antolovich, 2000; Shattuck & Grosse, 2007; McLennan, Huculak, & Sheehan, 2008; Jensen & Spannagel, 2010; Volkmar, Reichow, & Doehring, 2011). "These disciplines speak different languages, have different research traditions, and bring their own unique perspectives to this population" (Volkmar et al., 2011, p. 374). This study aims to better understand the practices and perspectives of professionals across the disciplines that most frequently provide services to children with ASDs: (a) education; (b) medicine/nursing; (c) occupational/physical therapy; (d) psychology; (e) speech language pathology/audiology; and (f) social work. Other disciplines may play a role in the care for some children, but this study focuses on disciplines with which a majority of children with ASDs interact.

Education. Education is a very important discipline in relation to children with ASDs because frequently the school or educational center acts as a hub for care coordination with other professionals (e.g., via an Individualized Family Service Plan [IFSP], or Individualized Educational Program [IEP] team). The discipline of education is primarily concerned with teaching children with ASDs different skills, concepts, adaptive behaviors, and academic content (National Association of Special Education Teachers, 2011). Educators working with children

with ASDs most likely hold a Bachelor's or Master's degree in Education or Special Education or related field. Depending on the cognitive and adaptive functioning of the child, educators can play different roles. Some children with ASDs may be placed in regular education classrooms working from a standard curriculum, while others may be in special classrooms providing additional support (e.g., routines and behavior management), assessment (e.g., functional behavior assessment), and an individualized educational curriculum focused on the child's set of strengths and weaknesses. The strategies and interventions that educators utilize within the classroom vary a great deal based on their training, the state and county they are in and available funding, and personal experience with ASDs (Swiezy et al., 2008; Shattuck & Grosse, 2007) as well as on the age and developmental level of the children they serve. Another important profession within the education discipline is that of an educational diagnostician (National Certification of Educational Diagnosticians Board, 2011; Sutton, Frye, & Frawley, 2008), whose general work is centered on assessing, diagnosing, and providing treatment recommendations for learning problems in children. Individuals with this professional title may practice at either a Master's or Doctoral level (Ph.D. or Ed.D.).

This study also considered those Board Certified Behavior Analysts (BCBAs) who did not have degrees in another discipline in the study as part of the Education group. BCBAs provide services utilizing principles of applied behavioral analysis (ABA) with individuals with ASDs in a range of settings (e.g., school to private practice). BCBAs typically design, provide, and supervise behavioral analytic assessments and interventions. BCBAs must hold at least a Master's degree (or Doctoral degree in the case of BCBA-Doctoral) and have specific graduate training and meet licensure requirements. Individuals may also practice as Board Certified Assistant Behavior Analysts (BCaBA) under the supervision of a BCBA, and as such, they must

have at least a Bachelor's degree and pass certain other requirements. Individuals practicing in this domain are certified by the Behavior Analyst Certification Board (2011).

Medicine/Nursing. The disciplines of medicine and nursing are primarily concerned with the ongoing medical and behavioral health of children with ASDs. The primary degree held by physicians in this field is a Doctor of Medicine (M.D.) degree, although some individuals hold a Doctor of Osteopathic Medicine (D.O.) degree. Pediatricians and family medicine doctors see children with ASDs for primary care on a regular basis. Literature has suggested that primary care physicians are potential conduits for care coordination between a child's medical and non-medical providers (i.e., the medical home; Carbone, Behl, Azor, & Murphy, 2010), yet this has not implemented widely for children with ASDs (Brachlow, Ness, McPheeters, & Gurney, 2007). Pediatric neurologists, developmental-behavioral pediatricians, psychiatrists, nurse practitioners, and other medical specialties may interact with children with ASDs to prescribe medications and to treat symptoms. Children with ASDs are often prescribed particular medications aimed to treat various symptoms related to ASDs, such as atypical antipsychotics prescribed for symptoms of repetitive behavior or self-injurious behavior (Goin-Kochel et al., 2007; McPheeters et al., 2011; Oswald & Sonenklar, 2007). Nurses provide additional medical services to individuals with ASDs. Nurses may receive any level of degree (e.g., master's, doctoral), although specific training and certification is required to become a nurse practitioner or other specialty nurse (Davila, n.d.). School nurses may play a particularly important role in collaborating with educational teams surrounding medication management in school and implementing Individual Education Plans (Galinat, Barcalow, & Krivda, 2005). Nurse practitioners and psychiatric nurses may play a role in a child's medical care, medication management, and service coordination. Some medical doctors or nurse practitioners may also

provide or recommend biomedical treatments for ASDs (e.g., gluten-free, casein-free diets; American Medical Autism Board, 2011) or particular courses of treatment with biomedical undertones (e.g., DAN! Protocols; Autism Research Institute, 2011). It should be noted that Medicine and Nursing require different training and may have different philosophies about care. For the purposes of this study they were combined into one group, as their primary focus in working with children with ASDs (medical and behavioral health) is similar.

Occupational/physical therapy. The discipline of occupational therapy (OT) is generally concerned with the fine motor, visual motor, and sensory functioning of children with ASDs (American Occupational Therapy Association, AOTA, 2011). The discipline of physical therapy (PT) is also concerned with the motor and sensory functioning of children with ASDs, although often the focus within physical therapy is on gross motor impairments and functioning (Ming, Brimacombe, Chaaban, Zimmerman-Beir, & Wagner, 2007). OTs and PTs may practice at either the Master's or Doctoral level. OTs must pass the Occupational Therapist Registered OTR® examination administered by the National Board for Certification in Occupational Therapy (AOTA, 2011). PTs may be certified additionally in Pediatrics or Neurology by taking a specialist certification examination (American Board of Physical Therapy Specialties, 2012). OT and/or PT are often recommended by a child's intervention team when it is determined that a child's sensory difficulties (e.g., sensitivity to light, noise, tactile stimulation, etc.) or motor impairments interfere with her daily functioning at school or at home. OTs may utilize the term "sensory processing disorder" with children with ASDs, which refers to a constellation of sensory symptoms such as hypersensitivity or hyposensitivity to touch/sound/etc., problems with tactile perception and discrimination, hypersensitivity or hyposensitivity to movement, poor muscle tone or coordination, etc. (SPD Foundation, 2011). An OT assesses the child's responses

to stimulation and suggests environmental changes for the child (AOTA, 2011). PTs may work with children on reducing motor impairments such as toe-walking, hypotonia, and apraxia (Ming et al., 2007). OTs and PTs may work with children within a school, private practice, or hospital setting. For the purposes of this study, OTs and PTs were combined into one group as their primary focus in working with children with ASDs (sensory and motor functioning) is similar.

Psychology. The discipline of psychology is primarily concerned with the psychosocial and behavioral functioning and development of children with ASDs and their families (American Psychological Association, 2011). Psychologists typically hold a degree of Ph.D. (Doctor of Philosophy in Psychology) or Psy.D. (Doctor of Psychology). School psychologists may practice with a Master's level degree. Psychologists are important members of comprehensive assessment teams, and may also conduct independent psychological evaluations with children with ASDs. In terms of intervention, the type that a psychologist may provide a child with an ASD varies a great deal based on the functioning of the child. Psychologists may provide a range of interventions for ASDs from the behavioral domain (e.g., functional assessments of behavior) and may also provide parent training, behavioral therapy, social skills training, or psychotherapy for comorbid disorders in children with ASDs (White, 2012). School psychologists work with children with ASDs, providing assessment, consultation, or intervention in school settings (Williams, Johnson, & Sukhodolsky, 2005), while most clinical psychologists work in community, hospital, or private practice settings. Gillis and Beights (2012) have outlined the major roles for clinical psychologists in their work with children with ASDs: "(a) assisting families with the process of treatment coordination, (b) identifying and providing treatment for comorbid psychiatric disorders in children with an ASD, and (c) addressing parental stress" (Gillis & Beights, 2012, p. 392).

Social work. The discipline of social work has been involved in the care of individuals with developmental disabilities for a long time (National Association of Social Workers - Social Work Policy Institute [NASW-SWPI], 2007; Gabovitch & Curtin, 2009). Social workers typically hold a Master's degree in social work and may receive a license (e.g., LCSW) after a certain number of supervised clinical hours and taking an exam. Social workers may provide a range of services for children with ASDs in many settings, including educational and medical settings. One role social workers may take is to provide direct intervention services for children with ASDs. Social workers may also be a part of transdisciplinary diagnostic assessment teams, providing psychoeducation related to the child's diagnosis as well as information on community resources (e.g., Pinkett-Davis, Whitney, Kalb, Foster, & Freedman, 2010). Social workers may also play the role of case manager or case coordinator for a child with an ASD, working with the child's family and other providers to manage and coordinate services (Thyer & Pignotti, 2010).

Speech language pathology (SLP) and audiology. Given the communication deficits in individuals with ASDs, the disciplines of SLP and audiology are often involved in intervention services of children with ASDs. SLPs and audiologists may practice at a Master's or Doctoral level. SLPs receive the Certificate of Clinical Competence in Speech Language Pathology (CCC-SLP; American Speech-Language-Hearing Association, 2012). Audiologists receive the Certificate of Clinical Competence in Audiology (CCC-A; ASHA, 2012). The American Speech-Language-Hearing Association (ASHA, 2005a, 2005b) provides a specific description of the principles and roles of SLPs in the diagnosis, assessment, and treatment of ASDs, as well as the roles for audiologists in pediatric practice. Comprehensive assessments for ASDs ideally include assessment of the following domains: receptive language, expressive language including communicative functions and pragmatics, and voice and speech production, and oral-motor skills

and articulation (Filipek et al., 2000; Volkmar et al., 2005). SLPs may provide speech therapy to children with ASDs in school, private, or medical settings (ASHA, 2012). Speech therapy may focus on a range of different areas, but frequently, the pragmatics and social use of language is a focus for children with ASDs, in addition to learning how to use language to communicate needs. Another role that SLPs and audiologists may play in ASD intervention is in the development of augmentative and alternative communication programs or devices (ASHA, 2012). For the purposes of this study SLPs and audiologists were combined into one group, as their primary focus in working with children with ASDs (communication) is similar.

Evidence-based Practice: A Multidisciplinary Imperative for ASDs

The chronic disorder healthcare and ecological systems perspectives both situate professionals as important players in the care for children with ASDs; the previous section outlined specifically how each professional discipline in the study may be involved in care of children with ASDs. This section will discuss these issues further within the context of the evidence-based practice movement. The rationale for focusing on the two dependent variables selected in this study (recommendation/provision of EBIs and use of an FCC approach) will be presented and these variables will be described.

Evidence-based practice overview. Across professional disciplines, there has been a push towards adopting *evidence-based practices* for ASDs (Reichow & Volkmar, 2011). Evidence-based practice is the integration of three important domains: (1) consulting research evidence to identify and use interventions with demonstrated efficacy, (2) considering patient (e.g., individual, family, group, etc. or other individual receiving services) characteristics, culture, preferences, and values, and (3) developing clinical expertise and experience in the

provision of services (APA Presidential Task Force on Evidence-Based Practice, 2006). In Figure 2, the overlapping center of the Venn-diagram represents evidence-based practice.

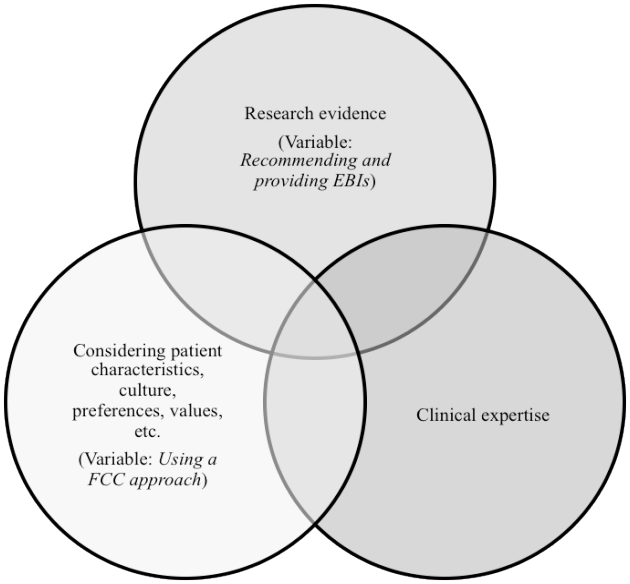

Figure 2. Evidence-based practice: Combining research evidence, consideration of patient characteristics, and clinical expertise

The first two of these areas of evidence-based practice are conceptually similar to two variables addressed in this study: using *evidence-based interventions* and providing these interventions in a *family-centered* fashion. Striking a balance between these two areas is often a challenge, especially in the ASD field. Professionals must appreciate a family's hope for finding an intervention that will lead to symptom amelioration for their child, and the professional imperative to provide the best possible information about evidence-based interventions (White, 2012). This balancing act must be done in the face of the availability of many controversial or unsupported interventions (Christon et al., 2010; White, 2012).

While the definition for evidence-based practice outlined above is from the discipline of psychology, similar definitions of evidence-based practice exist across disciplines (e.g.,

education, Simpson, 2005; SLP, Zipoli & Kennedy, 2005; social work, Thyer & Pignotti, 2010, etc.). The concept of evidence-based practice emerged out of the medical field, and the concept of *evidence-based medicine* (Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996). Evidence-based medicine is defined as "the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients… integrating individual clinical expertise with the best available external clinical evidence from systematic research" (Sackett et al., 1996, p. 71).

Professional organizations across disciplines provide some guidance to those in their field about having an evidence-based practice focus. For instance, in the discipline of social work, both the Council on Social Work Education (2011) and Social Work Policy Institute (2010) provide their membership with definitions of evidence-based practice as well as a range of resources regarding evidence-based practice. The American Speech-Language-Hearing Association (ASHA, 2005c, d) has developed guidelines for the treatment of children with ASDs, including a summary of evidence-based practices as well as a summary of effective interventions for ASDs. In the field of occupational therapy, the American Occupational Therapy Association released a book called, "*Occupational Therapy Practice Guidelines for Children and Adolescents with Autism*," (Tomcheck & Case-Smith, 2009) which introduces guidelines for OTs in using evidence-based practices. ASD associations/organizations (e.g., Autism Speaks, National Autism Society) frequently take the stance that they aim to disseminate information on evidence-based practices (Stephenson, Carter, & Kemp, 2012). Parents and professionals may use these resources to seek information on interventions and evidence-based practices for ASDs (Stephenson et al., 2012). Preliminary examination of the content of various autism

association/organization websites indicates that autism organizations may present limited, and often discrepant, information regarding interventions (Stephenson et al., 2012).

In sum, the importance of evidence-based practice is recognized across professional disciplines that are involved in the field of ASD. Use of evidence-based interventions and a family-centered approach to care are two important areas of evidence-based practice. Upcoming sections delve into how evidence-based interventions and family-centered care, two variables included in this study, have been defined and measured in the literature. Clinical expertise (while not measured in this study) is also briefly described.

Recommendation and Provision of Evidence-based Interventions (EBIs): Dependent Variable #1

Evidence-based interventions (EBI)[3] are those interventions for which efficacy is demonstrated by a sound body of high-quality scientific research published in peer-reviewed scientific journals (e.g., Reichow & Volkmar, 2011; Chambless & Ollendick, 2001; etc.). Using EBIs leads to improved outcomes for children with ASDs (Reichow & Volkmar, 2011). Yet how do we classify interventions as being 'evidence-based' or not? Determining the criteria for an EBI and the best ways to outline and communicate standards for adequate evidence for an intervention to be considered an EBI are ongoing discussion topics across professional disciplines and across populations (including within the autism field; Lord & Bishop, 2010). Yet even as there are discrepancies in how to define EBIs, the utilization of EBIs is generally considered to be an important component of practice across all professional disciplines included

[3] Within the literature on interventions for autism, I found that the terms "evidence-based practice," "evidence-based treatments," and "evidence-based interventions" are used interchangeably. This is a confusing approach to the lexicon in the autism field as each term also has a slightly different definition. Also, historically within different sets of literature (e.g., psychology), other terms are used to describe this concept, including "empirically supported treatments." At an attempt at clarity for the current project, I am using the term "evidence-based practice" in the more global sense as described above by APA (2006). I chose the term "evidence-based interventions" (over the term "evidence-based treatment") to refer to specific interventions with a high degree of empirical support, as "intervention" is a more global encompassing term than "treatment" based on literature across disciplines.

in this study. In the field of ASD, there are many interventions with varying degrees of empirical support. Ideally, families should be provided with and steered towards interventions with a higher degree of empirical support, rather than those interventions that have been deemed ineffective or harmful.

A number of groups have established criteria for determining whether an intervention is "efficacious" or "evidence-based" (e.g., Chambless & Hollon, 1998; Chambless & Ollendick, 2001; Odom, Collet-Klingenberg, Rogers, & Hatton, 2010a; Reichow, Volkmar, & Cicchetti, 2008). None of these criteria have been accepted universally, but, in general, an intervention meets the criteria of being an EBI if there is supportive evidence of its efficacy from two independent randomized clinical trials conducted by separate research teams (Reichow et al., 2008; Reichow & Volkmar, 2011). The definition of EBI that is used here and included within the current dissertation survey is:

> *"…Those interventions for which efficacy has been demonstrated by a credible body of scientific work and high-quality research published in peer-reviewed scientific journals. Evidence-based interventions: (1) have manuals or standardized instructions for use; (2) have demonstrated efficacy over a placebo or equal to an established intervention in at least 2 experimental or quasi-experimental design experiments OR a large series of single-case design experiments (in both cases, the characteristics of samples must be clearly specified, e.g., how diagnoses of participants was assigned); (3) have findings of efficacy replicated by different investigators or research groups."*

This definition was synthesized from a range of references defining evidence-based interventions (e.g., Chambless & Hollon, 1998; Chambless & Ollendick, 2001; Reichow, Volkmar, & Cicchetti, 2008) and is provided to survey participants to encourage the use of a common language when considering their perspectives on EBIs.

In order to give the reader an example of criteria for an intervention to be "evidence-based," the Division 12 (i.e., Division of Clinical Psychology) Task Force criteria is elaborated upon (Chambless et al., 1998). While this criteria is not universally accepted across disciplines, it

provides an illustration of how the efficacy of interventions may be evaluated. According to Chambless et al.'s (1998) guidelines, a "well-established" (here the term "evidence-based" instead) intervention has sufficient evidence of efficacy in that it has shown to have beneficial outcomes above either no-intervention or another intervention. Those interventions *not* considered to be EBIs may fall into one of a number of other categories according to Chambless et al. (1998): (a) "probably efficacious" (or "promising," to use the terminology of Spirito, 1999) interventions that may meet some of the criteria for an evidence-based intervention, but do not meet others, such as not being tested by at least two different investigators or teams, and (b) experimental interventions that have not yet been studied in research meeting task force criteria for methodology. Mesibov and Shea (2010a) and Reichow and Volkmar (2011) discuss how other disciplines have prioritized and approached identifying EBIs (e.g., the 'Scientifically Based Research' movement within education, namely within the US Federal Law Elementary and Secondary Education Act/No Child Left Behind Act of 2001).

It is important to couch any discussion of defining "efficacy" with the caveat that not all professionals or researchers agree on the previously discussed definitions. Mesibov and Shea (2010a) outline a number of domains upon which the definition evidence-based interventions outlined above falls short, specifically in the case of ASD intervention research. Their primary objections to this definition are (p. 7-10): 1) Randomized controlled trials (RCTs) may not be the best way to examine efficacy in the ASD field due to numerous drawbacks (e.g., children using multiple interventions during RCTs, and the outcome variables selected for study may not provide information on long-term outcomes); 2) Manualizing ASD interventions is a challenge, as "overall program manuals" may not be flexible enough to take into account heterogeneous symptom presentations; 3) EBI criteria is not consistently defined and reviews of interventions

vary widely based on the criteria used. Mesibov and Shea (2010a) argue for the use of more flexible approaches to categorizing EBIs and defining manuals for studies and utilizing single-case designs as suitable alternatives to RCTs in ASD research.

One of the core problems in the ASD intervention field currently is the lack of an agreed-upon operational definition of EBIs. Reichow and colleagues (2008, p. 1312) assert that a common set of criteria for EBIs is especially necessary within "a field such as autism, which utilizes several independent bodies of research (e.g., medical, psychological, educational) with distinct purposes, orientations, theories, and research methods." While Mesibov and Shea's (2010a) counter-arguments for the narrow definitions of EBIs are acknowledged, it was important to have a working operational definition of EBIs for this study. Thus, in the absence of a universally agreed-upon definition of EBIs, the definition previously presented was used. Within the ASD literature, future work will likely focus on further delineating consistent and appropriate definitions of evidence-based interventions (e.g., Volkmar et al., 2011). The next section outlines the different categories of EBIs identified for inclusion in this study (classification procedures are covered in the Method section).

Classifying EBIs for ASDs. A number of comprehensive and systematic reviews synthesizing the research evidence for a wide range of interventions for ASDs have been conducted[4]. A selection of these reviews (years 1999-2011) was used in this study to define which intervention practices are considered to be EBIs. Each of these reviews makes use of a

[4] The references used in this study are as follows: The National Autism Center's National Standards Project [NAC] (2009); The National Professional Development Center on Autism Spectrum Disorders [NPDC] (2011); Odom, Collet-Klingenberg, Rogers, & Hatton (2010a); Rogers & Vismara (2008); Odom, Boyd, Hall, & Hume (2010b); Vanderbilt Evidence-based Practice Center's [VEBPC] *Comparative Effectiveness Review for Therapies for Children with Autism Spectrum Disorders* (2011); Chorpita, Daleiden, Ebesutani, Young, Becker, Nakamura et al. (2011); National Research Council [NRC] (2001); Johnson, Myers, & the Council on Children with Disabilities (2007); Volkmar, Cook, Pomeroy, Realmuto, & Tanguay (1999); Filipek et al. (1999); Filipek et al. (2000); McPheeters et al. (2011, summarized from VEBPC, 2011); Scahill & Martin (2005); Siegel & Beaulieu (2011); and Huffman, Sutcliffe, Tanner, & Feldman (2011).

slightly different coding scheme for classifying EBIs, consistent with current critiques of the literature (e.g., Mesibov & Shea, 2010a; Reichow et al., 2011), and a challenge to assembling a list of EBIs. This study does not independently classify interventions as EBIs and relies instead on the classifications made in these systematic reviews[5].

The ASD literature distinguishes between different classifications of EBIs. The first classification is *focused intervention practices*, which are individual instructional practices or strategies designed to teach specific skills and concepts within a relatively brief period of time (Odom, Collet-Klingenberg, Rogers, & Hatton, 2010a). One example of a focused intervention practice classified as an EBI is Social Stories (also called Social Narratives, Story-based Interventions; National Autism Center [NAC], 2009). This intervention involves providing a child with short stories that describe a social situation that the child might find difficult or confusing. The goal is to teach the child social skills or help them adjust to changes in routine based on the cues of the situation by providing them with information about social and physical cues and appropriate behavior (National Professional Development Center [NPDC], 2012). Another example is task analysis (NAC, 2009). In task analysis, a skill that a child is trying to learn is broken down into small, manageable steps to facilitate learning, with the ultimate goal being independent performance of the skill (NPDC, 2012).

Another classification of EBIs for ASDs is *comprehensive treatment models (CTMs)*. These models are conceptually organized packages of interventions, based on specific theories, aiming to address a broad array of skills and abilities (Odom, Boyd, Hall, & Hume, 2010b). One example is Discrete Trial Training. This intervention package has its origins in applied behavioral analysis and uses a one-on-one instructional approach to teach skills in a systematic fashion via small repeated steps (Rogers & Vismara, 2008; NPDC, 2012). Another example is

[5] This study includes reviews available through the year 2011.

Pivotal Response Training. This model also has its foundations in applied behavioral analysis and relies on learner initiative to alter "pivotal" or fundamental learning variables (i.e., motivation, responding to multiple cues, self-management, and self-initiations; NPDC, 2012).

Finally, the classification of *pharmacological/medical interventions* currently includes medications that are given to treat specific symptoms of ASDs (Lord & Bishop, 2010). There is a paucity of research on pharmacological or medical interventions for children with ASDs. In general, the atypical antipsychotics risperidone and aripiprazole are the only class of medications to have demonstrated efficacy in treating symptoms of ASDs. They are used to treat repetitive behaviors and other challenging behaviors associated with ASDs (McPheeters et al., 2011).

Professionals and EBIs for ASDs. The general role of each professional discipline has been presented, and the previous section described EBIs for ASDs. In this section the specific role of professionals in recommending and providing EBIs is presented. Professionals may provide interventions directly to children with ASDs, exerting a direct influence on the child's potential outcomes. Professionals also serve as a valuable source of information for families about ASDs and interventions. They may have an indirect influence on the child's intervention trajectory by discussing and recommending intervention options with families. Professionals can recommend evidence-based interventions to families that are outside of their own scope of practice (e.g., a pediatrician can recommend that a family explore the use of visual schedules with their child with autism, even though the pediatrician may not provide this intervention him or herself). Often this is the case, as medical, educational, and additional professionals may make recommendations about interventions across disciplines in addition to providing services directly (Gabovitch & Curtin, 2009). Professionals can help a family sift through different intervention options and evaluate potential pros and cons of each approach (Gabovitch & Curtin, 2009). This

requires professionals to have a certain level of knowledge about different interventions (and the evidence supporting certain interventions), and also requires spending additional time with the family to help them in this decision-making process.

Research has indicated that information from professionals is one important source of information used by families of children with ASDs in the intervention decision-making process (e.g., Kennedy Krieger Institute, 2011; Christon, Mackintosh, & Myers, 2010; Mackintosh, Myers, & Goin-Kochel, 2007). Families endorse gathering information about ASDs and interventions from a range of sources including the internet, other parents of children with ASDs, medical professionals, mental health professionals, providers of ASDs therapies, and practitioners of alternative medicine, as well as educators/school personnel (Kennedy Krieger Institute, 2011; Christon et al., 2010; Mackintosh et al., 2007). One internet-based study of 498 parents who self-identified as having children with ASDs found that parents reported relying on physicians (48% of parents), educators (49% of parents), and other professionals (e.g., early interventionists, speech-language pathologists, occupational therapists, psychologists, etc.; 57% of parents) as sources of information about ASDs (Mackintosh et al., 2007).

There is potential in these interactions with families for professionals to steer families towards interventions that either *are* or *are not* based on solid research evidence. Given the many pseudoscientific and unstudied treatments that exist for ASDs and the extraordinary cost (e.g., $2,000 for auditory integration training; AIT Institute, 2011) or demonstrated ineffectiveness or potential risks of some interventions (e.g., secretin; Krishnaswami, McPheeters, & Veenstra-VanderWeele, 2011), it is important for professionals to provide and recommend those interventions with demonstrated efficacy that "are likely to produce measurable improvements in the lives of persons with ASD and their families" (Lord & Bishop, 2010, p. 11).

Making decisions about interventions must be done within the context of having many unsupported interventions available. While this is true not only for ASDs, the intervention landscape for ASDs is distinctive; the existence and use of interventions without empirical support with ASDs is greater than for other pediatric psychological or developmental disorders (Golnik & Ireland, 2009; Christon et al., 2010; White, 2012). More information on complementary and alternative medical (CAM) treatments and other interventions can be found in Christon et al. (2010) and Levy and Hyman (2008). A responsibility of professionals is to help families weigh intervention options and provide information about interventions for which the field has documented or promising efficacy data. To do so, professionals working with children with ASDs must be informed about the evidence for different interventions. White (2012, p. 435) suggests that choosing to deliver interventions to children with ASDs that lack scientific evidence when EBIs are available may be "clinically negligent." Despite the general push toward the use of EBIs across professional disciplines, little is known about what interventions community professionals provide to children with ASDs and what interventions they recommend when they meet with families.

Measurement of professionals' EBI practices. The attitude of professionals toward evidence-based practice is sometimes described as one of ambivalence (Reichow & Volkmar, 2011). Professionals may acknowledge the importance of utilizing an evidence-based approach to practice, but barriers such as negative attitudes and unfamiliarity with EBIs or intervention research may lead to lower use of EBIs (Pagoto, Spring, Coups, Mulvaney, Coutu, & Ozakinci, 2007; Nelson & Steele, 2007). In the field of psychology, individual factors such as background training in EBIs, attitudes towards intervention research, and the perceived openness of practice setting to EBIs have been found to predict self-reported use of EBI (Nelson & Steele, 2007).

Information on the perspectives and practices of professionals on recommending/providing EBIs is notably absent from the ASD field.

Some research has highlighted that professionals differ in their attitudes towards evidence-based practice across disciplines (or professional fields), and often do not look outside of their own discipline for research evidence (Upton & Upton, 2006). This has been discussed as a particular problem within the field of ASDs (Reichow & Volkmar, 2011). Given that the nature of ASD intervention and research is multidisciplinary and that professionals and researchers are from "many fields with different theoretical backgrounds and diverse research methods, it is imperative that researchers [and practitioners] consider, acquire, and synthesize research across disciplines" (Reichow & Volkmar, 2011, p. 9-10).

While some measures have been developed to assess professionals' general attitudes, behavior, and perspectives regarding evidence-based practice or interventions (e.g., *The Evidence-based Practice Attitude Scale*, Aarons, 2004; *Evidence-Based Practice Profile*, McEvoy, Williams, & Olds, 2010; *Evidence-Based Practice Questionnaire*, Upton & Upton, 2006), there are a number of drawbacks to these existing measures. First, these measures are not specific to interventions within the field of ASDs. Second, these measures do not rely on psychological or other theories that might help to explain behaviors to guide the measure's development. Third, the lexicon in certain of these measures includes words such as "manualized interventions," which may hold differing meaning across professional discipline (e.g., what would a manualized intervention be defined as within medicine?). The measure used in this study to assess the perspectives of professionals working with children with ASDs about EBIs aims to address some of these limitations to the current measures. The measure used is specific to considering work with children with ASDs and provides an operational definition of EBIs. In

addition, the measure included in this study draws upon a well-researched social psychological theory, the Theory of Planned Behavior (Ajzen, 2005, n.d.; Francis et al., 2004), which is discussed later in the literature review. In the next section, FCC is discussed and elaborated upon.

Use of a family-centered care (FCC) approach: Dependent Variable #2

Given the heterogeneity present in ASDs, there may be challenges when an EBI is applied to a "real child" in clinical practice (Lord & Bishop, 2010). Interventions must be not only have empirical support but "tailored to [the] developmental expectations for each child within his or her family" (Lord & Bishop, 2010, p. 13). The concept of delivering interventions to a child in a supportive fashion in line with the goals and abilities of the child and her family has been termed in the literature "family-centered care" (FCC). This is conceptually analogous to the dimension of respect for patient preferences and values within psychology's conceptualization of evidence-based practice in psychology (e.g., APA Presidential Task Force on Evidence-Based Practice, 2006), but expands this definition to encompass the family system (e.g., Bronfenbrenner, 1979).

The concept of FCC has evolved over the past century, changing in concert along with changes in service delivery for children with disabilities. In the early 1900s, institutional placement was recommended for children with disabilities and special needs (such as ASDs) and families were deemed unable to care for their children (Rosenbaum, King, Law, King, & Evans, 1998). In the 1940-50's, a shift away from professionally-centered decision-making began, with a growing focus on parents making decisions about care for their children. FCC principles originated with Carl Rogers' "client-centered" approach to psychotherapy in the 1940s (Rosenbaum et al., 1998). The term "family-centered care" was first used to describe service

delivery in the field of social work in the 1950s (Gabovitch & Curtin, 2009). FCC became an important component of the Individuals with Disabilities Education Act, and parent-professional collaboration was included as an essential component of intervention programs for children with disabilities (Rosenbaum et al., 1998; Gabovitch & Curtin, 2009). In the field of medicine, FCC became a core component of the medical home model of care in the medical/nursing discipline such that a primary care provider acts as a coordinator of services in partnership with families (Gabovitch & Curtin, 2009).

When providing an intervention, one is not only treating the child, but the whole family. The core of FCC approaches is that partnering with the family in implementing interventions is instrumental in facilitating successful child outcomes (Woodside, Rosenbaum, King, & King, 2001; Dunst, 1997). FCC respects the important role that a family plays, both as a constant in the child's life, and in impacting the child's development (Woodside et al., 2001). Interventions must be adapted to a child and family's unique characteristics. The family-centered approach to care represents a shift away from professional-centered care. "Professional-centered" care is a more paternalistic approach to care (Bensing, 2000). In this model, the professional takes charge of providing a "prescription" for care that may be, at times, incongruent with what is known from the professional's personal relationship with the patient or family (Bensing, 2000). A shift toward FCC from a more paternalistic perspective places professionals in a position of partnership with parents, rather than shouldering the responsibility for a "cure" for the child's condition (Rosenbaum et al., 1998).

FCC is an approach to planning and delivering care, "grounded in mutually beneficial partnerships among health care providers, patients, and families" that acknowledges the important and multifaceted roles that families play in ensuring the health and well-being of their

children (Institute for Patient- and Family-centered Care, 2011, no page number). According to the Institute for Patient- and Family-centered Care (2011), the core concepts of FCC are treating patients and families with respect and dignity, sharing information with patients and families, encouraging patients and families to participate in care and decision-making, and collaborating in implementation and delivery of care. "A family-centered approach recognizes the facts that the family is an important source of influence… when practitioners support families, parents are in a better position to have time, energy, knowledge and skills to beneficially parent a developing child (Bronfenbrenner, 1979, 1992; as cited in Dunst, 1997, p. 75).

The family is a crucial component of a child's environment, as families are largely the gatekeepers for a child's involvement in various interventions. Family members may be the most knowledgeable and well versed in the intricacies of their child's particular needs (AAP, 2005; Bamm & Rosenbaum, 2008). Using an FCC approach means that professionals explore a family's preferences, provide the family with the necessary information to make educated decisions about the care for their child, and attend to psychosocial aspects of care (Bensing, 2000). Hallmarks of FCC also include building the motivation, self-empowerment, and self-efficacy of families (Bensing, 2000). The term *family-centered care* has many definitions in the literature. In order to have a working operational definition for the survey in this study, FCC is defined in this study as:

> *"…Collaborative and respectful partnerships between professionals and families. This includes having: (1) an appreciation for the culture, values, and customs of each child and family; (2) an understanding that the family is the child's primary source of strength and support, and that psychosocial support is important to care; (3) open and honest communication about child/family perspectives and information related to care (e.g., interventions); and (4) a goal of empowering families in their children's care."*

This definition was synthesized from a number of resources (e.g., Bamm & Rosenbaum, 2008; Bensing et al., 2000; Dunst, 1997; Woodside et al., 2001) and was included in the survey to encourage a common language when participants consider their perceptions of FCC.

From the evidence-based practice perspective (APA Presidential Task Force on Evidence-Based Practice, 2006), best outcomes for a child with an ASD will be when she is receiving EBIs, tailored to her needs in a fashion that takes into account both her and her family's unique characteristics (i.e., in a family centered fashion). With high quality family-centered care, professionals tailor interventions to the needs of families, respond to family priorities, empower family members, and exercise sensitivity to the child and family's unique characteristics (Harbin et al., 2000). Interventions are important not only in terms of the level of empirical support, but also in terms of *how* they are implemented – this the domain of FCC (Dunst, Trivette, & Hamby, 2007). "Wise" implementation and recommendation of efficacious interventions requires that scientific evidence must be interpreted and adapted to each individual's unique characteristics (Wagner et al., 2005). Including the parents and family is even more necessary for children with ASDs than other client populations, especially given the need for coordinated services and the opportunities for teaching and skill generalization across multiple settings (White, 2012). Families and children with ASDs also need professionals' support as they explore different intervention options and implement interventions across these multiple settings (Gabovitch & Curtin, 2009):

> "FCC practices may also help assuage the anxiety and self-doubt that families [of children with ASDs] often experience when feeling compelled to search out a variety of interventions and treatments, some of which may represent traditional medicine or alternative treatments. Stories of parents who have provided intensive around-the-clock treatment for their child that resulted in a cure may prompt other families to question whether they are doing enough and may perpetuate the fear that they are missing an important aspect of treatment for their child. The practice of FCC is critical at this juncture by acting as a sounding board for parents as they sift through the myriad

> services, resources, treatments, and ‘‘cures’’ that are often available or touted in books and on the Internet. Families need support to pursue that which they believe is in the best interests of their child but may benefit from a professional’s assistance to weigh the costs and benefits of treatment options and to provide them with information to help make informed decisions” (Gabovitch & Curtin, 2009, p. 486-487).

Other benefits of FCC include improvements in family adherence to a child’s set of interventions (Woodside et al., 2000). In addition, FCC approaches may reduce emotional distress of families, increase coping and adjustment, and increase family satisfaction with care (Gabovitch & Curtin, 2009). FCC itself may not directly impact child outcomes, but may influence child outcomes by increasing the self-efficacy of the parents and family and improving relationships between parents and professionals (Dunst et al., 2007). FCC has been linked to increasing parent’s positive judgments of child behavior, and increased parenting confidence in managing a child’s care (Dunst et al., 2007).

Despite these benefits, professionals may not consistently practice FCC in working with children with ASDs (Gabovitch & Curtin, 2009). Indeed, families of children with ASDs report receiving less FCC than do children with other emotional/behavioral/developmental problems (Kogan et al., 2008; Gabovitch & Curtin, 2009). FCC has been less prevalent for children with ASDs compared to children with other medical conditions (e.g., asthma) even after controlling for condition severity, personal characteristics, and insurance status (Brachlow, Ness, McPheeters, & Gurney, 2007). A likely scenario is that due to the pervasiveness and severity of symptoms in ASDs, children with ASDs and their families need a higher degree of FCC care. Professionals may then struggle to meet this increased need, for a variety of reasons.

Some of the barriers cited to the use of a FCC approach include a lack of training, a fear of offending families, and a lack of knowledge of resources within the community that might meet the family’s needs (Harbin et al., 2000). Rosenbaum and colleagues (1998, p. 14) point out

that shifting to a FCC perspective may cause some professionals to feel devalued, unskilled, or to no longer feel like "revered authorities" in their discipline. Wagner and colleagues (2005, p. S11) provide the following perspective on barriers to family- or patient-centered care:

> "…Professionals by virtue of their culture, training, social dominance, job stress, and other factors are traditionally inclined to be controlling and biomedically-oriented, and not inclined to explore the non-disease aspects of their patients' lives or share power. From this perspective, the problem is professional attitudes and behaviors that must be altered."

Professionals may have a lack of knowledge about FCC and may have little organizational support for practicing FCC (Gabovitch & Curtin, 2009). Another challenge to practicing FCC may be a lack of time and a lack of funding or insurance coverage for FCC-type activities (Gabovitch & Curtin, 2009). Spending additional time with children and families to tailor interventions or address the complex psychological, physical, medical, or behavioral needs of children is challenging for many professionals (Gabovitch & Curtin, 2009). Even in educational settings with public funding, the cost of serving children with ASDs is enormous, and little funding is provided for additional services (Shattuck & Grosse, 2007). Finally, a challenge of implementing FCC is that the multiple systems within which the child is involved (e.g., multiple professionals) are often unconnected, such that often professionals may recommend different interventions or services, but not have the time or ability to follow-through to see if the family implemented the recommendation (Gabovitch & Curtin, 2009).

Professionals improve care for children with ASDs and their families by utilizing a FCC approach. To this point, the construct of FCC has not been examined extensively in professionals working with children with ASDs. Given the emphasis of this domain within the evidence-based practice framework, more information is needed on the factors that contribute to increased use of FCC (e.g., professional's attitudes; Wagner, 2005; Gabovitch & Curtin, 2009).

Measurement of professionals' FCC practices and perspectives. A number of measures have been developed to assess the construct of FCC from professionals' perspectives and parents' perspectives. A selection of these measures is reviewed in Dunst et al. (2007) and Dempsey and Keen (2008). None of these measures has been developed for use specifically in professionals who work with children with ASDs, and few have adequate reliability and validity information published (Woodside, Rosenbaum, King, & King, 2001). One measure, the *Measure of Processes of Care for Service Providers* (*MPOC-SP*; Woodside, Rosenbaum, King, & King, 2001) has published psychometric data and been used to assess the self-reported FCC behaviors of professionals working in pediatric disability and rehabilitation settings. This measure was selected for this study to assess FCC in professionals working with children with ASDs, and is described in greater depth in the Method section.

Some research has examined psychological constructs as predictors of FCC behavior in professionals. For instance, King and colleagues (2003) developed a *Measure of Beliefs about Participation in Family-Centered Service (MBP-FCS*) to examine particular beliefs about FCC. They found that professionals' reported beliefs (beliefs about family-centered philosophy and principles, positive and negative outcomes, personal competencies, and barriers) were all significantly correlated with self-reported FCC behavior on the MPOC-SP. While King et al. (2003) mention constructs similar to those of the Theory of Planned Behavior (e.g., attitudes; Ajzen, 2005) in their discussion of measure development, this measure is not derived from a specific theoretical model. Additionally, this measure is not specific to children with ASDs. This study uses a measure based on the TPB to assess professionals' perspectives of FCC.

Professional Clinical Expertise

The last element of evidence-based practice is clinical expertise (APA Presidential Task Force on Evidence-Based Practice, 2006). The components of clinical expertise differ depending on the professional discipline being discussed (e.g., physicians versus psychologists). Globally, clinical expertise refers to the individual possessing a set of competencies deemed important to high-quality performance within their professional discipline. According to the APA Presidential Task Force on Evidence-Based Practice (2006, p. 276):

> "Experts recognize meaningful patterns and disregard irrelevant information, acquire extensive knowledge and organize it in ways that reflect a deep understanding of their domain, organize their knowledge using functional rather than descriptive features, retrieve knowledge relevant to the task at hand fluidly and automatically, adapt to new situations, self-monitor their knowledge and performance, know when their knowledge is inadequate, continue to learn, and generally attain outcomes commensurate with their expertise."

Clinical expertise may be difficult to quantify but is an important component of practice with children with ASDs (Mesibov & Shea, 2010a). Clinical expertise is not a variable directly or objectively assessed in this study due to the study's self-reported nature and the specifics of this domain are not elaborated upon further here. Interested readers are directed to APA Presidential Task Force on Evidence-Based Practice's publication on evidence-based practice in psychology (2006) and Sackett et al.'s (1996) paper on evidence-based practice in medicine for further discussions of clinical expertise.

Research on Professionals Providing Services for ASDs

The previous section outlined details about the two dependent variables of interest in this study of professionals from different disciplines. This section will briefly present and discuss a selection of the current literature on professionals working with children with ASDs. While professionals providing services are an important piece of the ASD intervention puzzle, in general, there is a lack of research specifically focused on professionals.

Some research has addressed ASD knowledge and treatment beliefs within and between particular disciplines. Studies have found that professionals across disciplines differ in both their knowledge about ASDs and their beliefs about ASDs (Heidgerken, Geffken, Modi, & Frakey, 2005; Stone, 1987). Research has highlighted professionals' misconceptions in knowledge about social, emotional, and cognitive aspects of ASDs (Heidgerken et al., 2005; Helps, Newson-Davis, & Callis, 1999; Stone & Rosenbaum, 1988; Stone, 1987). Other studies have looked at various psychological constructs and practices within specific disciplines. For instance, work has been done on the beliefs and use of ASD interventions in BCBAs (Schreck & Mazur, 2008), knowledge and training on ASDs in SLPs (Schwartz & Drager, 2008), knowledge and beliefs about ASDs in social workers in the United Kingdom (Preece & Jordan, 2007), knowledge of ASDs and perspectives on services in nurses in Nigeria (Bakare et al., 2009), practices used to treat children with ASDs by early intervention providers (Stahmer, Collings, Palinkas, 2005), and perspectives of therapists regarding serving children with ASDs in community mental health settings (Brookman-Frazee et al., 2011).

Few of these studies have addressed professionals' reported behaviors in clinical practice. With the exception of one recent study (Brookman-Frazee, Drahota, & Stadnick, 2012), there is little information on the dissemination and implementation of evidence-based interventions in community settings. Brookman-Frazee et al. (2012) describe a pilot study testing the feasibility and preliminary findings of training therapists in community mental health clinics to use evidence-based strategies with children with ASDs to reduce challenging behaviors. The intervention (*An Individualized Mental Health Intervention for Children with ASD; AIM HI*) includes a range of focused intervention practices that have demonstrated efficacy (e.g., functional behavioral assessment, self-management, etc.; NAC, 2009). Brookman-Frazee and

colleague's (2012) study is one of the first to address the dissemination and implementation of these evidence-based strategies to community practitioners. In general, there is little indication in the literature whether community professionals (across disciplines) are aware of and are using EBIs. A selection of the current research on professionals who work with children with ASDs is summarized in Table 2.

Table 2

Selection of research on professionals working with children with ASDs, by publication year

Citation	Purpose of study	Disciplines or professions included	*N*	Findings and Limitations (in relation to current study)
Stone (1987)	-Assess knowledge and beliefs of different professionals about autism via The Autism Survey; -Compare professionals' beliefs to those of specialists	-Clinical psychologists -Pediatricians -School psychologists -Speech/language pathologists (SLP)	239	**Findings**: -Specialists' views were consistent with research literature -Individual disciplines exhibited misconceptions about autism, compared to specialists -Diagnostic criteria used was different between groups **Limitations**: -Convenience sample -Does not address intervention practices predictors of practices -Does not address family-centered care -Does not compare disciplines to one another (instead, compared each discipline to specialists) -Autism Survey is now outdated (per personal communication with Wendy Stone, 2011)
Stone & Rosenbaum (1988)	-Assess knowledge and beliefs about autism in teachers and parents of children with ASDs (via The Autism Survey; Stone, 1987) -Compare teachers' and parents' beliefs to those of specialists	-Teachers -Parents	94	**Findings:** -Parents and teachers exhibited misconceptions about autism, compared to specialists -Parents and teachers held discrepant beliefs from one another **Limitations:** -Convenience sample -Does not address intervention practices predictors of practices -Does not address family-centered care -Does not compare disciplines to one another (instead, compared each discipline to specialists) -Autism Survey is now outdated (per personal communication with Wendy Stone, 2011)

Table 2 continues.

Table 2., continued.

Selection of research on professionals working with children with ASDs, by publication year

Citation	Purpose of study	Disciplines or professions included	N	Findings and Limitations (in relation to current study)
Helps, Newsom-Davis, Callias (1999)	-Assess knowledge and beliefs about autism in educators of children with ASDs (via The Autism Survey; Stone, 1987) -Compare findings with 'control' group (i.e., mental health professionals working in field of autism)	-Teaching and support staff	72	**Findings**: -Teachers and support staff held many different beliefs about autism than mental health professionals -Most participants had received little to no training on autism and desired more **Limitations**: -Small non-US convenience sample -Autism Survey is now outdated (per personal communication with Wendy Stone, 2011) -Analyzed each item of survey as independent variable without using Bonferroni corrections -Does not directly assess intervention practices predictors of practices -Does not address family-centered care
Heidgerken, Geffken, Modi, & Frakey (2005)	-Extend research knowledge and beliefs about autism in professionals working with children with ASDs (via The Autism Survey; Stone, 1987) -Compare professionals' beliefs to those of specialists	-Psychiatrists -SLPs -Clinical psychologists -Primary health care providers	111	**Findings:** -All disciplines exhibited adequate knowledge of DSM-IV criteria -Individual disciplines exhibited different perceptions about prognosis, course, and treatment of ASDs than specialists, especially primary health care providers **Limitations:** -Convenience sample -Analyzed each item of survey as independent variable without using Bonferroni corrections -Does not directly assess intervention practices predictors of practices -Does not address family-centered care

Table 2 continues.

Table 2., continued.

Selection of research on professionals working with children with ASDs, by publication year

Citation	Purpose of study	Disciplines or professions included	N	Findings and Limitations (in relation to current study)
Stahmer, Collings, & Palinkas (2005)	-Outline provider self-reports of the use of interventions via focus groups (qualitative)	-Primary service providers or supervisors of early-intervention programs	22	**Findings**: -Providers reported using EBIs and non-EBIs -Few providers showed knowledge of EBIs -Providers reported lack of training **Limitations**: -Small convenience sample (non-national) -Uses qualitative approach to data collection to collect quantitative data -Does not include multiple disciplines
Bakare, Ebigbo, Agomoh, & Menkiti (2008)	-Assess knowledge of autism in health workers in Africa using the Knowledge about Childhood Autism Among Health Workers (KCAHW)	-Psychiatric nurses	50	**Findings**: -KCAHW demonstrated adequate test-retest reliability and internal consistency -KCAHW may be used as measure to assess "baseline knowledge" of childhood autism and the impact of continuous education **Limitations**: -Small non-US convenience sample -Does not address intervention practices predictors of practices -Does not address family-centered care -Does not include multiple disciplines
Hess, Morrier, Heflin, & Ivey (2008)	-Identify strategies used in education with children with ASDs via the Autism Treatment Survey in Georgia	-Educators in Georgia	185	**Findings:** -Top five strategies identified as being used were not evidence-based -Choice of strategies varies based on grade level and classroom type -More training desired by professionals **Limitations:** -Does not include multiple disciplines -Does not assess predictors of intervention practice -Does not address family-centered care

Table 2 continues.

Table 2., continued

Selection of research on professionals working with children with ASDs, by publication year

Citation	Purpose of study	Disciplines or professions included	N	Findings and Limitations (in relation to current study)
Schreck & Mazur (2008)	-Assess beliefs, endorsement, and use of scientifically supported and unsupported treatments for people with autism in a national sample of BCBAs	-Board Certified Behavior Analysts (BCBAs)	467	**Findings**: -BCBAs endorsed and used ABA-related treatments most frequently -BCBAs used other treatments (e.g., CAMs) despite beliefs that these treatments are difficult to implement, not cost effective, and not supported by research **Limitations**: -Convenience sample -Does not address family-centered care -Does not include multiple disciplines
Schwartz & Drager (2008)	-Assess knowledge and training regarding ASDs in speech-language pathologists (SLPs) -Assess SLPs confidence in providing services to children with ASDs	-SLPs	67	**Findings:** -SLPs had accurate knowledge of characteristics of children with autism -SLPs had mixed perceptions about diagnostic criteria of autism -Little ASD training has been provided to SLPs; some SLPs lack confidence in abilities to provide services to children with ASDs **Limitations:** -Mixed sampling methods not laid out a priori -No psychometrics provided on survey -Small sample; low response rate -Does not address intervention practices predictors of practices -Does not address family-centered care -Does not include multiple disciplines

Table 2 continues.

Table 2., continued.

Selection of research on professionals working with children with ASDs, by publication year

Citation	Purpose of study	Disciplines or professions included	N	Findings and Limitations (in relation to current study)
Golnik & Ireland (2009)	-Assess physician's reported practices regarding CAM treatments in children with ASDs and other childhood disorders in a random national sample	-Physicians (pediatricians, family medicine)	539	**Findings**: -Reports on which CAMs physicians encourage/discourage -Descriptive information regarding physicians who recommend CAMs -Descriptive information regarding barriers to treatment between autism and other childhood conditions from physicians' report **Limitations**: -Does not include multiple disciplines -Does not assess intervention practices or predictors of practices
Brookman-Frazee, Drahota, Stadnick, & Palinkas, (2011)	-Examine therapist perspectives on serving children with ASDs	-Marriage and Family Therapy (MFT) represented 61% of the sample followed by 18% Social Work, 13% Psychology, and 8% Psychiatry.	100	**Findings:** -Therapists perceive serving this population as challenging and frustrating due to limited training. -Therapists are highly motivated for comprehensive ASD training on ASD characteristics and intervention strategies. **Limitations:** -Measures not guided by established theory -Includes multiple disciplines, but excludes others (e.g., education) -Convenience sample -Does not address family-centered care
Brookman-Frazee, Drahota, & Stadnick (2012)	-Examine feasibility, acceptability, preliminary outcomes of training therapists to deliver a package of EBI strategies for children with ASD	-Therapists in community mental health clinic	13	**Findings:** -Therapists delivered intervention with fidelity, perceived the intervention strategies as useful. --Parents participated in almost all sessions -Meaningful reductions in child problem behaviors occurred over 5 months **Limitations:** -Small N -Does not examine how perspectives on EBIs may contribute to therapist perceptions of EBIs and fidelity of implementation of EBIs.

ASD professionals: Limitations of the current research. There are a number of limitations within the current body of research on professionals working with children with ASDs. Most of the studies completed with professionals are convenience samples. The limitation of using only convenience samples of professionals (e.g., those professionals available at a particular hospital or clinic) is that little information is known about how responders may differ from other populations of professionals who did not participate in the research. There are methodological drawbacks to not knowing how many individuals were contacted for the research and how many participated (e.g., the potential external validity or generalizability of the data).

In addition, per a personal communication with *The Autism Survey*'s creator, Dr. Wendy Stone (Feb. 18, 2011), the version of the knowledge survey used in many of these studies is now outdated, relying on DSM-III criteria for ASDs. While one research group headed by Dr. Naomi Swiezy (personal communications with Dr. Swiezy, Feb. 23, 2011, and Dr. Wendy Stone, Feb. 18, 2011) is working on updating this survey, no published studies have been released utilizing this updated measure. While *The Autism Survey* in its original version has demonstrated adequate reliability and validity in assessing knowledge of service providers (Campbell, Reichle, Van Bourgondien, 1996), it does not directly assess intervention practices or psychological constructs related to the practices of professionals.

A limitation of the current research is an overall lack of studies focused on ASD professionals' practices. We have little information on the extent to which evidence-based practices have been disseminated to the average professional working with children with ASDs. Also, existing studies focus solely on one discipline (e.g., SLPs; Schwartz & Drager, 2008). Little is known about evidence-based practices for ASDs across professional disciplines. With few notable exceptions (e.g., Schreck & Mazur, 2008), most studies utilizing samples of

professionals also do not address interventions for ASDs. In addition, no studies were identified that examined FCC in professionals working with children with ASDs. Further, no studies identified have sought to examine the relationship between psychological constructs and professionals' practices.

Summary

From a chronic disorder care and ecological systems perspectives, better care for conditions such as ASDs occurs when the family has a supportive team of professionals with whom to discuss options for efficacious interventions and who involve the family in the child's care. Professionals working with children with ASDs must balance different components evidence-based practice (EBI and FCC) in working with children with ASDs and their families. The current body of research on professionals working with children with ASDs does little to illuminate psychological factors related to professionals' evidence-based practice behaviors.

The Theory of Planned Behavior (TPB): Assessing Psychological Constructs Underlying Behavior

Predicting and understanding human behavior is a complex endeavor that has received a great deal of focus in the psychological literature. The Theory Planned Behavior (TPB) developed out of the Theory of Reasoned Action (e.g., Fishbein & Ajzen, 1975) and was designed to predict individuals' behavior in particular contexts (Ajzen, 1991, 2005). Over the past 30 years, research on many behaviors has supported the link between the psychological constructs of the TPB and self-reported and observable behavior (Ajzen, 1991, 2005; Armitage & Conner, 2001). Francis and colleagues (2004. p. 2) outline that the TPB is the "explicit theoretical basis for 222 studies published in the Medline database, and 610 studies published in the PsycINFO database, from 1985 to January 2004."

According to the TPB, an individual's behavior can be predicted from their intentions to engage in the behavior, as intentions are "close antecedents of overt actions" (Ajzen, 2005, p. 101). Intention (i.e., motivation) to perform a behavior and the behavior itself are functions of three factors: the individual's *attitude* toward the behavior (personal domain), perceived *subjective norms* around the behavior (social domain), and *perceived behavioral control* (control domain; Ajzen, 2005). In this way, behavioral intentions are thought of as mediators between the other factors of the TPB and behavior (Baron & Kenny, 1986). Given that this study is the first step in examining the applicability of the TPB in predicting the behavior of professionals, the primary aim of the study is to assess the relationship between TPB factors and behavior. Future work may focus on the role of intentions as mediating the relationship between TPB predictors and behavior, but this question of mediation is beyond the scope of the current study[6]. Future research may focus on investigating the mediating role of behavioral intention.

The TPB framework is useful to consider in the case of professionals' behavior around autism interventions. Francis and colleagues (2004) have noted that making changes to significant TPB predictors of behavior can increase the likelihood that a person will *intend* to do and actually perform a desired behavior (in this case recommending/providing EBIs and using a FCC approach to care). The TPB provides a useful theory-based framework for investigating professionals' "uptake" of desirable practices (Francis et al., 2004, pp. 2, 7). The goal of this study is to assess the usefulness of the TPB in predicting professionals' self-reported EBI and FCC behavior. It also aims to understand to what extent professional discipline moderates the

[6] In Ajzen's (1991, 2005) conceptualization of the Theory of Planned Behavior, behavioral intentions are considered to be important as they may mediate the relationship between attitudes, subjective norms, and perceived behavioral control, and actual behavior (Baron & Kenny, 1986). Intentions to perform behavior, or motivation to perform a behavior, may also be used as a proxy measurement for behavior. Introduction of a mediator such as intentions is often done after a strong relationship has already been established between a predictor and an outcome. A mediator may help to elucidate the mechanisms underlying this relationship (Baron & Kenny, 1986; Frazier, Tix, & Barron, 2004).

relationship between TPB factors and self-reported behavior. While the TPB model has been consistently shown to be a sophisticated theoretical approach to understanding behavior (Armitage & Conner, 2001; Francis et al., 2004), no studies have yet examined the usefulness of the TPB for understanding professionals' behavior in practice with children with ASDs. The TPB can be useful in designing strategies to help professionals and clinicians to increase performance of desirable practices. Enhancing professionals' attitudes, subjective norms, or perceived behavioral control regarding EBI and FCC is likely to increase compliance with guidelines (e.g., Francis et al., 2004) if these are significant predictors of self-reported behavior.

According to the TPB, the relative predictive value that the constructs of attitude, subjective norms, and perceived behavioral control may have for the intention to perform a behavior and a behavior itself depends on the idiosyncrasies of the behavior and situation (Ajzen, 2005). As such, for a certain behavior, attitudes may hold the greatest predictive value for the behavior, while for other behaviors, it may be that a combination of the three predictors independently contributes to influence the performance of the behavior (Ajzen, 2005). Each of the TPB factors also has a corresponding salient antecedent belief (i.e., behavioral, normative, and control beliefs), theorized to contribute to the factor. Ajzen (2005) considers these antecedent beliefs to be the primary determinants of a person's intentions and actions. Descriptions of each TPB factor and corresponding antecedent belief follow.

Attitudes. A person's *attitude* towards a behavior refers to the degree to which the person has a favorable or unfavorable evaluation of doing the behavior (Francis et al., 2004; Ajzen, 2005). Attitudes are influenced by *behavioral beliefs*, or those beliefs about the consequences of the behavior (e.g., the outcomes that the person links the behavior to, such as the cost or benefit of the behavior). For instance, a professional who *believes* that using a family-

centered care approach (a behavior) leads to increased patient satisfaction and adherence (a consequence) will likely have a more positive evaluation of FCC (i.e., more positive attitude toward FCC) according to this framework. However, a professional who believes that using evidence-based interventions (a behavior) reduce the "art" of clinical work (a consequence) will likely have a poorer evaluation of EBI (i.e., attitude toward EBI).

Subjective norms. Subjective norms regarding a behavior refer to a person's perception of the social pressure to perform or not perform the behavior (Ajzen, 2005; Francis et al., 2004). Subjective norms are influenced by *normative beliefs*, or beliefs that specific individuals or groups approve or disapprove of performing the behavior, or that these specific individuals themselves engage or do not engage in the behavior (Ajzen, 2005). For instance, if a professional believes that her supervisor (a social referent) approves of the professional utilizing EBIs in her practice (a normative belief), the professional is more likely to have a perception of social pressure from the supervisor to use EBIs (a subjective norm).

Perceived behavioral control. Perceived behavioral control refers to whether a person feels in control of the behavior in question, and the perception of the ease or difficulty (i.e., capacity) of performing the behavior (Francis et al., 2004; Ajzen, 2005). Ajzen (1991) has compared this concept to Bandura's (1982) concept of *perceived self-efficacy*, meaning how well an individual feels she can perform a particular behavior. Perceived behavioral control is influenced by *control beliefs*, or those beliefs about the presence or absence of resources and opportunities necessary for the behavior to occur. The presence of adequate resources and opportunities facilitate performance of the behavior, while the absence of these factors would impede the performance of the behavior (Ajzen, 2005). For instance, if a professional feels that

he has received adequate training on how to use a FCC approach (a control belief), he will likely feel more in control of integrating FCC into his practice (perceived behavioral control).

Clarifying terminology: 'Beliefs' versus 'attitudes.' While the terms 'beliefs' and 'attitudes' are often used interchangeably in the literature (e.g., King et al., 2003), these two terms have separate meanings within the TPB. Beliefs represent the *information* that people have about a certain object or concept and the subjective probability of the *relationship* between the object/concept that is the subject of the belief and some other value or attribute (Fishbein & Ajzen, 1975). Beliefs about an object/concept provide the basis of forming an attitude toward the object or concept (e.g., the behavior). Attitudes refer to the subjective evaluation of an object or concept (e.g., perceiving a behavior as "good" or "bad"; Fishbein & Ajzen, 1975). Beliefs, and subsequently attitudes, can be, but are not necessarily, impacted by background (e.g., demographic) factors. Consideration of background factors as variables in a study should be taken based on current theoretical and empirical relevance of the factors, as there are limitless background factors to potentially include across a number of domains (e.g., across personal, social, and information domains; Ajzen, 2005). According to Ajzen (2005, p. 134), background factors "are not part of the planned behavior model but can complement it by identifying relevant background factors and thereby deepen our understanding of a behavior's determinants." The current study includes and controls for relevant background variables (see Results section).

Measurement of TPB factors. Understanding the significant predictors related to these desirable features of care and treatment provision will help us to understand domains to target to improve professionals' openness to implementing and recommending these variables. Ajzen (n.d.) provides a manual (*Constructing A Theory Of Planned Behavior Questionnaire*) for creating measures of TPB constructs. Francis and colleagues (2004) have developed a manual

(*Constructing Questionnaires Based on the Theory of Planned Behaviour: A Manual for Health Services Researchers*) for creating TPB questionnaires for health service researchers and provide detailed instructions on creating different types of TPB questionnaires. These manuals were utilized in this study to develop the two TPB measures used in this study (see Method section).

Dissertation Study: Model, Aims, and Hypotheses

This study aims to assess the contribution of TPB predictors to professionals' self-reported behaviors in working with children with ASDs on two dependent variables: (a) self-report on overall recommendation/provision of evidence-based interventions, and (b) self-reported use of a family-centered care approach. Stated another way, I am interested in whether there is a main effect of attitudes, subjective norms, and perceived behavioral control in predicting professionals' self-reported behavior. If this is the case, and TPB variables predict self-reported behavior, I am interested in understanding whether these TPB variables operate differently for different disciplines.

Path diagrams can be helpful in clarifying hypothesized relationships between variables (Figure 3 and Figure 4; Jaccard, Guilamo-Ramos, Johansson, & Bouris, 2006). These figures reflect two ways of depicting the same hypothesized relationships (Baron & Kenny, 1986; Jaccard et al., 2006). In each figure, hypothesized relationships under examination in this study are outlined using straight, solid arrows (path 'a' and path 'c'), such that a causal link between them is assumed and will be tested in this study. In terms of examining main effects, TPB variables are the "cause" and self-reported behavior (EBI or FCC) is the "effect" (e.g., Jaccard et al., 2006).

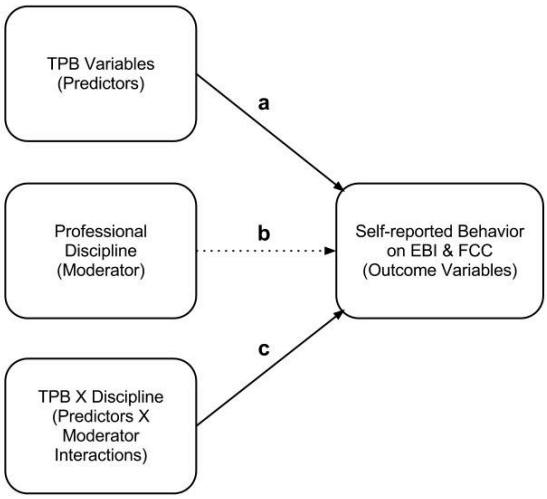

Figure 3. Path diagram of potential main and interaction effects (e.g., Baron & Kenny, 1986).

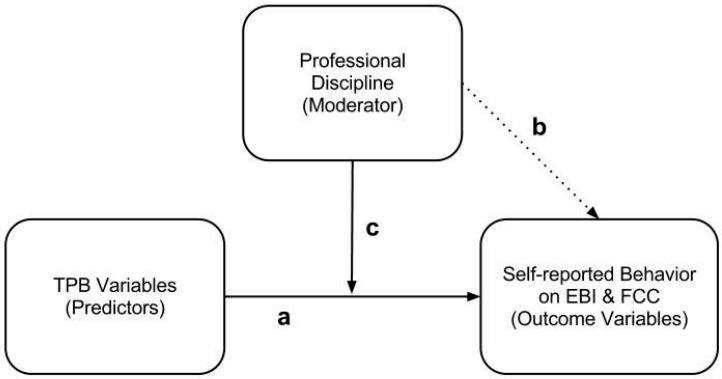

Figure 4. Moderated relationship in a path diagram (e.g., Jaccard, Guilamos-Ramos, Johansson, & Bouris, 2006).

In each figure, path 'a' (the straight, solid arrow emanating from TPB variables and towards self-reported behavior) reflects the direction of this effect between TPB variables (attitudes, subjective norms, and perceived behavioral control) and self-reported behavior. In each figure, there is also a dotted arrow (path 'b'), which indicates that there may be a causal relationship (i.e., between Discipline and self-reported behavior), but that, based on current theory and the focus of this study, a specific hypothesis is not made about this relationship (although it may be explored in the context of analyses that are aimed at testing study hypotheses). The question of whether TPB variables predict self-reported behavior is a question that lends itself well to analysis via multiple regression.

If path 'a' is found to be significant using multiple regression analyses, a secondary question arises: given evidence for an association between TPB predictors and self-reported behavior, is the association between TPB predictors and self-reported behavior similar across the different disciplines in question? This is a question of moderation. A preferred method for conducting group comparisons is by treating group as a moderating variable and running a hierarchical multiple regression analysis, where the interaction between the moderator and the predictors of interest are included as a component of the model (Jaccard & Turrisi, 2003). This approach was selected for this study and is discussed further in the Results section.

Moderators[7] aim to isolate differential effects of predictors on outcomes; they aim to explain "'for whom' a predictor is more strongly related to an outcome" (Frazier, Tix, & Baron, 2004, p. 116). Information on whether the TPB variables "work better" in explaining self-reported behavior for one discipline than the others would be very useful. If the relationship

[7] The issue of moderation is often confused with that of mediation (Baron & Kenny, 1986). A mediator explains the relationship between a predictor and an outcome (Frazier et al., 2004). A full discussion of the issue of mediation is beyond the scope of this dissertation, but the interested reader is directed to Baron and Kenny (1986) and Frazier et al. (2004) for a helpful review of this concept and its applications.

between each TPB variable and self-reported behavior changes as a function of discipline (i.e., the relationship is different across the disciplines), this would have implications for how these variables might be used differently to inform professional guidelines/training across disciplines.

Aims and hypotheses. The specific aims and hypotheses for the current study are listed here. All measures are described in detail in the Method section.

AIM 1: An aim is to explore and describe professionals' self-reported rates of recommending/providing EBIs for children with ASDs, across professional disciplines.

AIM 2: An aim is to determine whether constructs from the TPB are predictive of professionals' self-reported recommendation/provision of EBIs with children with ASDs. This main effect is diagrammed in Figure 3 and Figure 4 as path 'a.' In addition, an aim is to explore the main effect of Discipline (path 'b') after controlling for covariates and TPB predictors. Finally, an aim is to explore the main effects of covariates in explaining EBI behavior.

- **Hypothesis 1.** Attitudes, subjective norms, and perceived behavioral control surrounding recommending/providing EBIs for children with ASDs will each significantly ($p<.05$) predict professionals' self-reported overall recommendation/provision of evidence-based interventions, after controlling for relevant covariates and for professional discipline membership. This hypothesis is examined using hierarchical multiple regression.

AIM 3: If there is support for Hypothesis 1, and TPB variables significantly predict self-reported behavior, an aim is to assess whether the strength of the effect of TPB variables on self-reported EBI behavior differs for each of the disciplines compared with the "average professional" in the sample. Stated another way, an aim is to see whether the strength of

association between TPB variables and self-reported EBI behavior change as a function of the moderator variable, Discipline. This is diagrammed in Figure 3 and Figure 4 as path 'c.'

- **Hypothesis 2.** Professional discipline membership will moderate the relationship between TPB predictors and self-reported recommendation/provision of EBIs, such that the association between TPB constructs and behavior will be different for participants from different disciplines when compared to the sample mean. This hypothesis is examined using hierarchical multiple regression using interaction terms (product of Discipline by TPB predictors). The moderator hypothesis is supported if the interaction step in the regression (path 'c') is significant.

AIM 4: An aim is to explore and describe professionals' self-reported use of a family-centered care approach with children/youth with ASDs, across professional disciplines.

AIM 5: An aim is to determine whether constructs from the TPB are predictive of professionals' self-reported use of a family-centered care approach with children/youth with ASDs. This main effect is diagrammed in Figure 3 and Figure 4 as path 'a.' In addition, an aim is to explore the main effect of Discipline (path 'b') after controlling for covariates and TPB predictors. Finally, an aim is to explore the main effects of covariates in explaining *FCC-Behavior*.

- **Hypothesis 3.** Attitudes, subjective norms, and perceived behavioral control will each significantly ($p<.05$) predict professionals' self-reported family-centered care practices, after controlling for relevant covariates and professional discipline membership. This hypothesis is examined using hierarchical multiple regression.

AIM 6: If there is support for Hypothesis 3, and TPB variables appear to significantly predict self-reported behavior, an aim is to assess whether the strength of the effect of TPB

variables on self-reported FCC behavior differs for each of the disciplines compared with the "average professional" in the sample. Stated another way, an aim is to see whether the strength of association between TPB predictors and self-reported FCC behavior change as a function of the moderator variable, Discipline. This is diagrammed in Figure 3 and Figure 4 as path 'c.'

- **Hypothesis 4:** Professional discipline membership will moderate the relationship between TPB predictors and self-reported use of an FCC approach to care, such that the association between TPB constructs and behavior will be different for participants from different disciplines when compared to the sample mean. This hypothesis is examined using hierarchical multiple regression using interaction terms (product of Discipline by TPB predictors). The moderator hypothesis is supported if the interaction step in the regression (path 'c') is significant.

Method

Overview

The Method section will describe study participants (inclusion criteria, demographics, etc.). Explanation of the development of the measures in the survey will follow. For each measure, information on how it was constructed (if applicable) and scored will be covered. Next, the procedures used in the study will be described, including the sampling approach utilized and recruitment procedures for each of the samples. Measure psychometrics, data preparation, and analyses are covered in the Results section.

Participants

Inclusion and exclusion criteria. Participants (N = 709) were professionals recruited from multiple disciplines who provide services to children/youth (aged 0-18 years) with ASDs.

The term ‘professionals’ refers to those individuals who self-identified as having received specific training and a degree in their professional discipline that is commensurate with the expectations of the discipline (e.g., receiving a M.Ed. in special education or a M.D. in medicine).

Discipline groups were combined based on similarities in primary focus when working with children with ASDs, as outlined in the Literature Review. For instance, OTs and PTs are both involved in addressing sensory and motor challenges of children with ASDs. These combinations were made so that it was possible to include responses of each of the participant groups who filled out the survey, honoring the time and effort they took in participating (certain groups, such as physical therapists, $n = 15$, would have been difficult to include on their own due to small group *n*’s). The number of participants from each discipline were: (a) education (including behavioral specialists), $n = 157$; (b) medicine and nursing, $n = 108$; (c) occupational therapy and physical therapy, $n = 100$; (d) psychology, $n = 163$; (e) social work, $n = 52$; and (f) speech language pathology and audiology, $n = 129$.

A total of 753 participants submitted their responses for the study. In addition to these 753 participants, there were 398 blank or nearly-blank records created that were not submitted. This indicates that a person opened the survey (which creates a record), but then did not complete the survey. The survey software (REDCap, Research Electronic Data Capture) experienced multiple unpredicted server disruptions during the data collection period due to a series of unplanned “firewall adjustments” (per personal communication with Mike Tran at VCU REDCap, February 7, 2012). It is impossible to tell whether these 398 records were due to: a) being “kicked out” of the system during the server disruptions; or b) a participant quitting the survey voluntarily after opening the survey.

Also, when using Internet surveys, there is the potential for data submission problems (e.g., pressing "Submit" two times may submit duplicate records of the survey). A duplicate case analysis using SPSS 19.0 indicated that of the 753 submitted responses, 37 were duplicate cases; these were removed. Six cases were removed due to the participants being from disciplines that were not being recruited from (n = 5; e.g., genetic counselors) or due to the person not being from the United States (n = 1). There was one person with an Associate's degree in the sample, and this person was also removed for a final sample size of 709.

Power analysis. An *a priori* power analysis was completed to calculate the number of cases needed to detect effects comparable in size to past studies on the TPB. G*Power 3.1 was used to conduct the power analysis (Faul, Erdfelder, Lang, & Buchner, 2007; Faul, Erdfelder, Buchner, & Lang, 2009). An R^2 estimate from a meta-analysis examining the predictive value of the TPB for self-reported behaviors has been cited to be .31, a moderate effect size (Armitage & Conner, 2001). This R^2 estimate was entered into G*Power 3 to calculate Cohen's f^2 statistic (f^2 = .45). This effect size (a moderate effect size; Ferguson, 2009) was entered into G*Power 3, as was the conventional power statistic (1-β, or 0.80, which is consistent with Cohen's 1992 recommendations for necessary power), and the estimated number of predictor variables.

It was estimated that there would be 42 variables for the EBI analyses and 36 variables entered into the FCC analyses[8]. These values were entered into G*Power 3. Findings from this power analysis indicated that at least 96 participants for the EBI analyses were needed and at least 88 participants for the FCC analyses were needed to detect a moderate effect, if the

[8] This includes: one design covariate (Sample), two to three background covariates (Training in FCC/EBI, Years in Practice, Unfamiliarity [only EBI analyses]; see Results section for how these covariates were selected), three TPB predictors (Attitudes, Subjective Norms, Perceived Behavioral Control), five effects-coded Discipline variables (*groups*-1; Cohen, Cohen, West, & Aiken, 2003), fifteen interaction variables testing the moderating effect of Discipline (representing the product of effects-coded Discipline variables and each TPB predictor, 5x3 = 15), and ten (FCC) or fifteen (EBI) covariate interactions (per recommendations in Frazier et al., 2004).

regression coefficients for each of the predictors were examined individually. The possibility of future studies being conducted on the database was anticipated *a priori*; it is important to note that I aimed to collect a larger sample size than estimated above to accommodate the potential for future studies on other subsets of data. *A priori*, I aimed to collect data from at least 300 participants. This sample size is consistent with recommendations for sample and group size in exploratory survey (e.g., Fowler, 1993; Dillman, Smyth, & Christian, 2009) and normative (e.g., Bridges & Holler, 2007) research.

Participant demographics[9]. Eighty-six percent (n = 608) of the participants were female. The age of the participants ranged from 23 to 73 years old (M = 39.18 years; SD = 11.61 years). Most participants (n = 591; 83.36 %) endorsed having licensure or certification in their professional discipline. The average number of years in practice was 11.10 (SD = 9.55) years. Participants endorsed providing services to an average of 37.42 (SD = 57.49) children/youth with ASDs over the past year (range: 1 to 300)[10]. Participants lived within the United States (48 states and Washington DC). Table 3 summarizes the demographic characteristics of the study participants[11].

[9] Note: Some demographic data were missing. The procedures for dealing with missing data (i.e., multiple imputation) are outlined in detail in the Results section. The demographic characteristics reported in this section represent pooled or averaged values across the 10 multiple imputations. Standard deviations were calculated from the pooled value for Standard Error of the Mean (SE=SD/(√N); Field, 2005), as SPSS does not provide pooled standard deviations. In this section, we used the FCC imputation dataset to calculate demographics.

[10] Generally, if the sample sizes are larger than 80 cases, a case is an outlier if its standard score (z-score) is ±3.0 or beyond. By examining z-scores calculated for age, years in practice, and number of children provided services to, it was determined that there were outliers (e.g., eight participants endorsed serving 500-1000 children in the past year; two individuals endorsed being 74 years of age; and four individuals endorsed being in practice for between 40-44 years). Osborne (2013) recommends that these extreme values were subjected to Windzorization (shrinking the outliers to the outlier threshold) *prior* to multiple imputation, as outliers can have consequences for the performance of multiple imputation. The ranges presented for these three variables represent the range after the Windzorization correction was completed.

[11] Values reflect pooled estimates across the 10 multiple imputation datasets (see the Missing Data section in the Results section and Appendix E for a discussion of multiple imputation procedures).

Table 3.

Demographic characteristics of participants (N = 709)

Characteristic	*n*	%
Discipline		
1. Education (*n*=157; 22.10%)		
Special-education or classroom teacher	65	9.20
Educational diagnostician	2	0.30
Principal or Assistant principal	3	0.40
BCBA/ ABA Specialist or Behavioral/educational Consultant	54	7.60
Other Educational Professional (e.g., Family Support Specialist)	33	4.70
2. Medicine/Nursing (*n*=108; 15.23%)		
Developmental/behavioral Pediatrician	25	3.53
Pediatrician	34	4.80
Neurologist	4	0.56
Psychiatrist	6	0.85
Naturopathic Physician	6	0.85
Other Physician	13	1.83
Nurse Practitioners/Nurses	20	2.82
3. Occupational/Physical Therapy (*n*=100; 14.10%)		
Occupational Therapist	85	11.99
Physical Therapist	15	2.12
4. Psychology (*n*=163; 22.99%)		
Clinical Psychologist	113	15.94
School Psychologist	26	3.67
Other Psychologist (e.g., Counseling)	24	3.39
5. Social Work (*n*=52; 7.33%)		
6. Speech/Language Pathology and Audiology (*n*=129; 18.19%)		
Speech/Language Pathologist	120	16.93
Audiologist	9	1.27
Highest degree completed		
Bachelor's Degree	81	11.42
Master's Degree	371	52.33
Doctoral Degree	257	36.25
Currently a graduate student providing direct services	85	11.99
Race/ethnicity		
American Indian/Alaska Native	5	0.71
Asian/Asian American	26	3.67
Black/African American	14	1.97
Hispanic/Latino	33	4.65
Native Hawaiian/Other Pacific Islander	2	0.28
White/Caucasian	606	85.47
Biracial or Other	23	3.24
Gender		
Female	608	85.75
Male	101	14.25

Table 3., continued.

Demographic characteristics of participants (N = 709)

Characteristic	*n*	%
Type of community where services provided		
Urban	310	43.72
Suburban	324	45.70
Rural	75	10.58
Settings where services provided (**check all that apply)*		
Clinic or Center	262	37.0
Community Service Board	10	1.4
Early Intervention Program	77	10.9
Hospital (community or private)	52	7.3
Hospital (academic/university medical center)	116	16.4
Private Practice	185	26.1
Residential Treatment	39	5.5
School – Public	206	29.1
School – Private	67	9.4
Other Setting	56	7.9
Primarily work with children of this age (**check all that apply)*		
Birth – 2 years	228	32.2
3-5 years	491	69.3
6-11 years	496	70.0
12-18 years	334	47.1
Specialized training completed (**check all that apply)*		
Board Certified Behavior Analyst (BCBA) Certification	88	12.4
Defeat Autism Now! (DAN!)	19	2.7
Denver Model (or Early Start Denver Model)	32	4.5
DIR® or Floortime Model	131	18.5
Discrete Trial Training (DTT)	134	18.9
Leadership Education in Neurodevelopmental and Related Disabilities (LEND)	258	36.4
Pivotal Response Training (PRT)	62	8.7
Relationship Development Intervention (RDI)	51	7.2
SCERTS® Model	72	10.2
Treatment and Education of Autistic and related Communication-handicapped Children (TEACCH)	105	14.8
Other ASD Specialized Training Completed (e.g., ADOS, ADIR, specialized fellowships, etc.)	151	21.3

Note: *Percentages may add up to more than 100% when participants were allowed to "check all that apply."

Measures

Survey instrument. This study utilized a survey design (Shaughnessy, Zechmeister, & Zechmeister, 2006) for data collection. Two versions of the survey instrument were provided to participants: paper and Internet (Appendix A). Study data (in particular, the Internet version of the survey) were collected and managed using REDCap electronic data capture tools hosted at VCU (Center for Clinical and Translational Research [CCTR] and VCU Technology Services grant support [CTSA Award Number UL1RR031990]). REDCap is a secure, web-based application designed to support data capture for research studies (Harris, Taylor, Thielke, Payne, Gonzalez, & Conde, 2009). The survey instrument included sections on demographic variables and measures assessing independent and dependent variables, which will be described in detail in upcoming sections. The questions follow Dillman et al.'s (2009) guidelines for question formats (internet and mail) and were created in consultation with professionals from each of the disciplines represented in this survey.

Survey piloting. The pilot survey instrument was completed by a convenience group of professionals (n = 7). This pilot group included one early childhood special educator (M.Ed.), one occupational therapist (O.T.R./L.), one pediatrician (M.D.), one speech-language pathologist (S.L.P.-C.C.C.), one social worker (L.C.S.W), a master's level graduate student in psychology (M.S.), and one psychologist (Ph.D.). All of the professionals in the pilot group met the inclusion criteria for the study (their responses were not included as part of the final dataset).

As a series of measures were created for this study (e.g., TPB measures), it was necessary to receive feedback on the readability and face validity of items in the survey related to specific measures. Feedback was elicited from the pilot group on whether they felt items on each scale measured the construct of interest (in particular the list of interventions) or whether items should

be omitted. Written and verbal feedback was elicited from the pilot group on the feasibility and length of the survey as a whole. Following the suggestions from the pilot group, certain reverse-scored items were changed to positive statements, the items measuring a domain were kept together (as opposed to mixing them up), and items were shortened to avoid repetitiveness. These changes made it faster and simpler to take the survey.

The pilot group reported that the survey took on average 35 minutes to complete (range approximately 20-50 minutes). The survey was revised and shortened significantly. Two psychology doctoral students subsequently reported taking 20-25 minutes to complete the final survey. Some study participants in the final sample left comments indicating that the survey took longer for them to complete than was expected (e.g., 30 minutes or more). This was unanticipated by the researcher after the piloting process; the additional time for some participants may have been due to the length of qualitative responses provided, providing ratings on more interventions, or level of familiarity with online survey software.

Demographic measures. Participants provided demographic information including age, gender, and race/ethnicity. They also provided information on professional training, including: professional discipline; education and degree; years in practice in current discipline; state where they practice currently; number of children with ASDs that they provided services for in the last year; practice settings (e.g., hospital, school, etc.); setting of practice residence (e.g., rural, suburban, rural); and specific training received (e.g., Discrete Trial Training). Participants also responded to questions regarding their training. Specifically, participants provided ratings regarding their training on EBIs (*"In my training, an explicit emphasis was placed on using evidence-based interventions [i.e., interventions based on the best scientific evidence]."*) and their training on FCC (*"In my training, an explicit emphasis was placed on using a family-*

centered care approach [i.e., collaborative partnerships with families and considering individual/family values].") using a 5-point Likert-type scale with the following anchors: 1= "*Strongly Disagree*", 2= "*Disagree*", 3= "*Neutral*", 4= "*Agree*", and 5= "*Strongly Agree*."

Measurement of independent variables. The manuals: *Constructing A Theory Of Planned Behavior Questionnaire* (Ajzen, n.d.) and *Constructing Questionnaires Based on the Theory of Planned Behavior: A Manual for Health Services Researchers* (Francis et al., 2004) was used to construct two TPB measures: *TPB-EBI* and *TPB-FCC.* These measures assessed attitudes, subjective norms, and perceived behavioral control for each behavior in a fashion consistent with previous approaches to measuring TPB factors (Francis et al., 2004; Ajzen, n.d.). The manuals include detailed instructions for assessing relevant TPB psychological (internal) constructs (attitudes, subjective norms, perceived behavioral control) in both direct (i.e., by asking about overall attitudes) and/or indirect (i.e., by asking about underlying behavioral beliefs and outcome evaluations) fashions. As an initial investigation into this field, it is important to assess the usefulness of the TPB for predicting variance in self-reported behavior. Measuring relevant constructs *directly* is the most straightforward way to achieve this goal, as underlying beliefs *may* but do not necessarily contribute to expressed attitudes, subjective norms, etc. As such, a direct approach was chosen for the current study. Items were created by explicitly following the instructions in Francis et al., (2004) and Ajzen (n.d.), which are consistent with Ajzen's (1991, 2005, n.d.) conceptualization of the TPB constructs. Any deviations from this procedure are specifically noted, and detailed psychometric information on the measures is included in the Results section.

TPB-EBI measure*.* The operational definition of EBIs introduced in the Literature Review was provided to participants prior to filling out the TPB measure (synthesized from

Chambless & Hollon, 1998; Chambless & Ollendick, 2001; Reichow, Volkmar, & Cicchetti, 2008). According to Ajzen (n.d.) the behavior of interest must be very clearly defined to be included in TPB measures. This definition and a list of all items can be found in Appendix A (page 10). Per the manuals' instructions, seven-point bipolar adjective scales (such that there are two anchors, one on the high and one on the low end, and seven response options) are recommended for use in assessing TPB constructs (Ajzen, n.d.; Francis et al., 2004). The next three sections discuss TPB-EBI measure development.

TPB-EBI-Attitudes. According to the TPB, the construct of '*attitude'* reflects whether the person is in favor of doing a behavior (Ajzen, 2005). Participants rated six items in a Likert-response format (scores ranging from 1-7) after receiving the stem, "*Recommending and/or providing evidence-based interventions to children with autism is* – ." Anchors at either end of the Likert-type scale include items relevant to the professional (e.g., "*Important (to me)*"/ "*Irrelevant (to me)*"), as well as consequences for the child (e.g., *"Effective*"/ *"Ineffective*"), such that higher ratings reflect a more positive perspective of the target behavior. Previous elicitation studies based on the TPB in professionals have illuminated that both types of attitudes may be relevant for professionals in terms of their practice (e.g., in occupational therapists; Kolehmainen, Francis, & McKee, 2008). Francis et al. (2004) suggest having approximately four items for attitude measures; however, six items are included in this study for each measure to encompass outcomes for both professionals as well as for the child (as outlined in Kolehmainen et al., 2008. The *TPB-EBI Attitudes* subscale score was calculated by averaging the values of the items within the subscale (per instructions in Francis et al., 2004). The Cronbach α for this subscale in the current study was .95.

TPB-EBI-Subjective Norms. According to the TPB, the construct of '*subjective norms*' reflects how much the person feels social pressure to do a behavior (Ajzen, 2005). Participants rated four items in a Likert-response format (with scores from 1-7) related to their perceptions of subjective norms surrounding recommending and providing evidence-based interventions for children with autism. Anchors at either end of the Likert-type scale were labeled either "*I should*"/ "*I should not*" or "*Strongly disagree*"/ "*Strongly agree*," such that higher ratings reflect a greater degree of influence by subjective norms. The *TPB-EBI Subjective Norms* subscale score was calculated by averaging the values of the items within the subscale (per instructions in Francis et al., 2004). The Cronbach α for this subscale in the current study was .74.

TPB-EBI-Perceived Behavioral Control. According to the TPB, the construct of '*perceived behavioral control*' reflects whether the person feels able to enact a behavior (Ajzen, 2005). Participants rated four items on a Likert-response format (with scores from 1-7) related to their perceptions of their perceived behavioral control (or self-efficacy) of recommending and/or providing evidence-based interventions for children/youth with autism. Anchors at either end of the Likert-type scale items were labeled either "*Strongly disagree*"/ "*Strongly agree*" or "*Easy*"/ "*Difficult*," such that higher ratings reflect a more positive perspective of the target behavior. Items include components of self-efficacy (e.g., "*I am confident that I can recommend AND/OR provide evidence-based interventions to families of children with autism*") and controllability (e.g., "*The decision to recommend AND/OR provide evidence-based interventions children with autism is within my control*"). The *TPB-EBI Perceived Behavioral Control* subscale score was calculated by averaging the values of the items within the subscale (per instructions in Francis et al., 2004). The Cronbach α for this subscale in the current study was .81.

TPB-FCC measure. The operational definition of FCC introduced in the Literature Review was provided to participants prior to filling out the TPB measure (synthesized from Bamm & Rosenbaum, 2008; Bensing et al., 2000; Dunst, 1997; Woodside et al., 2001). The definition and a list of all items can be found in Appendix A (in the paper questionnaire; page 11). Per the manuals' instructions, seven-point bipolar adjective scales (such that there are two anchors, one on the high and one on the low end, and seven response options) are recommended for use in assessing TPB constructs (Ajzen, n.d.; Francis et al., 2004). The next three sections discuss how the TPB-FCC measure was developed.

TPB-FCC-Attitudes. According to the TPB, the construct of '*attitude'* reflects whether the person is in favor of doing a behavior (Ajzen, 2005). Participants rated six items in a Likert-response format (scores ranging from 1-7) after receiving the stem, "*Providing care for children with autism using a family children/youth –centered approach is – .*" Anchors at either end of the Likert-type scale included both items relevant to the professional (e.g., "*Important (to me)*"/ "*Irrelevant (to me)*"), as well as consequences for the child (e.g., *"Effective*"/ *"Ineffective*"); the rationale for including both types of items is identical to the rationale used for the TPB-EBP measure, discussed above. Higher ratings reflect a more positive perspective of the target behavior. The *TPB-FCC Attitudes* subscale score was calculated by averaging the values of the items within the subscale (per instructions in Francis et al., 2004). The Cronbach α for this subscale in the current study was .91.

TPB-FCC-Subjective Norms. According to the TPB, the construct of '*subjective norms*' reflects how much the person feels social pressure to do a behavior (Ajzen, 2005). Participants rated four items in a Likert-response format (with scores from 1-7), regarding their subjective norms related to recommending and providing evidence-based interventions for children with

autism. Anchors at either end of the Likert-type scale were labeled either "*I should*"/ "*I should not*" or "*Strongly disagree*"/ "*Strongly agree*," such that higher ratings reflect a greater degree of influence by subjective norms. The *TPB-FCC Subjective Norms* subscale score was calculated by averaging the values of the items within the subscale (per instructions in Francis et al., 2004). The Cronbach α for this subscale in the current study was .77.

TPB-FCC-Perceived Behavioral Control. According to the TPB, the construct of '*perceived behavioral control*' reflects whether the person feels able to enact a behavior (Ajzen, 2005). Participants rated four items on a Likert-response format (with scores from 1-7) related to their perceptions of their perceived behavioral control (or self-efficacy) of using a family-centered care approach when providing care for children/youth with autism. Anchors at either end of the Likert-type scale items were labeled either "*Strongly disagree*"/ "*Strongly agree*" or "*Easy*"/ "*Difficult*, such that higher ratings reflect a more positive perspective of the target behavior. " Items included components of self-efficacy (e.g., "*I am confident that I can provide care for children with autism using a family-centered approach*") and controllability (e.g., "*The decision to provide care for children with autism using a family-centered approach is within my control*"). The *TPB-FCC Perceived Behavioral Control* subscale score was calculated by averaging the values of the items within the subscale (per instructions in Francis et al., 2004). The Cronbach α for this subscale in the current study was .84.

Measurement of dependent variables. The dependent variables are participants' *self-reported* (a) recommendation and provision of evidence-based interventions and (b) use of a family-centered care approach when working with children with autism. The measures assessing these variables are described next; psychometric information is found in the Results section.

Dependent variable #1: Self-reported recommendation and provision of evidence-based interventions (EBI-Behavior). This section will discuss the process for developing the measure of professionals' self-reported behavior related to EBIs (variable name: *EBI-Behavior*) for children with ASDs. No established measures exist to assess this construct.

Procedure for EBI Identification. First, a number of recent comprehensive/systematic reviews of each of the types EBIs and intervention characteristics were assembled (years 1999-2011). Reviews were utilized that centered on identifying interventions that have been found to be efficacious (based on the review's criteria) in alleviating core or associated symptoms of autism in individuals under the age of 18 who have been diagnosed with one of the three autism spectrum disorders (Autistic disorder, Asperger's disorder, or PDD-NOS). Interventions were included on the EBI list if they were identified by at least <u>two</u> recent independent comprehensive/systematic reviews as having adequate evidence of efficacy. The intervention list also included other interventions that are not classified as EBIs for the purposes of a different study; these are not discussed further here. The EBI list is found in Table 4, and specifics of classification for each type of EBI follows.

Table 4.

List of evidence-based interventions for children with ASDs used in this study

Name	Definition
Focused Intervention Practices	
1. Antecedent-Based Interventions	Identifying factors that are reinforcing the interfering behavior and then modifying the environment or activity so that the factor no longer elicits the interfering behavior. Common ABI procedures include using highly preferred activities/items to increase interest level, implementing pre-activity interventions (e.g., providing a warning about the next activity, offering choices, enriching the environment so that learners with ASD have access to sensory stimuli that serve the same function as the interfering behavior, etc.)
2. Differential Reinforcement	In Differential Reinforcement, reinforcement is provided for desired behaviors, while inappropriate behaviors are ignored
3. Functional Behavior Assessment	A systematic set of strategies (describing problem behavior, identifying antecedent or consequent events, developing hypotheses for the behavior, and testing hypotheses, collecting data on this process) used to determine the underlying function or purpose of a behavior, to develop an effective intervention plan.
4. Functional Communication Training	A systematic practice to replace inappropriate behavior or subtle communicative acts with more appropriate and effective communicative behaviors or skills
5. Modeling (including Video Modeling)	An adult, peer, or video recording providing a visual demonstration of the target behavior/skill that ideally results in an imitation of the target behavior by the individual.
6. Naturalistic Interventions or Teaching Strategies	A collection of practices utilizing primarily child-directed interactions to teach specific behaviors and skills, based on learner's interests, in the natural environment. These interventions often involve providing a stimulating environment, modeling how to play, encouraging conversation, providing choices and direct/natural reinforcers, and rewarding reasonable attempts.
7. Peer-mediated or peer-training interventions	Typically developing peers learn ways to interact with and help individuals with ASD acquire new social skills by increasing social opportunities within natural environments.
8. Positive Behavioral Support	Functional behavior assessments to target challenging behaviors and communication.

Table 4. continues.

Table 4., continued

List of evidence-based interventions for children with ASDs used in this study

Name	Definition
Focused Intervention Practices (continued)	
9. Prompting and Time Delay ("wait time")	Any help given to the individual before or as the individual attempts to use a skill that assists the individual in using a specific skill (e.g., verbal, gestural, physical, visual prompts). Time delay is a practice that focuses on fading the use of prompts during instructional activities (a brief delay is provided between the initial instruction and any additional instructions or prompts).
10. Reinforcement	Positive reinforcement refers to the presentation of a reinforcer (e.g., food, verbal praise) after a learner uses a target skill/behavior (e.g., token economy program). Negative reinforcement refers to the removal of an object or activity the learner with ASD finds aversive (e.g., staying seated) when the child with an ASD uses an identified target skill/behavior (e.g., raising hand).
11. Response Interruption/ Redirection	Strategy used to decrease repetitive, stereotypical, and/or self-injurious or other behaviors (i.e., not maintained by attention or escape, and instead are often maintained by sensory reinforcement). Response interruption involves stopping the individual from engaging in the interfering behavior, while redirection focuses on prompting the individual to engage in a more appropriate, alternative behavior.
12. Self-Management	Individuals learn to independently regulate their own behaviors (they are taught to discriminate between appropriate/ inappropriate behaviors, accurately monitor and record own behaviors, and reward their appropriate behavior).
13. Social stories (Social Narratives, Story-based Interventions)	Short stories that describe a social situation, including social cues and appropriate behavior; used to teach social skills through the use of accurate information about those situations that the child may find difficult or confusing.
14. Structured Work Systems	A visually organized space where individuals independently practice skills previously mastered under supervision. Communicates at least four pieces of information to the learner: (a) tasks the learner is supposed to do; (b) amount of work remaining; (c) how the learner knows he/she is finished; (d) what to do when he/she is finished.

Table 4. continues

Table 4., continued

List of evidence-based interventions for children with ASDs used in this study

Name	Definition
Focused Intervention Practices (continued)	
15. Task analysis	Breaking a skill into smaller, more manageable steps in order to teach the skill.
16. Visual Supports	Any tool presented visually that supports an individual as he or she moves through the day (e.g., pictures, cartoons, Power cards, written words, arrangement of the environment or visual boundaries, schedules, labels, organization systems, timelines, etc.).
Comprehensive Treatment Models	
17. Applied Behavioral Analysis	A comprehensive treatment approach utilizing behavioral (Skinnerian) principles to target communication, social, self-care, play, motor, pre-academic skills that is implemented in structured and unstructured activities. Early (started before the age of 4), intensive (25-40 hours a week), behavioral intervention falls in this category.
18. Discrete Trial Training (Lovaas' Institute/UCLA Model)	A comprehensive treatment program for children with ASDs based on Discrete Trial Training, delivered in blocks of 20-40 hours a week for 2 or more years. A one-to-one instructional approach used to teach skills in a planned, controlled, and systematic manner (i.e., small repeated steps with definite, or discrete, beginnings and ends) using behavioral principles such as reinforcement.
19. Pivotal Response Training	A comprehensive treatment method involving systematically applying the principles of applied behavior analysis (ABA) to teach individuals with ASDs, while building on the individual's initiative and interests (four pivotal learning variables include: motivation, responding to multiple cues, self-management, and self-initiations).
Pharmacological/Medical	
20. Atypical antipsychotic medications	(e.g. Risperidone or aripiprazole)
Intervention Characteristics	
21. Early intervention	Interventions provided to children as soon as an ASD diagnosis is seriously considered.
22. Intensive interventions	Interventions provided on an intensive schedule (e.g., 25 hours/week).
23. Low student/teacher ratios	Sufficient one-to-one time to meet individualized goals.
24. Parent/family coaching	Families become experts in implementing interventions.

Focused intervention practices. To classify *focused intervention practices*, the following reviews were utilized: The National Autism Center's National Standards Project (NAC, 2009) and the National Professional Development Center on Autism Spectrum Disorders (NPDC, 2011; also presented in Odom, Collet-Klingenberg, Rogers, & Hatton, 2010a). The NAC (2009) and NPDC (2011) reviews both included literature through the year 2007 and used rigorous evaluation criteria. For instance, the NAC (2009) developed a Scientific Merit Rating System assessing five dimensions (research design, measurement of the dependent variable, measurement of the dependent variable and procedural fidelity, participant ascertainment, and generalization) to evaluate whether the methods used in a particular study were strong enough to determine whether an intervention led to improved outcomes for participants. Differences between the NAC (2009) and NPDC (2011) review criteria include variant definitions of the unit of analysis. The NPDC defined the unit of analysis as "focused intervention practices" while the NAC defined theirs as "treatments" (i.e., intervention strategies or intervention classes, or combinations of strategies). The unit of analysis of "treatments" is a broader conceptualization, so the reviews yielded slightly different findings; overall there is little disagreement as to which interventions have a strong evidence-base (NPDC, 2011). To be classified as an EBI in this study, an intervention had to be classified at the highest level in both reviews[12].

Comprehensive treatment models. To classify *comprehensive treatment models*, this study utilized Rogers and Vismara's (2008) review of comprehensive treatment models for ASDs; Odom, Boyd, Hall, and Hume's (2010b) review of comprehensive treatment models; the Vanderbilt Evidence-based Practice Center's [VEBPC] *Comparative Effectiveness Review for*

[12] The survey also includes brief definitions (drawn from the NSP and NPDC definitions) to facilitate a common understanding of the interventions between professionals. Conceptually similar interventions were combined in order to reduce the burden on participants of filling out a long survey instrument. For instance, the interventions "prompting" (i.e., providing a verbal, physical, gestural prompt), and "time delay" (i.e., providing "wait time" to fade the use of prompts) were combined into one category.

Therapies for Children with Autism Spectrum Disorders (2011); and Chorpita, Daleiden, Ebesutani, Young, Becker, Nakamura et al. (2011)'s review of evidence-based treatments for children and adolescents. Each of these three reviews utilized different methodologies for determining efficacy of the different comprehensive programs (see each review for details on their methodology).

Rogers and Vismara (2008) determined that Lovaas' Institute/UCLA Model met criteria for a "well-established" treatment based on Chambless et al.'s (1998) criteria, and provided a cautious endorsement of Pivotal Response Training programs as also likely meeting these criteria. Odom and colleagues (2010b) determined that the comprehensive treatment models with the highest ratings across domains (operationalization of procedures and curriculum, fidelity of implementation, model replication, outcome data of efficacy, and quality of the study) were the Denver Model, LEAP, Lovaas Institute/UCLA model, May Institute, and the Princeton Child Development Institute (PCDI) Model. The VEBPC (2011) determined that the only comprehensive treatment model that had been adequately studied was Lovaas' Institute/UCLA Model, but that the strength of evidence for this intervention was "low." The VEBPC (2011) also highlighted the promising findings of the Early Start Denver Model, but stated that findings were insufficient to classify this treatment, given the lack of replication. Chorpita et al. (2011) rely on a five-level classification system based on the standards of APA Division 12 (e.g., Chambless et al., 2001) and identify "Intensive Behavioral Treatment" and "Intensive Communication Training" as the comprehensive treatments with best support.

For the purposes of this study, based on these findings, only those comprehensive treatment models identified by at least two independent reviews were included (i.e., Lovaas' Institute/UCLA model). In addition, given that Pivotal Response Training was dually classified

by Rogers and Vismara (2008) as an EBI, and was also classified as an EBI by the reviews completed by the NPC (2009) and NPDC (2011) discussed previously, it was also categorized as an evidence-based intervention for the purposes of this study.

Characteristics of interventions. In addition to "name-brand" models, there are certain characteristics of interventions considered to be critical components of ASD intervention (National Research Council [NRC], 2001). Given the diversity among "name-brand" models, it is important for professionals to know the components of these programs that are currently defined as critical by the field and that have empirical-support for their use. The NRC (2001) and other resources have highlighted that positive outcomes in interventions for children with autism are related to these intervention characteristics: (a) early intervention; (b) intensive instructional programming (approximately 25 hours a week for at least 1 year); (c) low student-teacher ratios and sufficient one-to-one time; and (d) training family members on intervention strategies, or well-trained parents (NRC, 2001; NPDC, 2011; Johnson, Myers, & the Council on Children with Disabilities, 2007; Volkmar, Cook, Pomeroy, Realmuto, & Tanguay, 1999; Filipek et al., 1999; Filipek et al., 2000). These intervention characteristics are not "interventions" per se, but are core characteristics that are emphasized in the literature as critical components of intervention. As such, these characteristics were included in the EBI list for participants to rate.

Pharmacological/Medical interventions. To classify *pharmacological/medical interventions* with demonstrated efficacy for treating children with ASDs, this study utilized reviews on medical and psychopharmacological interventions for ASDs by McPheeters and colleagues (2011; summarized from VEBPC, 2011), Scahill and Martin (2005), Siegel and Beaulieu (2011), and Huffman, Sutcliffe, Tanner, and Feldman (2011). According to McPheeters et al. (2011, p. e1318), "although many children with ASDs are currently treated with medical

interventions, strikingly little evidence exists to support clear benefit for most medications." McPheeters et al. (2011) evaluated pharmacological interventions based on research study design, diagnostic approach, participant characterization, intervention description, outcomes measurement, and statistical analysis. Scahill and Martin (2005) do not specify a set of criteria for evaluation, but review relevant studies of medications and provide recommendations on the efficacy of each medication class. Siegel and Beaulieu (2011) relied upon the criteria outlined in Reichow et al. (2008) and evaluated psychopharmacological interventions based on a range of domains: research study design, participant characteristics/random assignment, intervention descriptions (independent variable information provided in enough detail to be replicated), statistical analysis, appropriate blinding, inter-observer agreement, fidelity, et cetera. Finally, Huffman et al. (2011) provide a comprehensive review of both pharmacologic and complementary and alternative medicine (CAM) treatments for ASDs, and utilize the Scientific Merit Rating Scale (SMRS) utilized by the NSP (2009).

For the purposes of this study, based on these findings, only those psychopharmacological/medical interventions identified as EBIs by at least two reviews were included. Those interventions that have support for their use in treating children with ASDs based on these reviews are atypical antipsychotics (specifically risperidone and aripiprazole), which have demonstrated efficacy for decreasing challenging behavior, as well as repetitive behavior and hyperactivity, although they also have significant adverse side effects (McPheeters et al., 2011; Scahill & Martin, 2005; Siegel and Beaulieu, 2011; Huffman et al.). Siegal and Beaulieu (2011) identified that Haloperidol, a first generation, antipsychotic, has "established evidence" for use in treating behavioral symptoms of ASDs. However, other reviews did not also rate Haloperidol as having this level of evidence, so it was not included. Other domains of

medication (e.g., serotonin reuptake inhibitors and stimulants) have some evidence for their efficacy, but currently do not meet EBI criteria based on the current reviews.

Creation of the EBI-Behavior measure. Participants were provided the list of interventions used with children with ASDs (Table 4) within a larger list of interventions (see Appendix A: Survey Instrument). To derive a measure of self-reported behavior (*EBI-Behavior*), first, participants were asked to rate whether they have recommended that children with ASDs use each intervention (i.e., *"In the past, how much have you RECOMMENDED (and/or REFERRED children to an appropriate provider for this intervention?) this intervention to treat at least one aspect of ASDs?"*) on a 5-point Likert-type scale: *0= "Never recommended" or "Recommended AGAINST using"; 1= "Rarely recommended"; 2= "Sometimes recommended"; 3= "Often recommended"; 4= "Almost always or always recommended"*). A 5-point scale was selected (instead of a 7-point scale) after consultation with the pilot group. The pilot group reported that a 7-point scale would induce unnecessary strain on participants filling out ratings for multiple interventions. They also noted that it would be more time-consuming to rate interventions using a 7-point scale, as participants would take more time deciding between more points. The score for the *Recommend* subscale of the *EBI-Behavior* measure was calculated by averaging the values of the items within the subscale to reflect the individual's overall average rate of recommending EBIs. The Cronbach α for the *Recommend* subscale was .89.

Second, participants were asked to rate whether they have provided each intervention for children with ASDs (*"In the past, how much have you PROVIDED this intervention to treat at least one aspect of ASDs?"*) using a 5-point Likert-response scale (*0= "Never provided or N/A Cannot provide (Not within my discipline's scope of practice)"; 1= "Rarely provided"; 2= "Sometimes provided"; 3= "Often provided"; 4= "Almost always or always provided"*). For

analyses, *N/A= "Cannot provide. Not within my discipline's scope of practice"* was coded at a value of "0", as participants who indicated "N/A" were also assumed to not be providing these interventions. The score for the *Provide* subscale of the *EBI-Behavior* measure was calculated by averaging the values of the items within the subscale to reflect the individual's overall average rate of providing EBIs. The Cronbach α for the *Provide* subscale was .93.

Each *Recommend* and *Provide* subscale score ranged from 0 to 4, with higher scores representing higher levels of the subscale construct. To calculate a total score (*EBI-Behavior*), these subscales were added together. This procedure was created to assess a participant's *overall* behavior related to recommending and/or providing evidence-based interventions. The Cronbach α for this overall measure was .95.

A rationale for the procedure for creating *EBI-Behavior* is as follows. Of primary interest in this study was the participants' general behavior surrounding those interventions that have currently been defined as EBIs. A very important role of professionals is discussing intervention options with families and helping them make treatment decisions (White, 2012). A measure focusing on providing EBIs alone would not capture this component of professionals' behavior surrounding EBIs. In addition, participants were from a diverse set of disciplines, and could *provide* only the interventions within their scope of practice. Arguably, certain interventions that one may be perceive as "outside" of a certain discipline's scope of practice to provide (e.g., one may perceive that differential reinforcement strategies are outside of a physician's scope of practice), may actually be feasible interventions for that professional to provide (e.g., a physician aware of differential reinforcement may utilize these strategies in appointments with children with ASDs and may also further recommend this strategy for the family to use at home). Similarly, while an occupational therapist and physical therapist may be primarily working with

a child with autism related to secondary symptoms such as sensory or motor issues, these professionals may be well versed in strategies that are efficacious for children with ASDs and may routinely integrate the use of visual supports and response interruption (NAC, 2009) in their work with children with ASDS.

Further, while certain interventions are outside the scope of practice for some professionals (e.g., psychologists cannot provide medications), all professionals have the potential to be aware of EBIs and to recommend these interventions to families to investigate further. For instance, a psychologist may recommend to the parents of a child with autistic disorder and severe repetitive and restricted behaviors that the field has some good efficacy data on the use of atypical antipsychotics to treat these behaviors in children with ASDs (McPheeters et al., 2011). This psychologist might then recommend that the family see a psychiatrist to see if this type of intervention might be appropriate. Similarly, a developmental/behavioral pediatrician might be unable to provide early intervention in a comprehensive treatment program (e.g., Discrete Trial Training; Rogers & Vismara, 2008), yet this pediatrician might be well-versed in the literature on ASD intervention and know that this is an intervention with empirical support and recommend it to families.

Inclusion of both recommendation and provision behavior in the measure aims tap into two ways in which professionals perceive their involvement with intervention for children with ASDs. This measure should be thought of as a proxy-measure of professional's overall perceptions (i.e., self-report) of how much they have recommended and provided the interventions on the list and not as a measure of their observable behavior.

Finally, for each intervention, participants were asked to rate their beliefs about how effective the interventions were (*"How EFFECTIVE is this intervention for children with*

ASDs?") by using a Likert-response format[13]. Participants could check whether they were "*Too Unfamiliar With the Intervention*" to rate their beliefs about its effectiveness[14]. This value (Unfamiliar: Checked or Unchecked) was used to calculate an overall score for Unfamiliarity. This was done by summing the number of interventions on the EBI list for which the individual checked that they were "Unfamiliar" with, yielding an overall score that represented how unfamiliar they were generally with the list of EBIs. In addition, participants were asked about their training on EBIs (*"In my training, an explicit emphasis was placed on using evidence-based interventions (i.e., interventions based on the best scientific evidence."*) using a 5-point Likert-type scale with the following anchors: 1= "*Strongly Disagree*", 2= "*Disagree*", 3= "*Neutral*", 4= "*Agree*", and 5= "*Strongly Agree*." Both *Unfamiliarity with EBIs* and *Training Emphasized EBIs* were controlled for statistically in analyses, as some EBIs may be more familiar to certain disciplines than others. In sum, the goal of the *EBI-Behavior* measure was to provide an estimate of participants' overall self-reported behaviors related to recommending/providing EBIs.

Dependent variable #2: Self-reported use of a family-centered care approach (FCC-Behavior). The *Measure of Processes of Care for Service Providers* (*MPOC-SP*; Woodside, Rosenbaum, King, & King, 2001) was used to evaluate professional's self-report of their FCC behaviors with children with ASDs. The *MPOC-SP* is a 27-item measure that assesses the extent to which pediatric service providers report providing various behaviors that are components of family-centered service in the past year. Participants are asked to describe their "actual" behavior

[13] I acknowledge the distinction made in the psychological literature between "efficacy" and "effectiveness" research (e.g., Hoagwood, Hibbs, Brent, & Jenson, 1999). The word "effectiveness" was chosen as a preferred term by the pilot group of professionals, who felt this term was more familiar to them than "efficacy" in terms of describing whether an intervention "worked."

[14] These Unfamiliarity ratings were used as auxiliary variables in the EBI database multiple imputation procedure and were included as a covariate in EBI analyses, as missing values on EBI-Behavior were dependent upon Unfamiliarity ratings. See section on Missing Data in the Results section and Appendix E for further information and rationale for this decision.

rather than what they feel would be "ideal" service. Woodside et al. (2001) describe the procedures for developing this measure and their efforts to ensure that the measure adequately reflected the construct of family-centered care (i.e., content validity).

The *MPOC-SP* has four subscales: (1) *Showing interpersonal sensitivity* (10 items); (2) *Providing general information* (5 items); (3) *Communicating specific information about the child* (3 items); (4) *Treating people respectfully* (9 items), with each item representing a behavior of a service provider that is related to family-centered service (Woodside et al., 2001). A copy of the MPOC-SP is found in Appendix A (pages 8-9). The words, "*children with AUTISM SPECTRUM DISORDERS (including Asperger's Disorder and PDD-NOS)*" were added to the instructions, and item 22 was rephrased from "*the spastic diplegic*" to "*the autistic child*" to maintain the focus on autism. Individuals are asked to indicate to what extent they performed a series of behaviors on a 0-7 scale (*0= "N/A"; 1= "Not at all"; 2= "To a Very Small Extent"; 3= "To a Small Extent"; 4= "To a Moderate Extent"; 5= "To a Fairly Great Extent"; 6= "To a Great Extent"; 7= "To a Very Great Extent"*). I decided to consider the N/A category as valid data (e.g., consistent with recommendations by Nijhuis et al. (2007)[15]. This decision was made because I was primarily interested in the self-report on behavior of participants; I presumed that individuals who selected "N/A" were also unable to perform the behavior (for unknown reasons). "N/A" responses were also considered "Not at all" performing the behavior and were recoded to "1" (Not at all).

[15] I made this decision rather than considering the "N/A" category as "missing" and using multiple imputation procedures to fill it in along with actual missing (i.e., not filled out) data (e.g., as in Bellin, Osteen, Heffernan, Levy, & Snyder-Vogel, 2011) or completing case-wise deletions for individuals who have not completed at least two-thirds the items for each domain (e.g., as in Lotze, Bellin, & Oswald, 2010). The missing values were then imputed via multiple imputation (see Missing Data section in the Results section and Appendix E; Rubin, 1987) limiting imputation to values from 1 to 7.

Each subscale score ranged from 1 to 7, with higher scores representing higher levels of that subscale construct. An overall *FCC-Behavior* score for use as a dependent variable in FCC analyses was calculated for this study by averaging the values of all items on the MPOC-SP (scores ranged from 1 to 7). The Cronbach α for this measure was .93, and the α for each of the subscales is as follows: Showing Interpersonal Sensitivity: .87; Providing General Information: .91; Communicating Specific Information: .79; Treating People Respectfully: .87.

The *MPOC-SP* has been studied across different professional disciplines (e.g., occupational therapy, speech language pathology, social work, etc.), and initial support for the discriminative validity of the measure found; the MPOC-SP is able to assess differences in different disciplines' reported FCC behaviors (Woodside et al., 2001). The *MPOC-SP* has demonstrated adequate internal consistency (Cronbach α of .75 to .88 across scales; Woodside et al., 2001) and test-retest reliability (Intraclass Correlation Coefficients ranging from .79 to .99 across subscales). In a sample of service providers working with children with special health care needs where multiple imputation was used for missing and N/A values, Cronbach's α ranged from .93 to .96 (Bellin et al., 2011).

Procedures

Recruitment and informed consent procedures. Data was collected from participants between December 2011 and May 2012. All participants received consent information prior to completing the survey. In the Internet version, participants were given the opportunity at the end of the survey to voluntarily submit their responses to the researchers and they were also given the option to "save" their responses and return to them later with a user-specific access code. The VCU Institutional Review Board approved all study procedures.

Triangulation within research generally refers to the use of multiple methodological techniques to increase the validity of the study's findings (Dootson, 1995; Campbell & Fiske, 1959). This study used a form of methodological triangulation, in that there were two sampling approaches used to access this population: a) a non-probability convenience sample using multiple methods of recruitment (Sample 1, n = 573; 80.8%); and b) a stratified random sample of participants recruited from online provider listings (Sample 2, n = 136; 19.2%). By using these two recruitment methods together, the study tapped a nationwide sample of professionals. Sampling and recruitment procedures for each sample are elaborated upon in detail below.

Sample 1: Non-probability sample. Sample 1 (n = 573) was recruited via a non-probability sampling method using a convenience sample (Shaughnessy, Zechmeister, & Zechmeister, 2006). Participants were recruited via multiple Internet methods including listservs (e.g., AUCD listserv of former trainees), newsletters (e.g., the Organization for Autism Research newsletter), direct emails (e.g., of available lists of ASD professionals from autism/professional organization websites), advertisements on autism organization websites (e.g., AutismSpeaks and the Organization for Autism Research), and snowball recruiting (i.e., asking professionals to send the survey to other individuals in their profession). Individuals emailed directly included individuals with publicly accessible emails from ASD provider lists, webmasters of relevant listservs and newsletters, and leaders and training directors of relevant professional organizations who did not list providers on their website who were asked to distribute the information to their colleagues (snowball recruiting). Groups whose emails were entered into REDCap's contact list for survey distribution included: a) *Defeat Autism Now*! (DAN!), *Relationship Development Intervention* (RDI), and *Developmental, Individual Difference, Relationship-based/Floortime* (DIR®) Model from their respective provider listings; and b) *Social Communication/ Emotional*

Regulation/ Transactional Support (SCERTS), *Training and Education of Autistic and Related Communication Handicapped Children* (TEACCH), *Early Start Denver Model* (EDSM; also called the 'Denver Model'), *Discrete Trial Training* (DTT), and *Pivotal Response Training* (PRT) providers listed on AutismSpeaks. In addition, this sample relied on recruitment from professionals who had participated in a graduate-level interdisciplinary training program (i.e., *Leadership Education in Neurodevelopmental and Related Disabilities* [LEND], operated by the Association of University Centers on Disabilities [AUCD]). Access to the directory of these professionals was contingent upon approval by the organization sponsoring the training program (AUCD; personal communication with Crystal Pariseau, January 24, 2011). AUCD approved of distributing the survey themselves to their listserv of former trainees, and administrators from AUCD emailed an initial invitation and one email reminder to their listserv members.

No identifiable information linked to survey responses was stored in REDCap©. All participants who completed the survey had the option to click on a link upon completion to a drawing for one of four $50 gift cards. This list was kept in a separate database of REDCap©, and the survey drawing from this list occurred at the completion of data collection. The researcher's REDCap© account was password protected. All data exported from REDCap© was fully de-identified and placed in a password-protected computer location.

Sample 2: Stratified random sample of online provider listings. Sample 2 (n = 136) was created via a stratified random sampling approach (Shaughnessy et al., 2006) using online provider listings. A comprehensive population list of professionals providing services to children with ASDs does not exist. A sampling frame is a list of all elements in the population of interest, which operationally defines the target population from which the sample is drawn, and to which the data from the sample will be generalized (Herek, 2012; Shaughnessy et al., 2006). The

procedure for generating each discipline's sampling frame was to create a comprehensive list of professionals included on publicly available "Find a Provider"-type listings (similar to yellow-page listings for specific disciplines) across all 50 states in the US. Each discipline was considered a separate stratum. Professionals were randomly selected from each discipline (strata) to yield a potential participant list.

To create the list for each discipline, at least two sources were used, such that: (a) one source was a list of self-identified providers from each discipline's *professional organization*, who report as specializing in or treating children with autism, behavioral disorders, or children with developmental delays and disabilities; and (b) one source was an *autism- or developmental disability-specific* website. A third listing was used when available, or if adequate numbers or potential participants were not found via the first two sources (e.g., social workers). From the sampling frame for each discipline, n = 200 individuals per discipline were randomly selected via a random number generator function in IBM SPSS v19.0 to be invited for participation in the study (N = 1200). Of the 1200 surveys mailed, 11 were returned to us with apologies that the individual who was mailed had either moved or was not eligible to participate, and 136 were completed and submitted to us either via paper or internet formats (11.4% response rate, out of 1189 participants presumably eligible to participate). The general steps for assembling each discipline's sampling frame are found in Appendix B. Specific information and notes regarding assembling each discipline's sampling frame are outlined in Appendix C.

These sampling frames were created using the sources noted between October 2011 and February 2012. The initial invitation to participate was sent by mail on Friday March 16, 2012 and included an invitation letter including information about consent and the study drawing for one of four $50 gift cards (Appendix D), a paper copy of the survey (Appendix A), a link to the

Internet copy of the survey for participants to use if they prefer this mode, and a paid business-reply envelope for the participant to use to return the survey. To increase response rates to the survey per Dillman et al.'s (2009) mixed-mode design recommendations, a follow-up reminder postcard was sent to all participants two weeks after the initial mailing (March 30, 2012). This postcard reminder included a re-iteration of the invitation information as well as a link to the Internet version of the survey. Once surveys were returned, data from the mailed responses was entered twice into a database based on the participant's ID number without any identifying information included (by the researcher and an undergraduate research assistant). Discrepancies in across double-entered data were checked via IBM SPSS v19.0 and resolved by the researcher going back to the paper documents and verifying discrepancies. Mailed surveys were kept in a locked filing cabinet in the researcher's locked office.

Results

Overview

This section begins with a review of the data preparation and data cleaning procedures that were conducted prior to analysis. This includes a discussion of treatment of missing data using multiple imputation. The psychometric properties of the measures used in this study are reviewed. Next, the descriptive statistics of the variables relevant to this study are presented. Non-equivalence tests between sample group and discipline group on demographic and other variables within each dataset are completed. The non-equivalence tests are used to identify variables as covariates for inclusion in subsequent multiple regression analyses that involve study variables. Next, the bivariate associations (intercorrelations) between predictors, covariates, and the dependent variables are presented. A rationale is offered for the approach

used in this study (i.e., interactions in multiple regression). Procedures used for checking the assumptions of multiple regression are described. The general procedures for the multiple regression analyses in the study are outlined. Then, the study hypotheses are addressed, beginning with hypotheses related to *EBI-Behavior*, and followed by those related to *FCC-Behavior*.

Data Preparation

This section reviews the data preparation procedures, specifically the treatment of missing data and Univariate outliers. IBM SPSS v19.0 software was used for all procedures.

Missing Data. The problem of missing data is one of the greatest concerns in data analysis and must be addressed prior to data analysis (Tabachnick & Fidell, 2007). To address missing data, guidelines outlined in three authorities were followed closely: (a) Cole (2008) Missingness Imputation Sequential System (MISS); (b) Schafer and Graham (2002); and (c) Schlomer, Bauman, and Card (2010). Multiple imputation (MI) was the approach selected to address problems with missing data; the rationale for this decision is as follows. This section provides an overview of Missing Data procedures; Appendix E covers this issue in more depth.

The pattern of missing data is more important than the amount of missing data (Tabachnick & Fidell, 2007). Data were carefully screened for the missingness mechanism. It is important to determine whether the data are missing completely at random (MCAR; the missing values do not depend on any values or potential values of other variables), missing at random (MAR; the probability of missing data was related to other observed variables in dataset, but not to other values within the variable of interest), or missing not at random (MNAR; Tabachnick & Fidell, 2007). MNAR data is also referred to as 'nonignorable missingness' because the missing

values are dependent upon values within the variable of interest (Tabachnick & Fidell, 2007). MI assumes at least MAR data in order for the algorithms to work appropriately.

After a series of diagnostics (see Appendix E; Schlomer, Bauman, & Card, 2010), there was evidence that the missing data for FCC analyses was MCAR and the missing data for EBI analyses was MAR (such that the probability of missing data on study variables was related to other observed variables in dataset). Determining whether data are MCAR or MAR is an important distinction with implications for both MI and subsequent analyses. First, when data are MAR, the missing values are by definition, dependent on other observed values in the dataset. As such, when imputing these values using MI, one must include these additional (auxiliary) variables into the imputation algorithm to better inform the imputation algorithm; such is not the case for MCAR (Cole, 2008). Second, for MAR data, one must include the variables upon which the missing values are dependent upon in later analyses (e.g., as a covariate) to avoid bias (Schlomer et al., 2010). In this study, *Unfamiliarity with EBIs* is included as a covariate for EBI analyses, as there was evidence that missing values on *Recommending EBIs* and *Providing EBIs* were dependent on the values on the *Unfamiliarity* variable (see Appendix E). MCAR data require little remediation, as the missing values are not related to any other variables under study and are randomly distributed across variables and cases (Schlomer et al., 2010).

Given the evidence for MAR within the missing data, it was decided that casewise or listwise/pair-wise deletion should not be used (Schafer & Graham, 2002). Doing so would mean a significant loss in power for analyses testing the relationship between TPB constructs and self-reported recommending/providing EBIs (*EBI-Behavior*). In addition, the presence of non-MCAR data and high percentages of missing data on certain measures indicates that missing data methods such as casewise deletion (or available case analysis and listwise/pairwise deletion) are

not recommended (Schafer & Graham, 2002). When missing data are not MCAR, results from deletion methods may be biased because the complete cases are not representative of the population, as deletion may misestimate population parameters (Schafer & Graham, 2002; Osborne, 2013). Mean substitution is also not recommended as it can create inaccurate population estimates and artificially reduce the variance in the variables, even when data are MAR or MCAR (Osborne, 2013).

Multiple imputation (MI) was the approach selected to address the missing data. The MI procedure (Rubin, 1987; Rubin, 1996; Schafer, 1997; Schafer 1999) generates *m* imputed datasets by estimating missing values using a Markov Chain Monte Carlo (MCMC) technique (the number of imputed datasets, *m*, is determined by the guidelines set out by Rubin, 1987). In MI, the missing values for each participant in each of *m* imputed datasets are predicted from his or her own observed values, with "random noise added to preserve a correct amount of variability in the imputed data" (Schafer & Graham, 2002, p. 167). The values from each of the imputed datasets are then pooled. As such, MI preserves both the variability of the values, as well as the relationships *between* variables. MI is appropriate for MAR or MCAR data. The goal of MI is not to correctly predict individual values, but to yield accurate parameter estimates for the relationships of interest (i.e., between analyzed variables). In using MI, "the point of imputation is not that the imputed values should *look* like observed values... [but] that the imputed variable should *act* like the observed variable when used in analysis" (von Hippel, in press; p. 2). Imputed datasets are analyzed separately using the statistical analyses specified by the researcher and are combined using averaging the analysis results for each of these imputations. In IBM SPSS version 19.0, analysis procedures run on a MI dataset will yield

results for each imputation, the original (un-imputed data), and the final data (pooled across all completed imputations).

Values for independent (IV) and dependent variables (DV) were imputed at the item-level (Gottschall, West, & Enders, 2012). Then the scale or total score was calculated on the imputed values. There was some indication of skewness in the data, but given the bi-directionality of the skewness (Field, 2005), the importance of preserving bivariate relations between variables (von Hippel, in press), and MI's robustness to violations of normality (Schafer & Graham, 2002; Graham, 2009; Lee & Huber, 2011; Osborne, 2013), skewed data were not transformed prior to imputation, consistent with recommendations by von Hippel (in press). Univariate outliers were Winsorized prior to imputation (see section on Univariate outliers). In all cases where there were either binary variables (e.g., gender) or categorical variables (e.g., degree), I completed the imputation as if the scores were on a continuous scale and then rounded the imputed score to the nearest integer value (Fichman & Cummings, 2003; Graham, 2009), converting the variable back to a categorical variable after imputation via rounding to the nearest whole number. For all continuous variables, values were imputed within the expected range for the variable; values were not rounded to the nearest whole number, consistent with recommendations in Graham (2009).

Ten imputed datasets (Bodner, 2008; Schafer, n.d.; Starkweather & Herrington, 2012) were generated for each set of data (EBI, FCC) using IBM SPSS 19.0. The EBI and FCC imputations included key demographic variables and auxiliary variables as predictors in the MI process to preserve the relationship of the analyzed variables with other relevant variables in the dataset (Cole, 2008; Graham, 2009). Ten datasets yielded greater than 99% efficiency[16] and

[16] Here, "efficiency" refers to the extent to which the imputations provide a precise estimate of the missing data (Schafer & Graham, 2002) or how strongly the imputations are influenced by the missing data, with lower

yielded an acceptable level of power as estimated by the percent missing data and number of imputations (4.45% missing overall; Rubin, 1987; Schafer, n.d.; Graham, Olchowski, & Gilreath, 2007). This indicates that the ten imputations completed had a very small degree of influence by the missing data; as such, parameter estimates should accurately represent the relationships present in the data. Subsequent analyses and parameter estimation were conducted on each of the ten datasets independently, and then pooled values were calculated using Rubin's (1987) rules for combining parameter estimates across imputations.

Univariate Outliers. Outliers were screened as well. A case was considered an outlier if it had standardized scores that were three or more standard deviations away from the mean. For continuous IVs, the ranges for each variable were examined and outliers were Winsorized (i.e., recoded into the most extreme acceptable scores) prior being imputed during MI procedures. All continuous variables were re-examined after MI for univariate outliers. Any remaining outliers with standardized (*z*) scores of 3.29 or greater were replaced with three-times the standard deviation added to the mean. Descriptive statistics and bivariate relations in the Methods and Results section reflect these variables after outliers have been Winsorized.

Psychometric Properties of Measures

Addressing missing data and Univariate outliers are critical preparatory steps necessary prior to data analysis. The next section describes another critical step that must be completed before data analysis: providing information on the psychometric properties of the measures utilized in the study. Where appropriate, steps for how to test the reliability and validity of the scales in future work is suggested.

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percentages indicating a greater degree of influence by the missing data (Schafer, n.d.). Efficiency calculation takes into account the rate of missing data as well as the proposed number of imputations to yield an estimate of the efficiency of the MI inferences (Schafer, n.d.; Graham et al., 2007).

Internal consistency. "One of the most important indicators of a scale's quality is the reliability coefficient, alpha" (DeVellis, 2003, p. 94). In this section, psychometric information is provided on the reliability (internal consistency in the form of Cronbach's alpha) of measures created for this study (i.e., TPB-EBI, TPB-FCC, and EBI-Behavior) as well as the established measure used to measure *FCC-Behavior* (i.e., MPOC-SP). This is a critical step prior to data analysis, as a core assumption of multiple regression is that all measures used have adequate reliability; low reliability of measures can lead to erroneous findings (Osborne & Waters, 2002).

Scale construction and scoring procedures and rationale for each measure were described in the Method section. In brief, the TPB subscale scores were calculated by averaging all items within the subscale (per instructions in Francis et al., 2004). *EBI-Behavior* was scored by averaging all ratings on the *Recommend* and *Provide* subscales separately and then adding them together for an overall score. The MPOC-SP (*FCC-Behavior*) was scored by averaging all items on the measure for a total score.

Values for alpha can range from 0.0 to 1.0, with higher values indicating a higher proportion of variance in the scale score that can be attributed to the true score (DeVellis, 2003). DeVellis' (2003, p. 96) guidelines for evaluating research scales on Cronbach α values were used: below .60, unacceptable; between .60 and .65, undesirable; between .65 and .70, minimally acceptable; between .70 and .80, respectable; above .80, very good. Values above .90 may indicate that the scale may be shortened; yet in scale development in research projects, it is recommended that Cronbach's α be higher than desired (DeVellis, 2003). This way, if alphas decrease when applied to a new sample or different research context, they will still be in the acceptable range (DeVellis, 2003). Overall, all measures and subscales were found to have acceptable to excellent internal consistency. Future work will want to focus on the test-retest

reliability of the measures over time and on assessing the internal consistency of the measures in different samples. For each measure, the internal consistency was calculated for the available items using a listwise deletion procedure (Available Item Analysis; AIA) for the original dataset (including missing data) and then internal consistency was evaluated for each Multiple Imputation (MI) iteration (see Table 5). The values for α across the imputations were calculated via averaging the values for each imputation[17].

Internal consistency of TPB measures. For the TPB measures developed for this study, the manuals utilized (Francis et al., 2004; Ajzen, n.d.) outline that it is critical for each subscale to have high internal consistency (at least above .70) in order to consider the scale as accurately measuring the construct. As such, for each of the TPB measures (*TPB-EBI* and *TPB-FCC*), the internal consistency of the scale as a whole and by subscale (attitudes, subjective norms, and perceived behavioral control) was evaluated using Cronbach's α. All subscales and the measures for *TPB-EBI* and *TPB-FCC* had Cronbach α values well above .70, which is the cut-off level cited as necessary by Francis et al. (2004) for TPB measures; all values also fall within the acceptable to very good range for research scales (DeVellis, 2003). This provides evidence for the fact that the items within each of the TPB measure subscales measure the same latent constructs (DeVellis, 2003). Examination of the 95% confidence intervals (CI) for Cronbach's α using the intraclass correlation coefficient (ICC) procedure in SPSS indicated that α's across imputations were within this 95% CI range (e.g., Parent, in press), providing a validity check for the imputation values. If there were α's across imputations that were outside of this 95% CI range, there would be cause for concern that some aspect of the MI procedure did not perform appropriately and that imputed values were different in some way from non-imputed values.

[17] Cronbach's α does not have a standard error calculation in IBM SPSS v19 multiple imputation, so a pooled estimate of the values for each scale/subscale could not be generated by SPSS and was calculated by averaging the values.

Internal consistency of *EBI-Behavior*. The internal consistency was also calculated for the dependent variable measuring professionals' self-reported recommendation/provision of EBIs (*EBI-Behavior*; Table 5). The same procedure was conducted as discussed above in regards to averaging values across multiple imputations and examining the confidence intervals (Parent, in press). Internal consistency is presented for the overall scale and the subscales, although the overall scale is the dependent variable used for analyses. Each of the separate subscales and the overall measure demonstrated very good (DeVellis, 2003) internal consistency across imputations (*Recommend* Cronbach $\alpha = .894$; *Provide* Cronbach $\alpha = .930$; Total *EBI-Behavior* Cronbach $\alpha = .945$[18]). These values provide some evidence that the items on the *EBI-Behavior* measure are measuring the same latent construct (DeVellis, 2003).

Internal consistency of the MPOC-SP (*FCC-Behavior* measure). The internal consistency was also calculated for the dependent variable measuring professionals self-reported *FCC-Behavior* (the MPOC-SP; Table 5). The same procedure was conducted as discussed above in regards to averaging values across multiple imputations and examining the confidence intervals (Parent, in press). The internal consistency is presented for both the overall scale and the subscales, although the overall scale is the dependent variable used for analyses. The internal consistency values of this scale on the sample population for this study were consistent with those presented in previous studies on the MPOC-SP (e.g., Woodside et al., 2001), and were in the respectable to very good range (DeVellis, 2003). This provides evidence that the items composing the MPOC-SP measure the same latent construct (DeVellis, 2003).

[18] DeVellis (2003, p. 96) noted that internal consistencies "much above .90" may indicate redundancies within the scale; items may be removed to reduce redundancies. However, I chose not to remove items in this case, as I wanted to maintain both subscales and all EBIs in the measure for the purposes of this study.

Table 5.

Cronbach's α for scales by available item analysis [a] (AIA) and multiple imputation (MI) iteration

	AIA[a]		MI	Iteration [b] #1	2	3	4	5	6	7	8	9	10	Average
Scale														
Subscale	*N*	α	*N*	α	α	α	α	α	α	α	α	α	α	α
TPB-FCC [c]	**625**	**.831**	**709**	**.830**	**.832**	**.830**	**.831**	**.832**	**.829**	**.829**	**.834**	**.830**	**.834**	**.831**
ATT	659	.906	709	.908	.911	.910	.909	.909	.907	.910	.913	.910	.912	.910
SN	672	.769	709	.771	.769	.767	.768	.766	.766	.765	.771	.770	.771	.768
PBC	679	.843	709	.845	.844	.844	.844	.846	.843	.842	.844	.843	.846	.844
MPOC-SP [d]	**651**	**.929**	**709**	**.926**	**.926**	**.927**	**.926**	**.926**	**.927**	**.926**	**.926**	**.926**	**.927**	**.926**
SIS	682	.866	709	.867	.866	.868	.866	.867	.867	.867	.866	.866	.867	.867
PGI	697	.907	709	.907	.907	.907	.906	.907	.907	.907	.907	.907	.907	.907
CSI	696	.792	709	.793	.794	.793	.794	.795	.791	.792	.794	.791	.793	.793
TPR	678	.875	709	.873	.874	.874	.873	.873	.873	.873	.874	.873	.874	.873
TPB-EBI [c]	**606**	**.867**	**709**	**.867**	**.867**	**.867**	**.867**	**.868**	**.868**	**.868**	**.867**	**.867**	**.869**	**.868**
ATT	643	.953	709	.953	.953	.953	.952	.954	.953	.953	.953	.954	.954	.953
SN	675	.733	709	.736	.735	.738	.737	.739	.735	.737	.739	.735	.731	.736
PBC	676	.811	709	.806	.807	.804	.803	.806	.804	.805	.809	.805	.809	.806
EBI-Behavior	**390**	**.950**	**709**	**.945**	**.946**	**.945**	**.945**	**.945**	**.946**	**.945**	**.945**	**.945**	**.946**	**.945**
Recommend	404	.901	709	.894	.895	.895	.894	.894	.894	.893	.894	.893	.894	.894
Provide	414	.935	709	.930	.930	.930	.930	.930	.930	.930	.930	.930	.931	.930

Notes: [a] AIA in SPSS Version 19.0 utilizes a listwise deletion procedure based on all variables included in the procedure.
[b] All alphas were calculated in the MI database for each set of variables (EBI or FCC) prior to outlier Windsorization.
[c] TPB Scales: ATT = *Attitudes*; SN = *Subjective Norms*; PBC = *Perceived Behavioral Control.*
[d] MPOC-SP Scales: SIS = *Showing Interpersonal Sensitivity*; PGI = *Providing General Information*; CSI = *Communicating Specific Information*; TPR = *Treating People Respectfully*.

Validity. Validity is defined as whether a scale yields meaningful information about the behavior/construct the researcher is interested in (DeVellis, 2003). The face validity (or how much the items on a scale appear to measure what they are stated to measure; DeVellis, 2003) of the measures in this study was evaluated by the researcher, her faculty adviser, and a pilot group of professionals. The items included on each scale were determined to have adequate face validity.

In addition, content validity (whether the instrument fully measures all the aspects of the construct/behavior; DeVellis) of each of the scales was assessed. Ajzen (n.d.) and Francis et al.'s (2004) manuals provided specific instructions for how to create each subscale, to clearly represent the necessary components of the constructs in the TPB model (Ajzen, 2005). Francis et al. (2004) provide specific wording for each item consistent with an accurate reflection of the construct of perceived behavioral control in the TPB. This same level of instruction was provided for each domain. Given that guidelines from theory developer (Ajzen) were explicitly followed to create these measures, they were esteemed to adequately reflect the constructs from his theory of planned behavior. The *EBI-Behavior* measure included the evidence-based interventions that were defined by other sources (at least two); by relying on a variety of systematic literature reviews, efforts were made to include all interventions that were classified as EBIs (by the year 2011). I did not independently choose any intervention for inclusion on this list; each intervention or intervention characteristic had to be identified by at least two independent sources as an EBI. The construct of interest in this study is professionals' *self-reported* recommendation/provision of EBIs, and not their observed behavior. Finally, the MPOC-SP was developed to reflect multiple domains of *self-reported* family-centered care behavior (*FCC-Behavior*) and the subscales and items are consistent with current definitions of

family-centered care (Woodside et al., 2001). An additional step taken to ensure content validity included consultation with experts in the field (i.e., pilot group). The pilot group was asked to provide feedback on the appropriateness of each intervention (EBIs and other interventions included) to assure that the range of interventions and behaviors on the FCC measure were appropriate for their professional discipline.

Construct validity (whether the scales reflect the construct of interest; DeVellis, 2003) of the measures used in this study was also considered. Preliminary evidence for construct validity can be provided by examining the correlations of each of the scales with other theoretically related constructs (Foster & Cone, 1995). It was hypothesized that the *TPB-EBI* measures would be significantly and positively correlated with one another, and each would also be significantly and positively correlated with *EBI-Behavior*. It was hypothesized that the *TPB-FCC* measures would be significantly positively correlated with one another, and each will also be significantly and positively correlated with values on the MPOC-SP (*FCC-Behavior*). The three *TPB-EBI* subscales were significantly and positively correlated with one another, and *EBI-Behavior* evidenced a significant positive correlation with: *Attitudes*, $r(707) = .235$, $p<.001$, *Subjective Norms*, $r(707) = .163$, $p<.001$, and *Perceived Behavioral Control*, $r(707) = .268$, $p<.001$. The three *TPB-EBI* subscales were significantly and positively correlated with one another, and the *MPOC-SP* Total Average evidenced a significant positive correlation with *Attitudes*, $r(707) = .309$, $p<.001$, *Subjective Norms*, $r(707) = .151$, $p<.001$, and *Perceived Behavioral Control*, $r(707) = .434$, $p<.001$. This provides some preliminary evidence for the construct validity of these measures. Future studies should focus explicitly on establishing the construct validity of the measures used in this study by focusing on studying each scale's associations with other established measures measuring similar constructs (e.g., the *TPB-EBI* measure could be

administered along with the *Evidence-based Practice Attitude Scale*, Aarons [2004], the *Evidence-Based Practice Profile*, McEvoy et al. [2010], and the *Evidence-Based Practice Questionnaire*, Upton and Upton [2006], and intercorrelations could be examined).

Descriptive Statistics

Descriptive statistics are presented in this section for all variables included in analyses. Two aims of this project were to: 1) describe professionals' self-report of their recommendation of and provision of EBIs for children/youth with ASDs; and 2) describe professionals' utilization of a family-centered care approach for children/youth with ASDs; these descriptive values are presented in this section. This descriptive data also is an important foundational step towards examining non-equivalence between samples in the next section. Descriptive statistics were calculated for continuous independent and dependent variables in the form of means and standard deviations.

Professionals' self-reported recommendation and provision of EBIs. Descriptive data (means, standard deviations) of professionals' self-reported behavior in terms of recommending EBIs and providing each EBI are presented in Table 6 and Table 7. The averages (standard deviations, and standard errors) for scale scores of r*ecommending* EBIs, *providing* EBIs, and *EBI-Behavior* (used as a dependent variable in regression analyses representing the sum of recommending and providing subscale scores) are found in Table 8.

Table 6.

Mean ratings of recommending evidence-based interventions [a b]

Interventions	Education (*n*= 157)		Medicine/ Nursing (*n*= 108)		OT/PT (*n*= 100)		Psychology (*n*= 163)		Social Work (*n*= 52)		SLP/ Audiology (*n*= 129)		Total (*n*= 709)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Category 1: Focused Intervention Practices														
Antecedent-Based Interventions	2.94	1.09	2.41	1.24	2.15	1.02	2.88	1.09	2.42	1.01	2.18	1.11	2.56	1.15
Differential Reinforcement	2.89	1.07	2.17	1.18	2.15	1.04	2.92	1.11	2.23	1.14	2.08	1.11	2.49	1.17
Functional Behavior Assessment	2.64	1.29	2.16	1.32	1.74	1.26	2.69	1.18	2.14	1.33	2.07	1.17	2.31	1.30
Functional Communication Training	2.71	1.40	1.68	1.39	1.76	1.34	2.12	1.37	1.99	1.44	2.41	1.25	2.17	1.46
Modeling (including Video Modeling)	2.10	1.30	1.01	1.20	1.93	1.24	1.57	1.18	1.48	1.22	2.23	1.23	1.77	1.28
Naturalistic Interventions	2.87	1.29	1.35	1.36	2.48	1.35	2.05	1.45	1.83	1.39	2.82	1.17	2.31	1.44
Peer-mediated/training interventions	2.31	1.26	1.75	1.32	2.23	1.09	2.09	1.17	2.30	1.22	2.21	1.22	2.14	1.22
Positive Behavioral Support	2.72	1.22	2.32	1.32	2.33	1.22	2.54	1.21	2.77	1.17	2.38	1.18	2.51	1.24
Prompting and Time Delay	3.10	1.08	1.63	1.35	2.47	1.08	2.40	1.20	2.30	1.29	2.62	1.23	2.48	1.28
Reinforcement	3.27	1.06	2.60	1.15	2.73	0.95	3.24	0.98	2.85	1.02	2.69	1.20	2.95	1.11
Response Interruption/ Redirection	2.51	1.14	2.01	1.26	1.90	1.04	2.34	1.11	2.15	1.26	2.12	1.04	2.21	1.14
Self-management	2.27	0.98	1.55	1.21	2.47	0.97	2.11	1.08	2.19	1.09	2.05	1.10	2.11	1.09
Social Stories	2.33	1.21	1.60	1.32	2.38	0.99	2.88	1.09	2.42	1.01	2.37	1.07	2.21	1.20
Structured Work Systems	1.62	1.40	1.05	1.31	1.24	1.22	2.92	1.11	2.23	1.14	1.02	1.22	1.20	1.37
Task Analysis	3.08	0.93	2.41	1.24	2.15	1.02	2.69	1.18	2.14	1.33	2.69	1.13	2.56	1.15
Visual Supports	3.30	0.92	2.17	1.18	2.15	1.04	2.12	1.37	1.99	1.44	3.23	0.95	2.49	1.17

Table 6 continues

Table 6, continued.

Mean ratings of recommending evidence-based interventions [a b]

Interventions	Education (*n*= 157)		Medicine/ Nursing (*n*= 108)		OT/PT (*n*= 100)		Psychology (*n*= 163)		Social Work (*n*= 52)		SLP/ Audiology (*n*= 129)		Total (*n*= 709)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Category 2: Comprehensive Treatment Models														
Applied Behavioral Analysis	2.75	1.44	2.20	1.43	1.44	1.22	2.76	1.27	2.24	1.29	2.02	1.32	2.29	1.42
Discrete Trial Training	1.93	1.45	1.13	1.17	0.79	1.00	1.68	1.34	1.25	1.36	1.09	1.15	1.35	1.33
Pivotal Response Training	1.46	1.36	0.86	1.24	0.56	0.88	0.84	1.14	2.86	1.02	0.77	1.04	0.91	1.18
Category 3: Pharmacological Interventions														
Atypical Antipsychotic Medications	0.38	0.75	1.47	1.05	0.32	0.63	0.86	1.00	0.80	1.02	0.32	0.74	0.67	0.97
Category 4: Characteristics of Interventions														
Early Intervention	3.56	1.09	3.49	1.01	3.48	0.93	3.65	0.83	3.27	1.29	3.65	0.82	3.55	0.97
Intensive Interventions	1.89	1.50	1.47	1.52	1.13	1.23	1.79	1.48	0.72	1.16	1.58	1.43	1.55	1.48
Low student/teacher ratios	3.06	1.13	2.56	1.25	2.50	1.20	2.66	1.20	2.47	1.22	2.90	1.11	2.74	1.20
Parent/family coaching	2.72	1.39	2.23	1.51	3.04	1.18	2.74	1.24	2.72	1.36	3.06	1.14	2.76	1.34

Note: [a] These scores represent the pooled descriptive statistics across imputations. Standard deviations were calculated from the pooled value for Standard Error of the Mean (SE=SD/(√*N*); Field, 2005), as SPSS does not provide pooled standard deviations.
[b] Participants provided ratings on the following scales: Recommend: *0= "Never recommended or recommend AGAINST using"; 1= "Rarely recommended"; 2= "Sometimes recommended"; 3= "Often recommended"; 4= "Almost always or always recommended."* Provide: *0= "Never provided or cannot provide because not within my discipline's scope of practice"; 1= "Rarely provided"; 2= "Sometimes provided"; 3= "Often provided"; 4= "Almost always or always provided."*

Table 7.

Mean ratings of providing evidence-based interventions [a b]

Interventions	Education (*n*= 157)		Medicine/ Nursing (*n*= 108)		OT/PT (*n*= 100)		Psychology (*n*= 163)		Social Work (*n*= 52)		SLP/ Audiology (*n*= 129)		Total (*n*= 709)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Category 1: Focused Intervention Practices														
Antecedent-Based Interventions	3.05	1.01	1.10	1.28	2.07	1.17	2.40	1.34	1.98	1.29	2.12	1.14	2.22	1.34
Differential Reinforcement	2.87	1.08	1.11	1.30	2.24	1.12	2.57	1.35	1.98	1.33	2.10	1.13	2.24	1.34
Functional Behavior Assessment	2.52	1.31	0.84	1.22	1.36	1.36	2.07	1.43	1.45	1.38	1.61	1.31	1.75	1.46
Functional Communication Training	2.68	1.43	0.64	1.15	1.58	1.35	1.67	1.46	1.63	1.48	2.27	1.31	1.83	1.55
Modeling (including Video Modeling)	2.07	1.33	0.58	1.09	1.88	1.31	1.22	1.24	1.52	1.32	2.19	1.24	1.60	1.36
Naturalistic Interventions	2.79	1.33	0.60	1.13	2.39	1.38	1.43	1.48	1.37	1.42	2.65	1.29	1.96	1.55
Peer-mediated/training interventions	2.26	1.25	0.53	1.07	1.91	1.13	1.29	1.31	1.42	1.31	1.88	1.25	1.59	1.34
Positive Behavioral Support	2.83	1.15	1.23	1.44	2.30	1.27	2.18	1.38	2.55	1.31	2.37	1.25	2.26	1.40
Prompting and Time Delay	3.18	1.08	0.86	1.21	2.43	1.11	2.08	1.34	2.07	1.45	2.66	1.20	2.29	1.41
Reinforcement	3.30	1.07	1.39	1.43	2.73	1.13	2.93	1.27	2.67	1.26	2.74	1.20	2.70	1.36
Response Interruption/ Redirection	2.55	1.16	1.16	1.30	2.09	1.01	2.04	1.24	2.08	1.29	2.17	1.00	2.05	1.24
Self-management	2.29	1.05	0.82	1.15	2.50	1.01	1.94	1.23	1.96	1.28	1.95	1.17	1.93	1.26
Social Stories	2.24	1.23	0.58	0.98	2.03	1.13	1.73	1.23	1.88	1.30	2.25	1.10	1.81	1.30
Structured Work Systems	1.74	1.40	0.48	1.10	1.23	1.26	0.71	1.05	0.89	1.21	0.95	1.19	1.03	1.40
Task Analysis	3.09	0.89	1.05	1.29	3.01	0.93	2.39	1.26	2.50	1.23	2.69	1.15	1.93	1.26
Visual Supports	3.28	0.92	0.86	1.30	2.91	1.11	2.27	1.25	2.15	1.43	3.13	1.03	1.81	1.30

Table 7 continues

Table 7., continued.

Mean ratings of providing evidence-based interventions [a b]

Interventions	Education (*n*= 157)		Medicine/ Nursing (*n*= 108)		OT/PT (*n*= 100)		Psychology (*n*= 163)		Social Work (*n*= 52)		SLP/ Audiology (*n*= 129)		Total (*n*= 709)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Category 2: Comprehensive Treatment Models														
Applied Behavioral Analysis	2.80	1.49	0.57	1.15	0.93	1.20	1.82	1.56	1.02	1.41	1.50	1.41	1.60	1.60
Discrete Trial Training	2.02	1.49	0.42	0.93	0.58	0.97	1.09	1.31	0.51	0.93	1.01	1.11	1.07	1.36
Pivotal Response Training	1.52	1.41	0.36	0.85	0.55	0.93	0.62	1.05	0.39	0.82	0.73	1.05	0.78	1.25
Category 3: Pharmacological Interventions														
Atypical Antipsychotic Medications	0.25	0.69	1.45	1.10	0.17	0.42	0.16	0.56	0.24	0.67	0.24	0.67	0.40	0.85
Category 4: Characteristics of Interventions														
Early Intervention	3.03	1.49	1.12	1.64	3.02	1.30	2.10	1.71	1.76	1.80	3.11	1.28	2.44	1.70
Intensive Interventions	1.71	1.53	0.54	1.15	0.75	1.22	0.93	1.36	0.54	0.96	1.12	1.38	1.02	1.43
Low student/teacher ratios	2.91	1.28	0.65	1.27	1.77	1.62	0.99	1.43	0.93	1.42	2.50	1.54	1.75	1.68
Parent/family coaching	2.55	1.46	0.89	1.46	2.82	1.34	2.00	1.55	2.27	1.53	2.86	1.27	2.25	1.60

Note: [a] Higher scores indicate more frequent provision of the intervention. These scores represent the pooled descriptive statistics across imputations. Standard deviations (SD) were calculated from the pooled value for Standard Error of the Mean (SE=SD/(√*N*)), as SPSS does not provide pooled SDs.

[b] Participants provided ratings on the following scales: Recommend: *0= "Never recommended or recommend AGAINST using"; 1= "Rarely recommended"; 2= "Sometimes recommended"; 3= "Often recommended"; 4= "Almost always or always recommended."* Provide: *0= "Never provided or cannot provide because not within my discipline's scope of practice"; 1= "Rarely provided"; 2= "Sometimes provided"; 3= "Often provided"; 4= "Almost always or always provided."*

Table 8.

Mean rating of recommending (REC), providing (PROV), and Total EBI-Behavior (REC + PROV) [a b]

Scale	Education (*n*= 157)	Medicine/ Nursing (*n*= 108)	OT/PT (*n*= 100)	Psychology (*n*= 163)	Social Work (*n*= 52)	SLP/ Audiology (*n*= 129)	Total (*n*= 709)
REC EBI							
Mean	2.52	1.88	2.05	2.28	2.04	2.19	2.21
Standard Error	0.05	0.07	0.05	0.05	0.08	0.05	0.02
Standard Deviation	0.58	0.75	0.48	0.65	0.57	0.62	0.65
PROV EBI							
Mean	2.48	0.83	1.89	1.69	1.57	2.03	1.82
Standard Error	0.05	0.07	0.05	0.06	0.10	0.06	0.03
Standard Deviation	0.58	0.74	0.49	0.80	0.70	0.67	0.85
Total (REC + PROV)							
Mean	5.00	2.71	3.94	3.98	3.61	4.22	4.02
Standard Error	0.09	0.11	0.09	0.10	0.16	0.11	0.05
Standard Deviation	1.12	1.17	0.93	1.31	1.15	1.23	1.37

Note: [a] Higher scores indicate more frequent recommendation or provision of the intervention. These scores represent the pooled descriptive statistics across imputations. Standard deviations (SD) were calculated from the pooled value for Standard Error (SE) of the mean (SE=SD/(√N)), as SPSS does not provide pooled SDs.

[b] Participants provided ratings on the following scales: Recommend: *0= "Never recommended or recommend AGAINST using"; 1= "Rarely recommended"; 2= "Sometimes recommended"; 3= "Often recommended"; 4= "Almost always or always recommended."* Provide: *0= "Never provided or cannot provide because not within my discipline's scope of practice"; 1= "Rarely provided"; 2= "Sometimes provided"; 3= "Often provided"; 4= "Almost always or always provided."*

Professionals' self-reported family-centered care behaviors. Next, participants' self-reported family-centered care behaviors on the subscales of the *Measure of Processes of Care for Service Providers [MPOC-SP]* (Woodside et al., 2001) are presented in Table 9. The scores for the subscales on the *MPOC-SP* were calculated using syntax provided by the scale developers (personal communication with Dayle McCauley, March 9, 2012). In addition to these subscales, an overall score for the *MPOC-SP* (used as the dependent variable in FCC multiple regressions) was calculated by averaging all *MPOC-SP* items.

Table 9.

Mean FCC-Behavior measured by the MPOC-SP [a b]

	Discipline						
Scale	Education (*n*= 157)	Medicine/ Nursing (*n*= 108)	OT/PT (*n*= 100)	Psychology (*n*= 163)	Social Work (*n*= 52)	SLP/ Audiology (*n*= 129)	Total (*n*= 709)
SIS							
Mean	5.27	4.87	5.48	5.26	5.49	5.33	5.26
Standard Error	0.09	0.12	0.08	0.07	0.14	0.09	0.04
Standard Deviation	1.11	1.26	0.84	0.88	1.03	0.99	1.04
PGI							
Mean	4.13	4.38	4.39	4.51	4.89	4.19	4.36
Standard Error	0.13	0.16	0.14	0.12	0.24	0.14	0.06
Standard Deviation	1.65	1.64	1.43	1.56	1.72	1.59	1.60
CSI							
Mean	5.28	5.02	6.04	5.80	4.91	6.02	5.57
Standard Error	0.14	0.17	0.10	0.09	0.24	0.08	0.06
Standard Deviation	1.75	1.72	1.03	1.21	1.72	0.95	1.47
TPR							
Mean	6.05	5.64	6.02	5.98	6.22	5.96	5.96
Standard Error	0.08	0.09	0.08	0.06	0.10	0.07	0.03
Standard Deviation	0.95	0.95	0.76	0.71	0.71	0.78	0.84
Total (Average)							
Mean	5.34	5.05	5.52	5.42	5.56	5.40	5.37
Standard Error	0.07	0.10	0.08	0.06	0.12	0.07	0.03
Standard Deviation	0.90	1.06	0.79	0.74	0.85	0.85	0.88

Note: [a] Higher scores indicate more family-centered care behaviors. The score for the Total (Average) represents the pooled descriptive statistics across imputations after outliers that were over 3 standard deviations (SDs) from the mean were Winsorized to the value at 3 SDs from the mean. All subscale means are presented without outlier removal, as these subscales are not used in analyses. SDs were calculated from the pooled value for Standard Error (SE) of the mean (SE=SD/(√N)), as SPSS does not provide pooled SDs.

[b] Participants provided ratings using the following anchors: *1= "Not at all or N/A"; 2= "To a Very Small Extent"; 3= "To a Small Extent"; 4= "To a Moderate Extent"; 5= "To a Fairly Great Extent"; 6= "To a Great Extent"; 7= "To a Very Great Extent."*

[c] MPOC-SP Scales: SIS= *Showing Interpersonal Sensitivity*; PGI= *Providing General Information*; CSI= *Communicating Specific Information*; TPR= *Treating People Respectfully*.

Theory of Planned Behavior (TPB) measures. Table 10 presents the descriptive statistics for ratings on the TPB measures used as independent variables in the study.

Table 10.

Mean ratings on theory of planned behavior (TPB) measures: Evidence-based interventions (EBI) and family-centered care (FCC) [a b]

	Discipline						
Scale	Education (*n*= 157)	Medicine/ Nursing (*n*= 108)	OT/PT (*n*= 100)	Psychology (*n*= 163)	Social Work (*n*= 52)	SLP/ Audiology (*n*= 129)	Total (*n*= 709)
TPB-EBI							
Attitudes							
Mean	6.55	6.43	6.34	6.55	6.29	6.34	6.45
Standard Error	0.06	0.07	0.09	0.06	0.11	0.07	0.03
Standard Deviation	0.73	0.75	0.85	0.70	0.82	0.79	0.77
Subjective Norms							
Mean	5.38	5.56	5.19	5.51	5.05	5.33	5.38
Standard Error	0.09	0.10	0.12	0.09	0.18	0.10	0.04
Standard Deviation	1.12	1.08	1.24	1.21	1.33	1.18	1.18
Perceived Behavioral Control							
Mean	5.75	5.50	5.60	5.87	5.51	5.51	5.66
Standard Error	0.10	0.12	0.12	0.08	0.16	0.10	0.04
Standard Deviation	1.25	1.26	1.19	1.04	1.13	1.15	1.18
TPB-FCC							
Attitudes							
Mean	6.63	6.64	6.80	6.69	6.85	6.70	6.70
Standard Error	0.04	0.05	0.04	0.04	0.05	0.04	0.02
Standard Deviation	0.56	0.56	0.42	0.50	0.35	0.46	0.50
Subjective Norms							
Mean	5.13	5.53	5.50	5.38	5.42	5.46	5.38
Standard Error	0.10	0.12	0.12	0.10	0.17	0.10	0.04
Standard Deviation	1.21	1.24	1.17	1.23	1.22	1.11	1.20
Perceived Behavioral Control							
Mean	5.50	5.67	6.09	5.92	6.32	5.80	5.82
Standard Error	0.11	0.11	0.10	0.08	0.11	0.11	0.04
Standard Deviation	1.36	1.16	0.99	1.08	0.79	1.28	1.19

Note: [a] These scores represent the pooled descriptive statistics across imputations. The score for the Total (Average) represents the pooled descriptive statistics across imputations after outliers that were over 3 standard deviations (SDs) from the mean were Winsorized to the value at 3 SDs from the mean. SDs were calculated from the pooled value for Standard Error of the Mean (SE=SD/(√N)), as SPSS does not provide pooled SDs.

[b] Participants provided ratings using Likert-type ratings ranging from 1-7. Generally, higher ratings indicate more of the construct (e.g., more positive attitudes, greater experience of subjective norms, higher perceived behavioral control). See Method section for additional details about anchors for TPB items.

Covariate measures. Table 11 presents the descriptive statistics for ratings on the Training items (*Training Emphasized EBIs* and *Training Emphasized FCC*) and the *Unfamiliarity with EBIs* variable used as covariates in analyses.

Table 11.

Mean values for Unfamiliarity and Training covariates [a]

	Discipline						
Scale	Education (*n*= 157)	Medicine/ Nursing (*n*= 108)	OT/PT (*n*= 100)	Psychology (*n*= 163)	Social Work (*n*= 52)	SLP/ Audiology (*n*= 129)	Total (*n*= 709)
Unfamiliarity with EBIs on list [b]							
Mean	3.15	7.86	5.08	3.72	6.91	4.49	4.79
Standard Error	0.25	0.59	0.36	0.31	0.69	0.34	0.17
Standard Deviation	3.08	6.16	3.57	3.92	5.00	3.84	4.50
Training - EBI [c]							
Mean	4.33	4.21	4.27	4.52	4.09	4.38	4.34
Standard Error	0.08	0.09	0.09	0.07	0.13	0.08	0.03
Standard Deviation	0.96	0.92	0.94	0.85	0.90	0.85	0.91
Training - FCC [c]							
Mean	4.18	4.26	4.41	4.34	4.62	4.29	4.31
Standard Error	0.07	0.09	0.08	0.06	0.11	0.07	0.03
Standard Deviation	0.92	0.91	0.82	0.76	0.77	0.84	0.85

Note: [a] The values here represent the pooled descriptive statistics across imputations after outliers that were over 3 standard deviations (SDs) from the mean were Winsorized to the value at 3 SDs from the mean. SDs were calculated from the pooled value for Standard Error (SE) of the mean (SE=SD/(√N)), as SPSS does not provide pooled SDs.

[b] For each EBI, participants could check a box to indicate that they were "Too Unfamiliar with the Intervention" to rate their beliefs about its effectiveness. This score was summed across all interventions on the EBI list to represent an overall score representing the number of EBIs on the list with which the participant is unfamiliar.

[c] Participants provided ratings regarding their training on EBIs (*"In my training, an explicit emphasis was placed on using evidence-based interventions (i.e., interventions based on the best scientific evidence)."*) and their training on FCC (*"In my training, an explicit emphasis was placed on using a family-centered care approach (i.e., collaborative partnerships with families and considering individual/family values)."*) using a 5-point Likert-type scale with the following anchors: 1= "*Strongly Disagree*", 2= "*Disagree*", 3= "*Neutral*", 4= "*Agree*", and 5= "*Strongly Agree*."

Testing for Non-equivalence and Identification of Covariates

Results of tests of non-equivalence to determine whether groups (i.e., sample group or discipline group) differed on important variables are described in this section. If variables of interest significantly differ between the recruitment samples, it is important to control for this relationship in multiple regression analyses. If variables of interest differ significantly between discipline groups, it is a good indication that Discipline should be examined as a covariate in analyses; this will also serve to identify other covariates for analyses to control for in examining the relationship of TPB variables to self-reported behavior.

Non-equivalence between sample groups. First, the equivalence of the two recruitment samples was assessed using exploratory analyses. It was decided *a priori* that if there were significant differences between the two samples on exploratory analyses of demographic variables and/or predictors of interest, Sample would be included as a design covariate in regression analyses. Pearson's Chi-square analyses were helpful in determining if there were any significant differences in demographic variables related to the Sample[19]. There were significant differences between Samples related to *Gender* ($\chi^2(1, N = 709) = 11.922, p < .001$). *Race* was recoded to two categories (Minority and Caucasian), and there were not significant differences between samples ($\chi^2(1, N = 709) = .187, p > .250$). *Degree* ($\chi^2(1, N = 709) = 3.463, p > .05$) did not significantly differ between samples.

Next, exploratory analyses of variances (ANOVAs) were used to assess whether covariates, predictors, or dependent variables differed between Samples 1 and 2. Specific mean differences are not presented here, as the purpose of these exploratory analyses was solely to determine the eligibility of variables for inclusion as covariates in regression analyses. Standard

[19] *p*-values for Chi-square and ANOVA analyses were calculated by averaging the Chi-square or *F*-values values across imputations (Rubin, 1987) and then looking up the *p*-value based on the critical values (Tabachnick & Fidell, 2007).

F-statistics for ANOVA are presented when analyses met the assumption of homogeneity of variances (Levene's test). Welch's adjusted *F*-statistics (noted in parentheses) are presented when the assumption of homogeneity of variances is violated for the analysis. For EBI analyses, there were not significant differences between Samples 1 and 2 on *TPB-EBI Attitudes* ($F(1, 707) = .332$, $p > .05$), *TPB-EBI Perceived Behavioral Control* ($F(1, 707) = .266$, $p > .05$), *Unfamiliarity with EBIs* (Welch's $F(1, 224.26) = 3.351$, $p > .05$), and *EBI-Behavior* ($F(1, 707) = 1.707$, $p > .05$). There were significant differences between samples on *TPB-EBI Subjective Norms* ($F(1, 707) = 10.868$, $p < .01$) and *Training Emphasized EBIs* ($F(1, 210.13) = 12.977$, $p < .01$). For FCC analyses, there were not significant differences between Samples 1 and 2 on *TPB-FCC Attitudes* (Welch's $F(1, 190.576) = 1.236$, $p > .05$) or *TPB-FCC Perceived Behavioral Control* ($F(1, 707) = 2.418$, $p > .05$). There were significant differences between samples on *TPB-FCC Subjective Norms* (Welch's $F(1, 201.24) = 15.647$, $p < .001$), *Training Emphasized FCC* ($F(1, 707) = 11.073$, $p = .001$), *Years in Practice* (Welch's $F(1, 186.60) = 73.939$, $p < .001$), and the *MPOC-SP* Total Average Score ($F(1, 707) = 4.052$, $p < .05$).

While there are not uniform differences between samples across all variables of interest, certain variables did differ between samples. The particular sample (1 or 2) that the participants are from is accounted for in data analyses by including Sample as a covariate in the regression analyses for hypothesis testing.

Non-equivalence between discipline groups. Next, the equivalence of the different disciplines (the primary group differentiation of interest) was assessed using exploratory analyses. It was decided *a priori* that if there were significant differences between Disciplines on demographic/background variables for which it made conceptual sense to control for in analyses, these variables would be included as covariates in analyses.

Non-equivalence on independent variables. Pearson's Chi-square analyses were used to determine if there were any significant Discipline differences in categorical demographic variable. There were significant differences between Disciplines related to *Gender* ($\chi^2(5, N = 709) = 94.701, p < .001$) and *Degree* ($\chi^2(5, N = 709) = 307.623, p < .001$). *Race* ($\chi^2(5, N = 709) = 7.574, p > .10$) did not significantly differ between Discipline groups.

Next, exploratory one-way analyses of variances (ANOVAs) were used to assess whether values on predictors or other theoretically relevant variables differed between the Disciplines. Standard *F*-statistics for ANOVA are presented when analyses met the assumption of homogeneity of variances (Levene's test) and Welch's adjusted *F*-statistics are presented when the assumption of homogeneity of variances is violated. Post-hoc results are not discussed, as the purpose of these exploratory analyses was solely to determine the eligibility of variables for inclusion as covariates in regression analyses. Related to EBI analyses, certain predictor variables were significantly different between disciplines: *TPB-EBI Attitudes* ($F(5, 703) = 2.523, p < .05$), *TPB-EBI Subjective Norms* ($F(5, 703) = 2.356, p < .05$), and *TPB-EBI Perceived Behavioral Control* ($F(5, 703) = 2.250, p < .05$). Related to FCC analyses, certain predictor variables were significantly different between disciplines: *TPB-FCC Attitudes* (Welch's $F(5, 277.17) = 3.508, p < .05$) and *TPB-FCC Perceived Behavioral Control* (Welch's $F(5, 278.07) = 1.998, p < .001$). *TPB-FCC Subjective Norms* ($F(5, 703) = 2.070, p > .05$) was not significantly different between disciplines. Other variables of interest were also significantly different between disciplines. *Training Emphasized EBIs* ($F(5, 703) = 2.250, p < .05$) and *Training Emphasized FCC* ($F(5, 703) = 2.532, p < .05$) were also significantly different between disciplines. Finally, *Unfamiliarity with EBIs* was significantly different between disciplines (Welch's $F(5, 258.19) = 16.086, p < .001$). In addition, as discussed in the Methods section, for

EBI analyses, it is important to include *Unfamiliarity* as a covariate, as the missing data on the outcome variable (*EBI-Behavior*) was dependent upon *Unfamiliarity*, providing support for the MAR (missing at random) status of the missing data[20]. *Years in Practice* showed a trend towards significant differences between disciplines (Welch's $F(5, 263) = 1.998$, $p = .079$). Variables that were significantly different or trended towards significantly different between the groups of interest in the study were added into regression analyses as covariates.

Non-equivalence on dependent variables. Next, non-equivalence between Disciplines on the dependent variables within the study was examined. Given the aim of this study was to describe and explore EBI and FCC behavior across disciplines, the findings of these analyses are described in more detail than previous non-equivalence tests. A regression approach to analysis of variance (ANOVA)/ analysis of covariance (ANCOVA) was used to explore disciplinary differences on dependent variables, after controlling for covariates; these analyses serve as the foundation for the multiple regression analyses testing study hypotheses related to the TPB.

ANOVA/ANCOVA and multiple regression are equivalent analyses; they are different versions of the general linear model (Tabachnick & Fidell, 2007). In the regression approach to ANCOVA, covariates are entered in Step 1 in a hierarchical multiple regression (i.e., they are controlled for), and the discipline group variables (unweighted effects coded) are entered in the second step. In unweighted effects coding[21] each regression coefficient represents the difference

[20] As Schlomer et al. (2010) discuss, when missing data are related to observed data (i.e., another variable) in the dataset, one must include the observed variable in the analysis as a covariate to avoid bias.

[21] Unweighted effects coding is described in more detail in the context of the regression models used in this study. In general, *groups*-1 number of codes are needed to fully represent the groups (here, 6-1=5). To construct unweighted effects codes, one group (arbitrarily) is designated to be the base group (the contrast of the base group is not represented in the equation, but can be calculated) and is assigned a value of -1 for each coding variable and each of the other groups is assigned a value of 1 for the code variables and a value of 0 for the other code variables (Cohen et al., 2003). I chose to use unweighted effects coding (rather than dummy coding) for the Discipline variable. When dummy coding is used, each regression coefficient represents a comparison of each group mean to a referent group (here, this would be one of the disciplines, say if we wanted to compare all of the groups to the Medical/Nursing group) after adjusting for the influence of the covariates (Cohen et al., 2003). However, my central question is

between the mean of each group and the grand mean on the dependent variable (after adjusting for the influence of the covariates), and the intercept/constant represents the unweighted grand mean of all groups on the dependent variable (Cohen, Cohen, West, & Aiken, 2003). The F-test for the model (for R^2) is equal to the F-test obtained from an ANCOVA (Cohen et al., 2003).

Disciplines and EBIs. Exploratory ANOVAs (using a regression approach) examined whether each discipline's values on *EBI-Behavior,* and each of the subscales (*Recommending EBIs* and *Providing EBIs*) differed significantly from the grand sample, before controlling for any covariates (i.e., baseline). For this analysis, a Holm's correction was used to examine individual tests of the regression coefficients[22], such that each of the variables of interest are ordered in order (i) of their p-values (significance), and then the formula $p(i^*) > \alpha/(k - i^* + 1)$ is used to apply a p-value for each variable (Holm, 1979; Holland & Copenhaver, 1988). As such, if this equation is not true for the variable with the smallest p-value, then all k hypotheses are rejected (Holland & Copehnaver, 1988).

There were significant differences between disciplines on baseline *EBI-Behavior* ($F(5,703)=51.355$, $p<.001$; Table 12), such that the Education group reported recommending/providing significantly more EBIs than the sample as a whole, and the Medicine group reported recommending/providing significantly fewer EBIs than the sample as a whole.

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whether the outcomes of each separate group differ from the average (mean) outcome for the entire sample (Cohen et al., 2003). I also had no *a priori* reasons for designating one group to be a referent group in this case.

[22] A total of 7 effects were examined using the Holms' correction (including the value for the constant in the regression equation).

Table 12.

Regression approach to ANOVA and ANCOVA: Group differences on EBI-Behavior (Recommend + Provide) [a b]

Predictor Variable (N=709)	R^2	*Adj.* R^2	B	SE_B	t	p
ANOVA Main effects						
Constant/Intercept			3.910	.048	82.293	<.001*
Step 1 (Discipline): df = 5, 703	**.268**	**.262**				**<.001***
Education			1.089	.090	12.132	<.001*
Medicine/Nursing			-1.119	.104	-11.531	<.001*
OT/PT			.027	.107	.256	.798
Psychology			.067	.088	.755	.451
Social Work			-.298	.141	-2.115	.034
SLP/Audiology [c]			.314	.097	3.251	.001
ANCOVA Main effects						
Constant/Intercept			3.984	.215	18.563	<.001
Step 1 (Covariates): df = 4, 704	**.406**	**.402**				**<.001***
Step 3 (Discipline): df = 5, 699	**.522**	**.516**				**<.001***
Education			.777	.076	10.238	<.001*
Medicine/Nursing			-.750	.088	-8.542	<.001*
OT/PT			.015	.088	.169	.866
Psychology			-.213	.074	-2.891	.004*
Social Work			-.017	.117	-.145	.884
SLP/Audiology [c]			.189	.079	2.399	.016

Note: The symbol: * is placed after the p-values for individual regression coefficients to indicate significance based on the Holm's correction for multiple comparisons between individual coefficients. Conventional standards (p<.05) should be used to interpret the significance of each of the main regression steps (also noted with the * symbol). Coefficients are not presented for Steps that do not themselves reach p<.05.

[a] All values presented are pooled across imputations using Rubin's (1987) rules.

[b] Only unstandardized B is presented here, as there is not currently a method for calculating pooled β coefficients across multiple imputations in IBM-SPSS v19.

[c] The SLP/Audiology group was the reference group using effects coding (meaning it did not appear as a regression coefficient). The value for this group was obtained by re-running the analysis with another group as the reference group (this yields the same results for the model, but allows for obtaining the value for the other reference group).

Next, an exploratory ANCOVA (using a regression approach; Table 12) examined whether values on *EBI-Behavior* differed significantly between disciplines, after controlling for participants' overall familiarity with the EBIs (*Unfamiliarity* variable), self-reported level of training on EBIs (*Training Emphasized EBIs* variable), and other covariates (*Sample*, *Years in Practice*). The list of EBIs composing *EBI-Behavior* does not provide each discipline with the same number of EBIs typically associated with that discipline (such that it is possible that certain disciplines are less likely to be exposed to and/or familiar with a higher proportion of interventions than others). This ANCOVA assessed how much variance was accounted for in *EBI-Behavior* by being a member of different Discipline groups, after partialling out the effects of these covariates. After controlling for covariates there were significant differences between individual disciplines and the average for the whole sample ($F(9,699)=84.987$, $p<.001$) on *EBI-Behavior*. For this analysis, a Holm's (1979) correction was used to examine individual tests of the regression coefficients[23]. Specifically, the mean for the Education group was significantly greater than the unweighted grand mean of all the disciplines, indicating a higher degree of recommending/providing EBIs compared to the "average professional." The means for the Medicine/Nursing group and the Psychology group were significantly lower than the unweighted grand mean of all the disciplines on EBI-Behavior after controlling for covariates.

Next, baseline discipline differences on the Recommending subscale of *EBI-Behavior* was examined via an ANOVA, using a Holm's (1979) correction. There were significant baseline (i.e., before including covariates) differences between disciplines on *Recommending EBIs* ($F(5,703)=16.570$, $p<.001$; Table 13).

[23] A total of 11 effects were examined using the Holms' correction (including the value for the constant in the regression equation).

Table 13.

Regression approach to ANOVA and ANCOVA: Group differences on Recommending EBIs [a b]

Predictor Variable (*N*=709)	R^2	*Adj.* R^2	*B*	SE_B	t	*p*
ANOVA Main effects						
Constant/Intercept			2.161	.025	86.341	<.001
Step 1 (Discipline): df = 5, 703	**.105**	**.099**				**<.001***
Education			.356	.047	7.536	<.001*
Medicine/Nursing			-.278	.055	-5.076	<.001*
OT/PT			-.109	.056	-1.940	.052
Psychology			.124	.047	2.653	.008*
Social Work			-.122	.075	-1.643	.100
SLP/Audiology [c]			.029	.051	.578	.564
ANCOVA Main effects						
Constant/Intercept			2.196	.103	21.251	<.001*
Step 1 (Covariates): df = 4, 704	**.497**	**.494**				**<.001***
Step 3 (Discipline): df = 5, 699	**.519**	**.513**				**<.001***
Education			.174	.036	4.775	<.001*
Medicine/Nursing			-.006	.042	-.132	.895
OT/PT			-.119	.042	-2.816	.005*
Psychology			-.044	.035	-1.256	.209
Social Work			.040	.056	.717	.474
SLP/Audiology [c]			-.045	.038	-1.198	.231

Note: The symbol: * is placed after the *p*-values for individual regression coefficients to indicate significance based on the Holm's correction for multiple comparisons between individual coefficients. Conventional standards ($p<.05$) should be used to interpret the significance of each of the main regression steps (also noted with the * symbol). Coefficients are not presented for Steps that do not themselves reach $p<.05$.

[a] All values presented are pooled across imputations using Rubin's (1987) rules.

[b] Only unstandardized *B* is presented here, as there is not currently a method for calculating pooled β coefficients across multiple imputations in IBM-SPSS v19.

[c] The SLP/Audiology group was the reference group using effects coding (meaning it did not appear as a regression coefficient). The value for this group was obtained by re-running the analysis with another group as the reference group (this yields the same results for the model, but allows for obtaining the value for the other reference group).

The Education and Psychology groups reported recommend significantly more than the sample as a whole, while the Medical/Nursing group reported recommended significantly fewer EBIs than the sample as a whole. Next, the same analysis was run controlling for covariates (ANCOVA). After controlling for covariates (*Unfamiliarity*, *Training Emphasized EBIs*, *Years in Practice*, and *Sample*) there were significant differences between individual disciplines and the average for the whole sample ($F(9,699)=83.820$, $p<.001$; Table 13) on *Recommending EBIs*. Specifically, the mean for the OT/PT group was significantly lower than the unweighted grand mean, while the mean for the Education group was significantly higher than the unweighted grand mean after adjusting for the effects of covariates.

Next, baseline discipline differences on the *Providing* subscale of *EBI-Behavior* was examined via an ANOVA, using a Holm's (1979) correction. There were significant baseline (i.e. prior to adding covariates) differences between disciplines on *Providing EBIs* ($F(5,703)=83.209$, $p<.001$; Table 14), such that the Education and SLP/Audiology groups reported providing significantly more EBIs than the sample as a whole, and the Medical/Nursing group reported providing significantly fewer EBIs than the sample as a whole. The same analysis was run controlling for covariates (ANCOVA). After controlling for covariates (*Unfamiliarity*, *Training Emphasized EBIs*, *Years in Practice*, and *Sample*) there were significant differences between individual disciplines and the average for the whole sample ($F(9,699)=70.281$, $p<.001$; Table 14) on *Providing EBIs*. Specifically, the means for the Education and Speech-Language/Audiology groups were significantly greater than mean of the sample as a whole, while the means for the Medicine/Nursing and Psychology groups were significantly lower than the mean of the sample as a whole.

Table 14.

Regression approach to ANOVA and ANCOVA: Group differences on Providing EBIs [a b]

Predictor Variable (N=709)	R^2	*Adj.* R^2	B	SE_B	t	p
ANOVA Main effects						
Constant/Intercept			1.749	.027	64.012	<.001*
Step 1 (Discipline): df = 5, 703	**.372**	**.367**				**<.001***
Education			.733	.052	14.196	<.001*
Medicine/Nursing			-.921	.060	-15.345	<.001*
OT/PT			.137	.062	2.217	.027
Psychology			-.057	.051	-.119	.263
Social Work			-.176	.081	-2.170	.030
SLP/Audiology [c]			.285	.056	5.122	<.001*
ANCOVA Main effects						
Constant/Intercept			1.788	.139	12.839	<.001
Step 1 (Covariates): df = 4, 704	**.240**	**.235**				**<.001***
Step 3 (Discipline): df = 5, 699	**.475**	**.468**				**<.001***
Education			.603	.049	12.244	<.001
Medicine/Nursing			-.745	.057	-13.051	<.001
OT/PT			.134	.057	2.344	.019
Psychology			-.168	.048	-3.516	<.001
Social Work			-.057	.076	-.756	.450
SLP/Audiology [c]			.234	.051	4.567	<.001

Note: The symbol: * is placed after the *p*-values for individual regression coefficients to indicate significance based on the Holm's correction for multiple comparisons between individual coefficients. Conventional standards (p<.05) should be used to interpret the significance of each of the main regression steps (also noted with the * symbol). Coefficients are not presented for Steps that do not themselves reach p<.05.

[a] All values presented are pooled across imputations using Rubin's (1987) rules.

[b] Only unstandardized *B* is presented here, as there is not currently a method for calculating pooled β coefficients across multiple imputations in IBM-SPSS v19.

[c] The SLP/Audiology group was the reference group using effects coding (meaning it did not appear as a regression coefficient). The value for this group was obtained by re-running the analysis with another group as the reference group (this yields the same results for the model, but allows for obtaining the value for the other reference group).

These exploratory analyses provide some additional information regarding the self-reported behavior of professionals. Overall, given these differences between disciplines, Discipline will be an important covariate to control for in study analyses. For all analyses testing study hypotheses, *EBI-Behavior* (combined measure) will be used as the dependent variable, as the primary focus of the study to assess whether the TPB is useful in understanding professionals' overall behavior surrounding recommending/providing EBIs.

Disciplines and FCC. An exploratory analysis of variance (using a regression approach to ANOVA) examined whether values on *FCC-Behavior (MPOC-SP)* differed significantly between disciplines, before controlling for any covariates. This ANOVA assessed baseline (i.e. prior to adding covariates) differences between Discipline groups in self-reported *FCC-Behavior* compared to the grand sample mean. For this analysis, a Holm's (1979) correction was used to examine individual tests of the regression coefficients[24]. There were significant differences between disciplines ($F(5,703)=4.224$, $p<.001$), such that the Medical/Nursing group reported using significantly a lesser degree of an FCC approach ($p<.001$) than the sample as a whole.

Next, an analysis of covariance (using a regression approach to ANCOVA) examined whether values on the *MPOC-SP* differed significantly between disciplines, after controlling for participants' self-reported level of training on FCCs (*Training Emphasized FCC*) and other covariates. After controlling for covariates, there were still significant differences between disciplines on the *MPOC-SP* ($F(8,700)=6.263$, $p<.001$). The significant effect (assessed after applying a Holm's (1979) correction[25]) noted was due to the Medicine/Nursing group being significantly lower than the sample grand mean.

[24] A total of 7 effects were examined using the Holms' correction (including the value for the constant in the regression equation).
[25] A total of 10 effects were examined using the Holms' correction.

In sum, these analyses of non-equivalence on the dependent variables provide the building blocks for the regression models that will later test study hypotheses. The findings that disciplines differed on the dependent variables indicate that discipline (along with the covariates included in analyses) are an important variable to control for prior to testing hypotheses related to the TPB constructs.

Selection of covariates for regression model. Covariates were selected by considering the theoretical justification for each[26] and the results of non-equivalence analyses. Ajzen (2005) suggests that background variables related to social (e.g., Discipline), personal (e.g., intelligence), and information (e.g., experience) categories be considered for inclusion as covariates. Based on the current literature on professionals working with children with ASDs and the nonequivalence analyses, the covariates for the current study were selected (Table 15).

Common demographics (e.g., gender, race, and age) were considered for inclusion as covariates. However, *Age* and *Years in Practice* were highly correlated ($r\ (707) = .79$, $p < .001$), and as such. *Years in Practice* was selected rather than *Age*, as it was of interest to assess for potential cohort effects (i.e., historical time when training/education was received). Chi-square analyses (presented in Results) indicated that *Race* was not dependent upon either *Sample* or *Discipline*, and was thus not included as a covariate. *Gender* was significantly dependent upon *Discipline* (and for some disciplines, e.g., occupational therapy, there were very few men). Gender was not included as a covariates, as there was no theoretical reason to suppose that women or men would be more or less likely to engage in the behaviors under study; this relationship was most likely to due to real differences in number of males and females in

[26] Jaccard, Guilamo-Ramos, Johansson, and Bouris (2006) caution against atheoretical partialling in multiple regression analyses (i.e., using covariates without a careful theoretical reason for doing so). Including covariates "simply because 'they might be relevant'" without a theoretical rationale for inclusion a priori can cause researchers to place an emphasis on variables for which there is no basis for doing so (Jaccard et al., 2006, p. 459).

particular disciplines. *Degree* (categorical: Bachelor's, Master's, Doctoral) was considered as a covariate for analyses. However in initial testing of the regression assumptions, it was found that the levels of *Degree* and *Discipline* had significant collinearity, as evidenced by tolerance values less than .10. This makes intuitive sense: for most disciplines the degree received is similar for most individuals within the discipline (e.g., all physicians receive doctoral-level degrees). As such, *Degree* was not used as a covariate. Based on non-equivalence testing, whether the participant was recruited from the paper or internet survey sample was also included as a design-level covariate for each analysis (*Sample*). Finally, *Discipline* was included as a covariate.

Table 15.

Covariates selected for analyses

Covariates for EBI analyses	Covariates for FCC analyses
Design • Survey mode (paper or internet) **Social** • Discipline (moderator) **Information: Experience** • Years in practice in this discipline **Information: Knowledge and familiarity** • Knowledge about EBIs (assessed via response to: "*In my training, an explicit emphasis was placed on using evidence-based interventions (i.e., interventions based on the best scientific evidence)"*). • Familiarity with EBIs (assessed by Unfamiliarity summary score).	**Design** • Survey mode (paper or internet) **Social** • Discipline (moderator) **Information: Experience** • Years in practice in this discipline **Information: Knowledge and familiarity** • Knowledge about FCC (assessed via response to: "*In my training, an explicit emphasis was placed on using a family-centered care approach (i.e., collaborative partnerships with families and considering individual/family values)"*).

Intercorrelations Among Study Variables

The previous section identified covariates for inclusion in the current study based on non-equivalence testing and theoretical grounds. Bivariate associations (correlations) were conducted to examine preliminary relations and patterns between variables included in analyses. This is a helpful step prior to multiple regression analyses in order to learn more about relations between

variables (in correlation, one assesses the degree of association between variables, while in regression, it is possible to assess whether there is a predictive relationship between independent variables and dependent variables; Tabachnick & Fidell, 2007). Two correlation matrices were completed: one for EBI predictors, covariates, and outcomes, and one for FCC predictors, covariates and outcomes. For each set of analyses (i.e., each correlation matrix), I used a Holm's (1979) correction to correct for multiple correlation analyses[27]. The correlations starred (*) in Table 16 and Table 17 are those that were significant after applying Holm's correction.

Bivariate associations among EBI predictors[28]. EBI correlations are found in Table 16. Within the *TPB-EBI* measure, there were significant correlations between each of the subscales. While these correlations are statistically significant, they do not reach the level indicative of multicollinearity (r>.70). Each TPB variable may be entered into multiple regression analyses as a unique predictor; multicollinearity will be assessed formally using regression diagnostics.

In addition, there were a number of significant correlations between the other covariates and between the covariates and the *TPB-EBI* measures. Participants who had been in practice for more years were less likely to have had training emphasizing EBIs, were less familiar (i.e., more *Unfamiliar*) with EBIs, had less positive attitudes towards EBIs and perceived less social pressure to use EBIs (*Subjective Norms*). Participants who reported being less familiar (i.e., more *Unfamiliar*) with EBIs had a lesser degree of perceived self-efficacy or control surrounding using EBIs with children with ASDs. Finally, participants who reported more training on EBIs reported having more positive attitudes towards EBIs, perceiving more social pressure to use EBIs, and having a higher degree of self-efficacy and control in using EBIs.

[27] A total of 21 correlations were completed for the EBI dataset, and a total of 15 correlations were completed for the FCC dataset. These numbers were used in the Holm's correction formula for each correlation matrix.
[28] Degrees of freedom for correlation analyses are always *n*-2; here, degrees of freedom are 709-2 = 707 (Walker, 1940).

Bivariate associations among EBI predictor and outcome variables. First, the relation between the independent variables (*TPB-EBI*) and dependent variable of interest, *EBI-Behavior* was examined. The strength and direction of these correlations indicate that participants who reported having more positive attitudes, perceiving a higher degree of social pressure, and having higher degree of self-efficacy and control surrounding recommending and providing EBIs also reported recommending/providing more EBIs. Next, the relation of *EBI-Behavior* to other covariates was examined. Participants who reported being less familiar (i.e., more *Unfamiliar*) with the EBIs on the list also reported less recommendation/provision of EBIs, while those participants who reported receiving more training on EBIs reported more recommendation/provision of EBIs.

Table 16.

Intercorrelations between continuous EBI variables [a]

	Variable	1	2	3	4	5	6
1	Years in Practice	--					
2	Unfamiliarity with EBIs [b]	-.163*	--				
3	Training Emphasized EBIs [c]	-.335*	.006	--			
4	TPB-EBI (*A*)	-.132*	-.077	.257*	--		
5	TPB-EBI (*SN)*	-.139*	-.069	.204*	.504*	--	
6	TPB-EBI (*PBC*)	.069	-.279*	.111*	.384*	.265*	--
7	EBI-Behavior (Sum Rec & Prov) [d]	.052	-.625*	.115*	.235*	.163*	.268*

Notes: [a] All correlations represent pooled estimates across all imputations after outliers that were over 3 standard deviations (SDs) from the mean were Winsorized to the value at 3 SDs from the mean for each variable.
**p* was significant after conducting a Holm's correction on all correlations run for EBI dataset.
[b] Calculated by summing the number of interventions for which the individual endorsed being "Unfamiliar" with.
[c] Participant provided response to the question, *"In my training, an explicit emphasis was placed on using evidence-based interventions (i.e., interventions based on the best scientific evidence,"* using a 5-point Likert-type scale ranging from 1= "Strongly Disagree" to 5= "Strongly Agree."
[d] Only total score for the EBI-Behavior measure is used for analyses.

Bivariate associations among FCC predictors. FCC correlations are found in Table 17. Within the *TPB-FCC* measure, there were significant correlations between each of the subscales. While these correlations are statistically significant, they do not reach the level indicative of multicollinearity (r>.70). Each TPB variable may be entered into multiple regression analysis as a unique predictor; multicollinearity will be assessed formally using regression diagnostics.

In addition, there were a number of significant correlations between the other covariates and between the covariates and the *TPB-FCC* measures and other covariates. Participants who were in practice for more years also reported having more self-efficacy and control in using FCC with children with ASDs, but also reported that they received less training on FCC. Also, participants who reported more training on FCC also reported having more positive attitudes towards FCC, perceiving more social pressure to use FCC, and having a higher degree of self-efficacy and control in using FCC.

Bivariate associations among FCC predictor and outcome variables. First, the relation between the independent variables (*TPB-FCC*) and dependent variable of interest, *MPOC-SP* Total Average Score (*FCC-Behavior*) was examined. The strength and direction of these correlations indicate that participants who reported having more positive attitudes, perceiving a higher degree of social pressure, and having higher degree of self-efficacy and control surrounding using an FCC approach also reported using an FCC approach more in their practice with children with ASDs. Next, the relation of the *MPOC-SP* to other covariates was examined. Participants who reported more behaviors consistent with an FCC approach also reported being in practice longer and having more training on FCC.

Table 17.

Intercorrelations between continuous FCC variables [a]

	Variable	1	2	3	4	5
1	Years in Practice	--				
2	Training Emphasized FCC [b]	-.188*	--			
3	TPB-FCC (A)	.072	.195*	--		
4	TPB-FCC (SN)	-.050	.173*	.320*	--	
5	TPB-FCC (PCB)	.119*	.210*	.382*	.282*	--
6	MPOC-SP Total (Avg. of all) [c]	.194*	.151*	.309*	.151*	.434*

Notes: [a] All correlations represent pooled estimates across all imputations after outliers that were over 3 standard deviations (SDs) from the mean were Winsorized to the value at 3 SDs from the mean, for each variable.
**p* was significant after conducting a Holm's correction on all correlations run for EBI dataset.
[b] Participant provided response to the question,*" In my training, an explicit emphasis was placed on using a family-centered care approach (i.e., collaborative partnerships with families and considering individual/family values,"* using a 5-point Likert-type scale ranging from 1= "Strongly Disagree" to 5= "Strongly Agree."
[c] Only total score for the MPOC-SP measure is used for analyses.

Rationale for Using an Interaction Approach to Multiple Regression to Test Study Hypotheses

The previous section reviewed the bivariate associations (correlations) between the variables in the study; there are a number of relations between the predictors, covariates, and outcome variables in the study. This section discusses the rationale for using an interaction approach to multiple regression to test study hypotheses. To review, this study aims to assess the contribution of TPB predictors to professionals' self-reported behaviors in working with children with ASDs on *EBI*- and *FCC-Behavior*. Stated another way, it is hypothesized that there will be a *main effect* of attitudes, subjective norms, and perceived behavioral control in predicting professionals' self-reported behavior. This analysis is tested by hierarchical multiple regressions. Secondly, if there is a main effect for TPB variables in predicting self-reported behavior, it is hypothesized that these TPB variables will operate differently for each discipline, compared to all other disciplines (or the "average professional" in the sample). Stated another way, it is hypothesized that if there is a main effect of TPB predictors, the strength of the effect of the TPB

predictors will be different for each discipline. Within this second set of hypotheses is a decision point regarding which analysis to proceed with.

Two options that have been used in the literature to address questions such as this (i.e., different effects of predictors for different groups) and the rationale for choosing one over the other will be discussed. The two options are: 1) running regressions separately within each group (Discipline); and 2) running a hierarchical regression with Discipline as a moderator variable on the whole sample.

Option 1: Separate regression models for separate groups. One option that has been commonly used in the applied research literature to address questions regarding between group differences in effects is to examine the regression model within each group separately. This is done by running separate multiple regressions within each group, and then drawing conclusions about whether the effect is the same for each group based on whether there is a significant effect for each group (Jaccard & Turrisi, 2003). However, by completing separate regression analyses for each discipline group, any significant findings for TPB variables within a group would indicate that the TPB variables "matter" statistically for that *particular* group in terms of predicting behavior (i.e., the effect is statistically significantly different than no effect, or zero effect). However the critical point is that without conducting formal tests [29], running models separately for each group does not provide any information about whether the TPB variables matter differently *across* groups (i.e., whether the magnitude of the effect is different for different groups compared to the other groups). Examining separate models can only provide information about whether the TPB variables are important in explaining the effect for a

[29] One example of this is the Chow test statistic. The Chow test statistic evaluates whether "the coefficients estimated over one group of the data are equal to the coefficients estimated over another" (Gould, 2002, updated 2011, p. 1). It is represented by a complex equation that essentially does the equivalent procedure as an interaction term does in a hierarchical multiple regression, as long as the variance of the residuals for each group are the same (Williams, n.d.; Matheson, 2001; Gould, 1999, updated 2005).

particular group and whether the effect for that group is statistically significantly different than a null effect (i.e., no effect).

Option 2: Using an interaction approach to multiple regression. The second option for conducting group comparisons is treating group (Discipline) as a moderating variable and running a hierarchical multiple regression analysis, where the interaction between the moderator (Discipline) and the predictors of interest (TPB predictors) are included as a component of the model (Williams, n.d.; Jaccard & Turrisi, 2003). Each level of Discipline (re-coded to represent a separate variable, for instance, using unweighted effect coding) would be multiplied by each of the predictors of interest to yield a series of product terms (Discipline × TPB predictors). The moderator effect can be tested by adding a step to the hierarchical multiple regression model (which already includes tests of the main effects for the predictor and moderator variables) that includes all product terms (Frazier et al., 2004). Each interaction variable (product term) represents the differences between the effect of TPB predictor in a specific Discipline (group) and the sample mean effect of TPB predictors, representing the "average professional" in the sample (Cohen et al., 2003).

"The moderator effect is tested with the multiple degree of freedom omnibus *F* test representing stepwise change for the step in which the multiple product terms are entered" (Frazier et al., 2004, p. 121). If this step is statistically significant, there is a significant interaction between Discipline and TPB variables, such that the TPB predictors matter differently for different disciplines in explaining behaviors, compared to all other disciplines. The specifics of the effects can be examined by looking at the single degree of freedom *t*-tests (and regression coefficients) related to specific product terms to determine the form and direction of the effects (Frazier et al., 2004). In order to understand the relationship, no further analyses

(e.g., the Chow test; Gould, 2002, updated 2011) are necessary. In this way, the interaction approach to regression parsimoniously addresses questions of 1) whether there is a main effect of predictors for the sample as a whole, and 2) whether the effect (magnitude of strength) of predictors is significantly different from the sample mean for each of the groups (Discipline; this is statistically equivalent to a Chow test statistic calculated performed on regression models run individually for different groups; Williams, n.d.; Gould, 2011). If the interaction step is not significant, it indicates that the effects of the TPB predictors on behavior do not significantly differ in magnitude across the disciplines, and the main effect model sufficiently represents the effect of TPB predictors in explaining the dependent variable.

Choice of Option 2 (Interaction approach) in this Study. An interaction approach to multiple regression is more appropriate for addressing the study hypotheses than running individual regression models for each group. The hypotheses are concerned with a) whether there is a *main effect* of TPB predictors on behavior, and 2) whether the *magnitude* of the effect of TPB predictors on behavior is different for different disciplines. Because the hypotheses are regarding differences in effect for each discipline and the sample as a whole, it is necessary use a statistical test that can evaluate differences in the magnitude of the effect between disciplines.

Running a regression model independently for each group does not address whether there are differences in effect between disciplines. Doing so would indicate whether, for each discipline, there is a significant effect (i.e., that the effect for that group is significantly different than zero, or no effect), but it would not (without formal tests) provide information on whether the magnitude of the effect for each group is statistically different (stronger or weaker) than the sample as a whole.

Indeed, there are also limitations to Option 1 (running a separate model for each group) that have been outlined in the methodology literature. First, estimating models for separate groups can result in a lack of statistical power to detect any effects within each group (Williams, n.d.), especially if you correct for multiple comparisons, for instance by using a Bonferroni or Holm's correction. This is especially problematic when the group sizes are different, as they are in this sample (e.g., social work's $n = 52$, while psychology's $n = 163$). Different groups would have different power to detect effects, based on their sample sizes. An even bigger challenge is that by simply examining the regression models of each group (here, Discipline), to see if they are significant *within* that group, does not result in a formal comparison of the different slopes (i.e., magnitude of effect) *between* the groups (Jaccard & Turrisi, 2003; Williams, n.d.). Williams (n.d., p. 13) does an excellent job of summarizing this problem:

> "When comparing groups by estimating separate models, it is entirely possible that a variable will have a significant effect in one group and [a non]-significant effect in the other. Yet, the difference in effects between the groups may not be statistically significant. This might occur if, say, the sample size for one group is larger than the sample size for the other. It would therefore be very misleading to say that a variable was important for one group but not the other. Likewise, apparently large differences in effects may not be statistically significant. When comparing groups, you should do formal statistical tests… if you want to claim there are group differences; don't rely on just eyeballing."

Formal statistical tests include the Chow test (if the models are run separately; Gould, 2002; updated 2011) or by including interaction terms in a multiple regression analysis (this is equivalent to the Chow test but completed within one regression model; Williams, n.d.). Stating that a "group difference" exists if slopes are significantly different in one group versus another without formal testing is "usually poor statistical practice" (Jaccard & Turrisi, 2003, p. 36).

A formal test of differences in slopes (e.g., as is done in the process of calculating an interaction term between the group of interest and the predictor of interest and testing the

interaction of the two in a moderated multiple regression) is necessary in order to draw conclusions about differences in effects across groups (Jaccard & Turrisi, 2003; Williams, n.d.). This is especially important when the sample sizes for groups are different, it is quite possible that the strength of effect noted for one group versus another is different simply because of the differences in effect size for effects in groups of varying sizes (Williams, n.d.).

Another problem with running regression models in separate groups relates to calculating the variance of the residuals (i.e., error terms; Jaccard & Turrisi, 2003). When running models separately for each group, the residuals are calculated based on only a single group, rather than on the pooled estimate of residual variance across all groups; this is tantamount to ignoring important available information in constructing the regression model (Jaccard & Turrisi, 2003). In particular, this applies when the variances of the residuals (normality, linearity, and homoscedasticity) are the same across all groups (i.e., Gould, 1999, updated 2005), as is the case in this study[30]. Even in cases where the variances of residuals are not the same across groups, "the model is fully interacted, so the assumption of equal variances never makes a difference in the calculation of the coefficients" (Gould, 1999, updated 2011, no page number).

Summary. In sum, hierarchical multiple regression with interaction terms (here, Discipline by TPB predictors) is a parsimonious method to assess whether the effect of predictors on outcome variables differ across different levels of the group variables. There are drawbacks to running regression models separately for different groups in this case, namely, that doing so does not provide a formal test of between-group differences in magnitude of effects, which is the primary secondary hypothesis.

Assumptions of Multiple Regression

[30] I examined the variance of the residuals separately (see Tabachnick & Fidell, 2007, p. 125) by group and the variance of the residuals about predicted dependent variable scores is comparable in each group.

This section will discuss the assumptions that were tested as a prerequisite to analyses to ensure that regression is an appropriate approach (Tabachnick & Fidell, 2007). The following assumptions for multiple regression equations were assessed: Reliability, Multicollinearity, Multivariate Outliers, Normality, Linearity, and Homoscedasticity (Osborne & Waters, 2002; Tabachnick & Fidell, 2007; Cohen, Cohen, West, & Aiken, 2003).

Reliability. Low reliability of measures can cause complex effects on the strength of relationships in a regression equation and can lead to erroneous findings (Osborne & Waters, 2002). All measures and scales included in the regression equation were above .70, meeting the general standards in the field for adequate reliability (DeVellis, 2003; Field, 2005).

Multicollinearity. Collinearity statistics were conducted. For variables across both sets of analyses (EBI and FCC), tolerance values were greater than .10 and variance inflation factors (VIF) values were less than 10, indicating a lack of multicollinearity (Field, 2005). Bivariate associations of the predictors were examined and none were equal to or greater than .70, providing additional support for a lack of multicollinearity of variables (Field, 2005).

Multivariate Outliers. For each multiple regression analysis, regression model diagnostics were conducted to assess the existence of multivariate outliers and influential cases. Centered leverage values and Mahalanobis distances were conducted to assess how unusual each case was in terms of its values on the independent variables (compared to the mean values; Cohen et al., 2003; Field, 2005; Tabachnick & Fidell, 2007). Externally studentized residuals were calculated to assess the discrepancy between predicted and observed values on the outcome variables (or whether individual cases pull the regression line towards themselves; Cohen et al., 2003). Cook's D was used as a global measure of influence assessing how much regression coefficients would change if a particular case or outlier were removed. Specific measures of

influence on each individual regression coefficient (*B)* were calculated (DFBETA; Cohen et al., 2003; Field, 2005). Diagnostic values for each multiple regression model are found in Appendix F (EBI) and Appendix G (FCC). In short, both models were deemed not to have any influential multivariate outliers, and all cases were maintained in study analyses.

Normality, Linearity, and Homoscedasticity. After calculating scale scores from the imputed item-level values, variables were screened to see if they had a normal distribution. Values for skewness and kurtosis were examined to determine normality of the data. While there were some skewed independent variables, dependent variables were within acceptable limits for skewness and kurtosis and were normally distributed. For multiple regression, no distributional assumptions are made about the independent variables; it is only a requirement that dependent variables be normally distributed (Tabachnick & Fidell, 2007, p. 125).

In addition, with regression, examination of residuals scatterplots provides a test of assumptions of normality, linearity, and homoscedasticity between predicted dependent variables and the errors (residuals) within the prediction model (Tabachnick & Fidell, 2007; Seltman, 2012). The scatterplot for the residuals (predicted values of dependent variable on the X-axis and residuals on the Y-axis) for each analysis was examined; this examination indicated that the models met the assumptions of normality. In addition, the shape of the scatterplots appeared to be consistent with a linear distribution for EBI and FCC regressions. Next, the band enclosing the residuals was examined and was approximately equal in width at all values of the predicted dependent variable for EBI and FCC regressions; this provides evidence for meeting the assumption of homoscedasticity (Osborne & Waters, 2002).

General Multiple Regression Procedures

This section provides an overview of the general procedures conducted for assembling each regression model. To address study hypotheses, hierarchical multiple regression analyses were performed (for the separate dependent variables: EBI and FCC). *Sample* (a categorical variable) was re-coded to a dummy coded variable such that 1 = the stratified random sample and 0 = the convenience sample. *Discipline* was re-coded into five effect code indicator variables (*groups*-1; Cohen et al., 2003) using unweighted effects coding, such that one group represents the base group (it is statistically arbitrary which group is the base group, unlike in dummy coding where the base group is the reference group against which all other means are compared to[31]), and is given a value of -1 for each of the five effects coded indicator variables (Cohen et al., 2003). Other indicators are coded as 1 to indicate membership in the group, and 0 to indicate non-membership (Cohen et al., 2003). In unweighted effects coding, each of the means of the groups are compared with the unweighted mean of the sample as a whole (i.e., the unweighted grand mean or the "average of the means" of each group[32]), and produces identical regression coefficients to those in an ANOVA framework. In effects coding, the regression coefficient for each group is the difference between the group's average value on the outcome variable and the grand mean of the outcome variable, and the individual significance test for each coefficient tests whether the value for that group differed significantly from the sample grand mean.

Continuous variables were centered by subtracting the sample means from each value (by imputation) prior to inclusion in the model; this was done to reduce collinearity with interaction

[31] This contrasts with dummy coding, in which the regression coefficient for each dummy coded variable (group) is contrasted with one reference group (Aiken, West, & Reno, 1991; Frazier, Barron, & Tix, 2004). I decided to use effects coding rather than dummy coding, as I was not interested in comparing one group to all the rest of the groups; I had no *a priori* hypotheses about the specific discipline groups. Instead, I was interested in comparing each group to the "average professional" in the sample (represented by the unweighted sample grand mean).

[32] When there are unequal sample sizes in each group, the "grand mean" refers to the average of the group means, weighted equally, and does not refer to the grand mean of all observations (such that each observation is weighted equally; Cohen et al., 2003). Weighted effects coding (r weighting the group mean by the number of observations contributing to the group mean) is generally only used when the sample distribution is assumed to be representative of your population (Cohen et al., 2003).

terms (Cohen et al., 2003; Aiken et al., 1991; Frazier et al., 2004). Product terms were created between each TPB predictor and the moderator variable (discipline) by multiplying the centered TPB variables by the unweighted effects coded discipline variables (Cohen et al., 2003; Aiken et al., 1991; Frazier et al., 2004). Variables were entered in a series of blocks in each analysis. The specific model (and blocks/steps) for each analysis is fully outlined in the corresponding sections for the analyses. To avoid left-out-variables (LOV) error, variables that did not have R^2 values indicating predictive value (i.e., p-values less than or equal to .20) were maintained in the final regression equations (consistent with recommendations in Jaccard et al., 2006)[33].

Testing Study Hypotheses: Predictors of *EBI-Behavior*

This section will discuss the process of testing Hypotheses 1 and 2 related to recommending/providing EBIs. Regression diagnostics are found in Appendix F. To determine the effect of predictors on *EBI-Behavior* (sum of average scores on *Recommending* and *Providing* EBIs), EBI predictor and covariate variables were entered in a series of blocks. Specific hypotheses were addressed using iterative versions of the regression model[34].

[33] When utilizing a theory-driven approach (here, we use an approach guided by the TPB theoretical model; Ajzen, 1991), "theory trimming" or removal of coefficients that are not significant can lead to left-out-variables (LOV) error (Jaccard et al., 2006, p. 474). In LOV, the "analyst omits from the estimating equation a theoretically relevant variable that is correlated with one or more of the other predictors and has a direct effect on the outcome variable… Leaving out such variables can create bias in the coefficients of the other predictors…" (Jaccard et al., 2006, p. 474). If theory guided the inclusion of the variable initially, it is recommended that predictors that are not significant be retained in the regression equation to protect against LOV error (Jaccard et al., 2006).

[34] It should be noted that slightly different versions of the regression model were utilized to test Hypothesis 1 and 2. My rationale for this is as follows. Hypothesis 2 analyses include the addition of a moderator and interaction term (product) to the regression equation. Jaccard et al. (2006) and Frazier et al. (2004) have cautioned against interpreting main effects when product terms (interactions) are entered into the regression equation, as the introduction of the product term alters what the coefficients for the predictor variables reflect. Specifically, the relationships "are interpreted as 'conditional' effects at the value of 0 for the other variables included in the model and not as 'main effects,' as is often the practice in published studies" (Frazier et al., 2004, p. 121). In order to simplify the interpretation of main effects of TPB predictors (Hypothesis 1), I opted to use a version of the regression equation in which the values were left un-centered, such that main effects of TPB predictors were more easily interpretable. Second, I chose to use a slightly different version of the regression equation to test Hypothesis 1, as I was interested in controlling for Discipline in testing the main effect of TPB predictors and assessing the added explanatory power of the TPB predictors (R^2) above and beyond the covariates. When including interaction terms in the analysis (Hypothesis 2), Discipline (the moderator) is entered into the equation after the predictors (Frazier et al., 2004), such that specifically assessing the change in R^2 of adding TPB variables while controlling for

Hypothesis 1. Attitudes, subjective norms, and perceived behavioral control surrounding recommending/providing EBIs for children with ASDs will each significantly (p<.05) predict professionals' self-reported overall recommendation/provision of evidence-based interventions, after controlling for relevant covariates and for professional discipline membership. This hypothesis is examined using hierarchical multiple regression. To test this hypothesis of a main effect of TPB predictors, variables were entered into the first version of the equation in a series of blocks: (1) design variable (*Sample*, dummy coded such that 1= stratified random sample); (2) covariates (*Years in Practice*, *Training Emphasized EBIs*, *Unfamiliarity with EBIs*); (3) *Discipline* (recoded using unweighted effects coding); and (4) TPB-EBI predictors (Attitudes, Subjective Norms, Perceived Behavioral Control). As such, it was possible to examine the predictive utility of the TPB variables while controlling for the effects of the *Sample*, *Years in Practice*, *Training Emphasized EBIs*, *Unfamiliarity with EBIs*, and *Discipline*. All variables were in their original form (un-centered) for this version of the regression equation for ease of interpretation of main effects[35].

Table 18 displays the results of the hierarchical regression analysis testing this hypothesis. The final model was significant ($F(12, 696) = 71.888$, $p < .001$). Overall, the regression model explained 49.8% of the variance (Adjusted $R^2 = .492$) in *EBI-Behavior*. In addition, a significant amount of variance was added at each step following the initial step, which included the *Sample* variable (which did not add significant explanatory power to the model). Covariates added in Step 2 explained 36.4 percent additional variance to the model.

Discipline and other covariates was not feasible. As such, alternate versions of the regression equation were created to test these hypotheses.

[35] Centering refers to putting variables into their deviation units by subtracting their sample means to produce revised sample means of zero (Frazier et al., 2004; Cohen et al., 2003). Centering is recommended when testing an interaction between predictors and moderators but is not necessary in typical hierarchical multiple regression analyses and can complicate interpretation of main effects (Frazier et al., 2004).

Discipline (added in a block in Step 3) also explained significant additional variance (10.5%). Finally, *TPB-EBI* variables were added in Step 4 and accounted for a significant amount of additional variance in the model (2.8%). This step was significant, but explained a small amount of additional variance after controlling for the effects of all other variables (2.8%). In this final model, the constant represents the unweighted mean of the six groups (grand mean), after accounting for the effects of all other covariates.

The observed power of this final model was calculated using an online calculator (Soper, n.d.) and was 1.0 (at p=.05, for 13 predictors). Ferguson's (2009, p. 533) guidelines for interpreting effect sizes using squared association indices (e.g., R^2) were used: "recommended minimum effect size representing a 'practically' significant effect for social science data" is .04; .25 is a moderate effect; and .64 is a strong effect. By these standards, the overall model has a moderate effect, and the TPB predictors have a practically non-significant effect. However, as R^2 change is not linearly related to effect size (Aiken & West, 1991, p. 157), Cohen's f^2 should instead be used as a measure of effect size (Aiken & West, 1991).

The effect size of the final model (Cohen's f^2) was calculated using an online calculator (Soper, n.d.), and evaluated by the guidelines for interpreting these effect sizes: f^2=.02 is a small effect size; f^2=.15 is a moderate effect size; f^2=.35 is a large effect size (Cohen, 1988, as cited in Aiken & West, 1991, p. 158). Cohen's f^2 was 0.992, indicating a large effect of the overall model. The effect size in the form of Cohen's f^2 for each of the steps was also calculated: Covariate step f^2= .574 (large effect); *Discipline* step f^2=.196 (moderate effect); and TPB predictor step f^2= .056 (small effect).

Table 18.

Hierarchical multiple regression analyses predicting professionals' EBI-Behavior from theory of planned behavior (TPB) constructs (final model) [a b]

Predictor Variable (*N*=709)	*B*	*R*	R^2	*Adj.* R^2	ΔR^2	*p*
Constant/Intercept	2.150					<.001*
Step 1 (Design covariate): df = 1, 707		**.044**	**.002**	**.001**	**.002**	**.215**
Step 2 (Covariates): df = 3, 704		**.574**	**.366**	**.363**	**.364**	**<.001***
Years in Practice	-.001					.763
Training Emphasized EBIs	.105					.014
Unfamiliarity with EBIs	-.151					<.001*
Step 3 (Discipline): df = 5, 699		**.651**	**.470**	**.465**	**.105**	**<.001***
Education	.759					<.001*
Medicine/Nursing	-.794					<.001*
OT/PT	.039					.650
Psychology	-.237					.001*
Social Work	.010					.932
SLP/Audiology [c]	.224					.003*
Step 4 (TPB-EBI): df = 3, 696		**.670**	**.498**	**.492**	**.028**	**<.001***
Attitudes (ATT)	.206					<.001*
Subjective Norms (SN)	.081					.022
Perceived Behavioral Control (PCB)	.054					.114

Note: The symbol: * is placed after the *p*-values for individual regression coefficients to indicate significance based on the Holm's correction for multiple comparisons between individual coefficients (Table 19). Conventional standards ($p<.05$) should be used to interpret the significance of each of the main regression steps (also noted with the * symbol). Coefficients are not presented for Steps that do not themselves reach p<.05.

[a] All values presented are pooled across imputations using Rubin's (1987) rules.

[b] Only unstandardized *B* is presented here, as there is not currently a method for calculating pooled β coefficients across multiple imputations in IBM-SPSS v19.

[c] The SLP/Audiology group was the reference group using effects coding. The value for this group was obtained by re-running the analysis with another group as the reference group (this yields the same results for the model, but allows for obtaining the value for the other reference group).

In examining the individual regression coefficients (14 t-tests: Covariates, Discipline variables, *TPB-EBI* variables, and the constant), it is recommended that a correction be performed for the multiple comparisons conducted within multiple regression analyses, although this is rarely done in practice in the literature (Mundfrom, Perrett, Schaffer, Piccone, & Roozeboom, 2006). For this

analysis, a Holm's (1979) correction was used. The critical values used for each of the variables, ordered by p-value are found in Table 19. In terms of covariates, *Unfamiliarity with EBIs* significantly predicted *EBI-Behavior*, indicating that being less familiar with EBIs predicted less recommending and providing of EBIs.

Table 19.

Significant p-values for EBI analysis 1 using Holm's correction

i	Variable	*p(i)*	α/(k – *i** +1)	Reject Null Hypothesis?
1	Unfamiliar	<.0001	.0036	Y
2	Education	<.0001	.0038	Y
3	Medical/Nursing	<.0001	.0042	Y
4	(Constant)	<.0001	.0045	Y
5	TPB-EBI Attitudes (ATT)	.0003	.0050	Y
6	Psychology	.0009	.0056	Y
7	Speech-Language/Audiology	.0030	.0063	Y
8	Training Emphasized EBIs	.0136	.0071	N
9	TPB-EBI Subjective Norms (SN)	.0220	.0083	N
10	Sample	.0252	.0100	N
11	TPB-EBI Perceived Behavioral Control (PBC)	.1135	.0125	N
12	OT/PT	.6499	.0167	N
13	Years in Practice	.7634	.0250	N
14	Social Work	.9318	.0500	N

The finding that *TPB-EBI Attitudes* significantly predicted *EBI-Behavior* provides support for a portion of Hypothesis 1. However, *TPB-EBI Subjective Norms* and *TPB-EBI Perceived Behavioral Control* did not significantly predict *EBI-Behavior* scores, indicating that while we can accept part of Hypothesis 1, there is not evidence for rejecting the null hypothesis for *Subjective Norms* and *Perceived Behavioral Control*. It should be noted that the effect size

for the contribution of TPB predictors was small (Aiken & West, 1991), indicating that this contribution had little practical significance.

Hypothesis 2. Professional discipline membership will moderate the relationship between TPB predictors and self-reported recommendation/provision of EBIs, such that the association between TPB constructs and behavior will be different for participants from different disciplines when compared to the sample mean. To test this hypothesis about *Discipline* moderating the relationship between TPB predictors and the outcome variable, an interaction approach was used[36]. Variables were entered into an alternate version of the equation used in Hypothesis 1 in a series of blocks following Frazier et al.'s (2004) recommendations for the order of entering variables to test moderating effects: covariates, predictors, moderator, product terms/interactions (predictors X moderator), and finally, product terms/interactions of covariates (covariates X moderator). Variables were entered using the following steps: (1) design variable (Sample, dummy coded such that 1= stratified random sample); (2) covariates (*Years in Practice*, *Training Emphasized EBIs*, *Unfamiliarity with EBIs*); (3) *TPB-EBI* predictors (*Attitudes*, *Subjective Norms*, *Perceived Behavioral Control*); (4) moderator variable (*Discipline*, recoded using unweighted effect coding; Cohen et al., 2003); (5) product terms between *Discipline* and *TPB* predictors (interactions); and (6) product terms between *Discipline* and the covariates.

All continuous variables were centered[37] (Cohen et al., 2003; Frazier et al., 2004) and interaction terms were calculated by multiplying the unweighted effects coded values for

[36] Interactions are a preferred method for assessing the differences in coefficients across groups of interest (Williams, n.d.; Jaccard & Turrisi, 2003).

[37] Centering refers to putting variables into their deviation units by subtracting their sample means to produce revised sample means of zero (Frazier et al., 2004; Cohen et al., 2003). Centering is highly recommended when testing an interaction between predictors and moderator variables (Frazier et al., 2004). As interaction terms are simply the product term of predictor and moderator variables, they are highly correlated (collinear) with the individual predictor and moderator variables (Aiken & West, 1991; Cohen et al., 2003; Frazier et al., 2004).

Discipline by the centered variables. As per Frazier et al.'s (2004) recommendations, covariate interactions were added to the model as an additional exploratory step, to see if any interesting interactions occurred with covariates that could be the focus of future research studies. Blocks (1) through (6) were entered into the analysis in separate steps. In this way, it was possible to examine the predictive utility of *Discipline* as a moderator on TPB variables and covariates, while controlling for the effects of the covariates and main effects of variables.

Table 20 displays the results (by step) of the hierarchical regression analysis testing this hypothesis. The purpose for the analysis testing Hypothesis 2 was to test the interaction between *Discipline* and TPB predictors[38]. The final model including all effects was significant ($F(42, 666) = 23.396$, $p < .001$). Steps 1-4 mirrored the analyses discussed in Hypothesis 1, and are not discussed further here[39].

To test the hypothesis that TPB predictors have a different effect for different disciplines, as compared to the sample mean, Steps 5 was examined. In Step 5, *Discipline* by TPB predictor interaction product terms were entered into the equation. This interaction step did not add significant explanatory power to the model, based on examination of the omnibus *F* test representing stepwise change Step 5 (Frazier et al., 2004). This indicates that the hypothesis that the association between TPB constructs and *EBI-Behavior* would be different for participants from different disciplines was not supported; in other words, the association (the magnitude of

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Centering decreases the collinearity between variables in the regression equation such that the assumption of no multicollinearity in the regression model continues to be met (Cohen et al., 2003; Frazier et al., 2004; Tabachnick & Fidell, 2007).

[38] The main effects of individual regression coefficients for TPB predictors were already tested using the model in hypothesis 1. As such, the effects of regression coefficients for individual variables for Steps 1-4 are not presented in this table and are not discussed in this section.

[39] The relationship between predictor and outcome variables are unique in multiple regression analyses examining moderator effects; adding a product term to the equation alters what regression coefficients mean (Frazier et al., 2004). These relations are considered to be "conditional effects" (at the value of 0 for the other variables) rather than as "main effects" (as was the goal in the model testing hypothesis 1; Cohen et al., 2003; Frazier et al., 2004). Additional calculations are necessary to interpret individual regression coefficients when included in interaction equations. In this study, the coefficients are presented individually in the section covering Hypothesis 1.

the effect) between TPB constructs and *EBI-Behavior* does not statistically significantly differ for any discipline from the association represented by the unweighted grand mean. The main effect of TPB predictors adequately describes the relation of TPB predictors to *EBI-Behavior* in this sample.

Table 20.

Hierarchical multiple regression analyses predicting professionals' EBI-Behavior from the interaction between TPB constructs and discipline, and the interaction between covariates and discipline [a]

Predictor Variable (N=709)	R	R^2	*Adj.* R^2	ΔR^2	p
Step 1 (Design covariate): df = 1, 707	.049	.002	.001	.002	.192
Step 2 (Covariates): df = 3, 704	.637	.406	.402	.403	<.001*
Step 3 (TPB-EBI): df = 3, 701	.658	.433	.427	.027	<.001*
Step 4 (Discipline): df = 5, 696	.744	.553	.546	.120	<.001*
Step 5 (Discipline × TPB-EBI): df = 15, 681	.749	.562	.544	.008	.682
Step 6 (Discipline × Covariates): df = 15, 666	.772	.596	.570	.034	<.001*

Note: Conventional standards (p<.05) should be used to interpret the significance of each of the main regression steps (noted with the * symbol).
[a] All values presented are pooled across imputations using Rubin's (1987) rules.

In Step 6, *Discipline* by Covariate interaction product terms were entered into the equation as an explanatory step per Frazier et al.'s (2004) recommendations. This step was significant and explained 3.4 percent additional variance to the model. To examine the specific interactions within Step 6, individual regression coefficients were examined for each of the Covariate by *Discipline* interactions, using Holm's (1979) correction for multiple comparisons. These findings indicated that the Medicine/Nursing × *Unfamiliarity with EBIs* product term was the only coefficient that was significant, indicating that the degree of association between

Unfamiliarity and *EBI-Behavior* was significantly different in magnitude (stronger) for the Medicine/Nursing discipline group than the "average professional" in the sample.

Finally, the observed power of this final model was calculated using an online calculator (Soper, n.d.) and was 1.0 (at p=.05 for 42 predictors). The effect size of the final model (Cohen's f^2) was calculated using an online calculator (Soper, n.d.) and was 1.48, indicating a very strong effect for the overall model (Aiken & West, 1991). Cohen's f^2 for the significant covariate interaction step was .084, indicating a small effect (Aiken & West, 1991).

Testing Study Hypotheses: Predictors of *FCC-Behavior*

This section will discuss the process of testing Hypotheses 3 and 4 related to using a FCC approach to care with children with ASDs. Regression diagnostics are presented in Appendix G. To determine the effect of predictors on *FCC-Behavior* (*MPOC-SP* Total Average score across all items), FCC predictor and covariate variables were entered in a series of blocks. Two specific hypotheses were addressed using alternate versions of the regression model[40].

Hypothesis 3. Attitudes, subjective norms, and perceived behavioral control will each significantly (p<.05) predict professionals' self-reported family-centered care practices, after controlling for relevant covariates and professional discipline membership. This hypothesis is examined using hierarchical multiple regression. To test this hypothesis about a main effect of the TPB predictors, variables were entered into the first version of the equation in a series of blocks: (1) design variable (Sample, dummy coded such that 1= stratified random sample); (2) covariates (*Years in Practice*, *Training Emphasized FCC*); (3) *Discipline* (recoded using unweighted effects coding); and (4) *TPB-FCC* predictors (*Attitudes*, *Subjective Norms*, *Perceived Behavioral Control*). As such, it was possible to examine the predictive utility

[40] Alternate versions of the regression equation were utilized to test Hypothesis 3 and Hypothesis 4. My rationale for this decision is described above in a footnote in the section on Addressing the Study's Hypotheses for EBI.

of the TPB variables while controlling for the effects of the *Sample*, *Years in Practice*, *Training Emphasized FCC*, and *Discipline*. All variables were in their original form (un-centered) for this version of the regression equation for ease of interpretation of main effects[41].

Table 21 displays the results of the hierarchical regression analysis testing this hypothesis. The final model was significant ($F(11, 697) = 21.698$, $p < .001$). Overall, the regression model explained 25.5% of the variance (Adjusted $R^2 = .243$) in *FCC-Behavior* (*MPOC-SP*) scores. In addition, a significant amount of variance was added at each step. In Step 1, *Sample* was added as a covariate and, while this step was significant, it only explained 0.6 percent of the variance. As such, it has little practical importance. Covariates added in Step 2 explained 6.9 percent additional variance. *Discipline* (added in a block in Step 3) also added significant additional variance (2.4%). Finally, *TPB-FCC* variables were added in Step 4 and accounted for a significant amount of additional variance in the model (15.6%). In this final model, the constant represents the unweighted mean of the six groups (grand mean), after accounting for the effects of all other covariates.

The observed power of this final model was calculated using an online calculator (Soper, n.d.) and was 1.0 (at $p=.05$, for 12 predictors) and Ferguson's (2009, p. 533) guidelines for interpreting effect sizes using squared association indices (e.g., R^2) were used. By these standards, the overall model has a moderate effect, and the TPB predictors have a small to moderate, practically significant effect. As discussed previously, Cohen's f^2 should instead be used as a more appropriate measure of effect size in regression (Aiken & West, 1991). The effect size of the final model (Cohen's f^2) was calculated using an online calculator (Soper, n.d.), and

[41] Centering refers to putting variables into their deviation units by subtracting their sample means to produce revised sample means of zero (Frazier et al., 2004; Cohen et al., 2003). Centering is recommended when testing an interaction between predictors and moderators but is not necessary in typical hierarchical multiple regression analyses (Frazier et al., 2004).

evaluated Cohen's guidelines (1988, as cited in Aiken & West, 1991, p. 158). Cohen's f^2 was .342, indicating a large effect size of the model. Cohen's f^2 for each of the steps was also calculated: Covariate step f^2= .075 (small effect); *Discipline* step f^2= .026 (small effect); and TPB predictor step f^2= .209 (moderate effect).

Table 21.

Hierarchical multiple regression analyses predicting professionals' FCC-Behavior (MPOC-SP) from theory of planned behavior (TPB) constructs (final model) [a b]

Predictor Variable (*N*=709)	*B*	*R*	R^2	*Adj.* R^2	Δ R^2	*p*
Step 1 (Design covariate): df = 1, 707		**0.075**	**0.006**	**.004**	**0.006**	**.044***
Sample	.055					.485
Step 2 (Covariates): df = 2, 705		**0.273**	**0.075**	**.071**	**0.069**	**<.001***
Years in Practice	.014					<.001*
Training Emphasized FCC	.084					.021
Step 3 (Discipline): df = 5, 700		**0.314**	**0.099**	**.088**	**0.024**	**.002***
Education	.102					.090
Medicine/Nursing	-.251					<.001*
OT/PT	.020					.779
Psychology	.055					.339
Social Work	.017					.854
SLP/Audiology [c]	.056					.371
Step 4 (TPB-FCC): df = 3, 697		**0.505**	**0.255**	**.243**	**0.156**	**<.001***
Attitudes (ATT)	.261					<.001*
Subjective Norms (SN)	.012					.655
Perceived Behavioral Control (PCB)	.248					<.001*

Note: The symbol: * is placed after the *p*-values for individual regression coefficients to indicate significance based on the Holm's (1979) correction for multiple comparisons between individual coefficients (Table 22). Conventional standards (p<.05) should be used to interpret the significance of each of the main regression steps (also noted with the * symbol).

[a] All values presented are pooled across imputations using Rubin's (1987) rules.

[b] Only unstandardized *B* is presented here, as there is not currently a method for calculating pooled β coefficients across multiple imputations in IBM-SPSS v19.

[c] The SLP/Audiology group was the reference group using effects coding. The value for this group was obtained by re-running the analysis with another group as the reference group (this yields the same results for the model, but allows for obtaining the value for the other reference group).

In examining the individual regression coefficients (13 t-tests: Covariates, *Discipline* variables, *TPB-FCC* variables, and the Constant), the Holm's correction was used with the same procedures as outlined above in the EBI section (Holm, 1979; Holland & Copenhaver, 1988). The critical values used for each of the variables, ordered by p-value are found in Table 22. In terms of covariates, *Years in Practice* significantly predicted *FCC-Behavior* (*MPOC-SP*), with more *Years in Practice* associated with more *FCC-Behavior*.

Table 22.

Significant p-values for FCC analysis 1 using Holm's correction

i	Variable	*p(i)*	α/(k – *i** +1)	Reject Null Hypothesis?
1	TPB-FCC Perceived Behavioral Control (PBC)	<.0001	.0038	Y
2	Years in Practice	<.0001	.0042	Y
3	TPB-FCC Attitudes (ATT)	.0001	.0045	Y
4	(Constant)	.0001	.0050	Y
5	Medical/Nursing	.0002	.0056	Y
6	Training emphasized FCC	.0208	.0063	N
7	Education	.0903	.0071	N
8	Psychology	.3385	.0083	N
9	Sample	.4851	.0100	N
10	Speech-Language/Audiology	.5511	.0125	N
11	TPB-FCC Subjective Norms (SN)	.6551	.0167	N
12	OT/PT	.7791	.0250	N
13	Social Work	.8536	.0500	N

In regards to Hypothesis 3, *TPB-FCC Attitudes* and *TPB-FCC Perceived Behavioral Control* both significantly predicted *FCC-Behavior* in a positive direction. These findings provide support for a portion of Hypothesis 3. However, *TPB-FCC Subjective Norms* did not significantly predict *MPOC-SP* scores, indicating that while part of Hypothesis 3 is supported,

there is not evidence for rejecting the null hypothesis for *Subjective Norms*. It should be noted that the effect size for the contribution of TPB predictors was moderate (Aiken & West, 1991).

Hypothesis 4: Professional discipline membership will moderate the relationship between TPB predictors and self-reported use of an FCC approach to care, such that the association between TPB constructs and behavior will be different for participants from different disciplines when compared to the sample mean. To test this hypothesis about Discipline moderating the relationship between TPB predictors and the outcome variable, I used an interaction approach (described previously). Variables were entered into an alternate version of the equation used to test Hypothesis 3, in a series of blocks following Frazier et al.'s (2004) recommendations for the order of entering variables to test moderating effects: covariates, predictors, moderator, product terms/interactions (predictors X moderator), and finally, product terms/interactions of covariates (covariates X moderator). Variables were entered using the following steps: (1) design variable (*Sample*, dummy coded such that 1= stratified random sample); (2) covariates (*Years in Practice*, *Training in FCC*); (3) *TPB-FCC* predictors (*Attitudes*, *Subjective Norms*, *Perceived Behavioral Control*); (4) moderated variable (*Discipline*, recoded using unweighted effect coding; Cohen et al., 2003); (5) product terms between *Discipline* and *TPB* predictors (interactions); and (6) product terms between *Discipline* and the covariates. To address Hypothesis 4, all continuous variables were centered[42] (Cohen et al., 2003; Frazier et al., 2004) and interaction terms were calculated by multiplying the unweighted effects coded values for *Discipline* by the centered variables. As per Frazier et al.'s (2004) recommendations,

[42] Centering is highly recommended when testing an interaction between predictors and moderator variables (Frazier et al., 2004). As interaction terms are simply the product term of predictor and moderator variables, they are highly correlated (collinear) with the individual predictor and moderator variables (Aiken & West, 1991; Cohen et al., 2003; Frazier et al., 2004). Centering decreases the collinearity between variables in the regression equation such that the assumption of no multicollinearity in the regression model continues to be met (Cohen et al., 2003; Frazier et al., 2004; Tabachnick & Fidell, 2007).

covariate interactions were added to the model as an additional exploratory step. While this step did not yield a significant omnibus *F* statistic at this step, it was maintained in the final model to reduce left-out-variable error (Jaccard et al., 2006). Blocks (1) through (6) were entered into the analysis. In this way, it was possible to examine the predictive utility of Discipline as a moderator on TPB variables and covariates, while controlling for the effects of the covariates and main effects of variables.

Table 23 displays the results (by step) of the hierarchical regression analysis testing this hypothesis. The purpose for testing Hypothesis 4 was to test the interaction between *Discipline* and TPB predictors[43]. The final model including all effects was significant ($F(36, 672) = 7.647$, $p < .001$). Steps 1-4 mirrored the analyses discussed in hypothesis 3, and are not discussed further here[44].

To test the hypothesis that TPB predictors would have a different effect on the outcome variable across discipline groups, Step 5 was examined. In Step 5, *Discipline* by TPB predictor interactions were entered into the equation. This interaction step did not add significant explanatory power to the model based on examination of the omnibus *F* test representing stepwise change Step 5 (Frazier et al., 2004). This indicates that the hypothesis that the association between TPB constructs and *MPOC-SP* would be different for participants from different disciplines was not supported; in other words, the association (the magnitude of the effect) between TPB constructs and using an FCC approach does not statistically significantly

[43] The main effects of individual regression coefficients were already tested in hypothesis 3, and as such, the effects of regression coefficients for individual variables for Steps 1-4 are not presented in this table and are not discussed further.

[44] The relationship between predictor and outcome variables are unique in multiple regression analyses examining moderator effects; adding a product term to the equation alters what regression coefficients mean (Frazier et al., 2004). These relations are considered to be "conditional effects" (at the value of 0 for the other variables) rather than as "main effects" (as was the goal of hypothesis 3; Cohen et al., 2003; Frazier et al., 2004). Additional calculations are necessary to interpret individual regression coefficients when included in interaction equations. In this study, the coefficients are presented individually in the section on hypothesis 3.

differ for any discipline from the association represented by the unweighted grand mean. The main effect of TPB predictors adequately describes the relation of TPB predictors to the *MPOC-SP* in this sample. Hypothesis 4 was not supported by analyses. In Step 6, *Discipline* by Covariate interactions were entered into the equation; this step did not explain a significant additional amount of variance.

Finally, the observed power of this final model was calculated using an online calculator (Soper, n.d.) and was 1.0 (at p=.05 for 36 predictors). The effect size of the final model (Cohen's f^2) was calculated using an online calculator (Soper, n.d.) and was 0.4104, indicating a moderate effect of the regression model (Ferguson, 2009).

Table 23.

Hierarchical multiple regression analyses predicting professionals' FCC-Behavior (MPOC-SP) from the interaction between TPB constructs and discipline, and the interaction between covariates and discipline [a]

Regression Steps (N=709)	R	R^2	*Adj.* R^2	ΔR^2	p
Step 1 (Design covariate): df = 1, 707	.075	.006	.004	.006	.044*
Step 2 (Covariates): df = 2, 705	.273	.075	.071	.069	<.001*
Step 3 (TPB-FCC): df = 3, 702	.488	.238	.232	.163	<.001*
Step 4 (Discipline): df = 5, 697	.505	.255	.243	.017	.008*
Step 5 (Discipline × TPB-FCC): df = 15, 682	.529	.279	.252	.024	.086
Step 6 (Discipline × Covariates): df = 10, 672	.539	.291	.253	.011	.397

Note: Conventional standards (p<.05) should be used to interpret the significance of each of the main regression steps (noted with the * symbol).
[a] All values presented are pooled across imputations using Rubin's (1987) rules.

Summary of Findings

Findings from this study indicate that the measures developed for this study exhibited adequate to excellent internal consistency, preliminary evidence for face, content, and construct validity, and appropriate bivariate relations with other variables of interest. Exploratory analyses indicated that professionals exhibited significant differences across disciplines in terms of participants' self-report on recommending/providing EBIs and using a FCC approach.

Attitudes towards EBIs significantly predicted professionals' self-reported *EBI-Behavior* after controlling for covariates, providing support for part of Hypothesis 1. In addition, being *Unfamiliar with EBIs* significantly predicted self-reported *EBI-Behavior*, such that being more *Unfamiliar with EBIs* predicted less recommendation/provision of EBIs. There was a trend for *Training Emphasizing EBIs* to predict self-reported *EBI-Behavior*, but this finding did not reach significance after correcting for multiple comparisons. No significant differences were evident in the associations between TPB variables and *EBI-Behavior* across disciplines; Hypothesis 2 was not supported. However, exploration of *Discipline* by covariate interactions indicated that for the Medicine/Nursing discipline, the association between *Unfamiliarity with EBIs* and self-reported recommendation/provision of EBIs was particularly strong. In examining FCC hypotheses, both *Attitudes* and *Perceived-behavioral Control* significantly predicted self-reported *FCC-Behavior*, providing support for part of Hypothesis 3. In addition, *Years in Practice* significantly predicted self-reported *FCC-Behavior*, such that a higher number of *Years in Practice* was associated with more *FCC-Behavior*. There was a trend for more *Training in FCC* to predict self-reported *FCC-Behavior*, but this finding did not reach significance after correcting for multiple comparisons. No significant differences were evident in the associations between TPB variables and self-reported *FCC-Behavior* across disciplines; Hypothesis 4 was not supported.

Discussion

One of the many daily challenges experienced by families of children with ASDs is accessing appropriate services and interventions (Dymond, Gilson, & Myran, 2007; Kogan, 2008). The goal of this study was to provide an initial investigation into the practices and perspectives of professionals from different disciplines working with children with ASDs in two areas: recommendation and provision of evidence-based interventions (EBIs) and use of family-centered care (FCC). Findings from the study can be understood within both chronic disorder healthcare models (e.g., Wagner, 2001; McDowell & Klepper, 2000) and within ecological systems models (e.g., Bronfenbrenner, 1977, 2005). In this discussion, first, the study's contributions to the existing literature will be reviewed. Second, each of the study's hypotheses will be addressed and findings will be explained within the context of relevant literature. Next, the study's implications for practice will be presented, and ideas for future research in this area will be discussed. Finally, methodological limitations of the current study will be outlined.

Study Contributions

ASDs are complex and heterogeneous disorders with impairments across domains (Volkmar & Klin, 2005; DSM-IV-TR, 2000). Children with ASDs require more interventions than children with other special healthcare needs (Montes et al., 2009), and interface with many professionals as they receive these services (Carbone et al., 2010; Volkmar et al., 2011). From a chronic disorder healthcare perspective, children with chronic disorders such as ASDs require care that is based in solid research, but that is also delivered in a family-centered way that empowers the family and child. While different groups (e.g., NSP, 2009, etc.) have outlined EBIs for ASDs and family-centered care guidelines for practice, the extent to which professionals from different professional disciplines report using these approaches had not

previously been addressed in the literature. From an ecological systems perspective, professionals must cooperate with one another and with the child's family (mesosystem interactions) in providing care (Cuvo & Valleulunga, 2007). This study makes a number of contributions to the current literature on ASD professionals.

Most of the literature on professionals working with children with ASDs has focused on the knowledge of professionals about diagnostic criteria for ASDs, specific perspectives on ASDs (e.g., beliefs, attitudes towards, etc.), and surveys of intervention practices within one discipline. Previous studies have not addressed: a) the use of specific intervention practices across disciplines; b) the use of family-centered care principles either within or across disciplines; or c) the relationship between psychological constructs (e.g., attitudes) and professionals' practices. Specifically, an important contribution of this study is a focus on family-centered care, a construct that has not been examined at length in the ASD literature, but has been considered critical for the management of chronic conditions and disabilities (McDowell & Klepper, 2000; Wagner, 2001; Gabovitch & Curtin, 2009). The field of ASDs is multidisciplinary both in terms of research and practice (Volkmar et al., 2011). A contribution of this study is that it examines perspectives and practices of professionals from multiple disciplines (i.e., different microsystems of influence for children with ASDs; Bronfenbrenner, 2005).

This study also makes a contribution by providing preliminary descriptive information on professionals' self-reported behaviors on specific ASD interventions that are outlined as EBIs (based on the study criteria). This descriptive data gives a snapshot of what is happening in the field, providing a rough benchmark against which to evaluate dissemination efforts for specific interventions. This may also provide some ideas surrounding training. For instance, if a

particular discipline does not report recommending/providing an EBI that is within their scope of practice, it may be helpful to receive additional training on the intervention.

The shift towards using an evidence-based practice approach across disciplines represents a chronosystem change regarding service provision (Bronfenbrenner, 2005). While previous work on evidence-based practice perspectives of professionals has been done (Upton & Upton, 2006; McEvoy et al., 2010), previous studies examining professionals' perspectives on EBIs (e.g., Aarons, 2006) and FCC (e.g., King et al., 2003) have not utilized a theory-based approach to assessing professionals' perspectives. In addition, no previous studies on perspectives of professionals have specifically sought out perspectives on working with children with ASDs. Previous studies on evidence-based practice perspectives are not specific to work with any particular population (e.g., Aarons, 2006; King et al., 2003). This study not only assessed self-reported behavior, but measured specific predictors of this behavior. Specifically, the relative contributions of discipline, training, familiarity and the components of a well-researched theoretical model (the Theory of Planned Behavior; Ajzen, 1991; 2005) are explored. It is clear that a great many professionals are involved in the chronic care of children with ASDs, and focusing on better understanding these microsystems of influence on children with ASDs is an important direction for the field.

Study Hypotheses

This section will discuss the findings of the study in relation to the study's hypotheses, within the context of current relevant literature.

Hypothesis 1: The three subscales of the TPB measure (attitudes, subjective norms, and perceived behavioral control surrounding recommending/providing EBIs for children with ASDs) will each significantly (p<.05) predict professionals' self-reported overall

recommendation/provision of evidence-based interventions (*EBI-Behavior*), after controlling for relevant covariates and for professional discipline membership. Findings indicated that TPB variables had only a small effect (2.8% unique variance explained) in explaining self-reported *EBI-Behavior* after controlling for all covariates. While TPB predictors are statistically important for explaining *EBI-Behavior*, the magnitude of this effect was small and there is little practical predictive utility for TPB constructs in explaining *EBI-Behavior*. .

TPB predictors. Of the three TPB constructs, *Attitudes* towards recommending/providing EBIs was the only significant TPB predictor of professionals' self-reported *EBI-Behavior* after controlling for covariates. The degree to which professionals had a favorable evaluation of recommending/providing EBIs for children with ASDs significantly predicted whether professionals recommended/provided these interventions for children with ASDs. This finding regarding attitudes echoes findings on professionals' perspectives regarding EBIs in general, such that negative attitudes may lead to lower use of EBIs (e.g., Pagoto et al., 2007; Nelson & Steele, 2007). This provides support for part of Hypothesis 1, yet this effect is extremely small.

Notably, neither *Subjective Norms* (perception of social pressure to recommend/provide EBIs) nor *Perceived Behavioral Control* (perception of personal control and self-efficacy to recommend/provide EBIs) significantly predicted *EBI-Behavior*. In regards to *Subjective Norms*, professionals may not experience social pressure to perform EBIs. It has been suggested that many community settings and schools do not use EBIs and instead use other interventions (Volkmar et al., 2011); there may not be professional guidelines for use of EBIs in many community settings. In addition, many professionals in the sample also reported working in private practice settings across disciplines (26%). It is possible that without an organizational

structure such as a hospital or school, etc., professionals are less subject to perceive social pressure to recommend and provide these interventions.

The finding regarding *Perceived Behavioral Control* is also interesting. Associations in the data indicated that professionals who reported being less familiar with EBIs also reported having a lower degree of control and self-efficacy to recommend/provide EBIs, while those who reported having more training in EBIs also reported having a higher degree of control and self-efficacy to recommend/provide EBIs. In addition, professionals who reported having a higher degree of control and self-efficacy to recommend/provide EBIs also reported that they recommended/provided more EBIs. However, this relation does not persist after controlling for the effect of *Unfamiliarity*, *Training Emphasizing EBIs*, *Discipline*, the other TPB predictors, etc., suggesting self-efficacy did not uniquely predict *EBI-Behavior*. Chronic disorder care models highlight the importance of a "prepared, proactive team" that can competently deliver interventions based on research evidence (Wagner et al., 2005) when caring for individuals with chronic conditions, such as ASDs. Future work may want to focus on better understanding of the underlying beliefs of professionals regarding their self-efficacy to use EBIs (Ajzen, 2005).

Covariate predictors. There is some evidence for a relationship between covariates and recommending/providing EBIs. As a whole, the step including *Years in Practice*, *Training Emphasized EBIs*, and *Unfamiliarity with EBIs* explained a significant and large amount of variance in *EBI-Behavior* (36%). This was primarily due to the effect of *Unfamiliarity* predicting recommending/providing EBIs. Participants who reported being less familiar (i.e., more *Unfamiliar*) with EBIs reported recommending/providing these EBIs at a lower rate. The size of this effect (large) was greater than the contribution of the TPB variables (small effect size). A lack of significant correlation between these *Attitudes* and *Unfamiliarity* also indicates that these

two variables explain unique variance in *EBI-Behavior*. Familiarity with EBIs and familiarity with research have been discussed as potential predictors of EBI use in the past (Pagoto et al., 2007; Nelson & Steele, 2007). The findings of this study further highlight the importance of helping professionals become aware and familiar with interventions with empirical support, as this predicts unique variance in their self-reported recommending/providing behavior. In regards to training, findings indicated that professionals who reported having more training on EBIs also reported having more positive attitudes towards EBIs and recommending/providing more EBIs. There was a trend for *Training Emphasized EBIs* to predict self-reported *EBI-Behavior*, but this finding did not reach significance after correcting for multiple comparisons.

Discipline. The role of *Discipline* is interesting to consider as well. The *Discipline* step added a significant and important (10.5%) amount of additional variance explained within the model, indicating that the *Discipline* of different professionals matters when considering recommending/providing the EBIs on the current list. Exploratory examinations of discipline differences separately on the subscales of *EBI-Behavior* separately (*Recommending EBIs* and *Providing EBIs)* provide a more nuanced analysis of professionals' self-reported behavior[45].

Examining differences in self-reported behavior (before controlling for any covariates, ANOVAs), the Education group reports both *recommending* and *providing* more EBIs than the sample as a whole, while the Medical/Nursing group reports both *recommending* and *providing* significantly fewer EBIs on the list than the sample as a whole. Prior to controlling for the influence of any covariates, the Psychology group reports *recommending* significantly more EBIs than the sample as a whole, and the SLP/Audiology group reports *providing* significantly more EBIs than the sample as a whole. These findings are likely related to the interventions included on the *EBI-Behavior* measure (i.e., an artifact of the interventions that have been

[45] The findings discussed here reflect data in exploratory ANOVAs and ANCOVAs (see Results section).

studied enough to meet criteria for EBIs). This measure includes those interventions defined as EBIs, most of which fall within the Educational/Behavioral domain. These differences may be related to each discipline group's familiarity with the EBI list and overall training on EBIs. Yet assuming that these differences are only an artifact of the list of EBIs does not tell the full story. It is interesting to note that differences between disciplines still exist after controlling for *Unfamiliarity* and *Training Emphasized EBIs* and other covariates. The Education group reports *recommending* more EBIs after partialling out the influence of familiarity and training, which makes sense, given the nature of the interventions (educational/behavioral).

After partialling out the influence of familiarity with the EBI list and training on EBIs, the OT/PT group reports *recommending* fewer EBIs than the sample as a whole. The OT/PT group may have a higher degree of familiarity and training on EBIs, yet this may not translate into recommending more EBIs. This may be due to the general focus of the OT/PT disciplines on sensory and motor concerns of children with ASDs (AOTA, 2011). OT/PT professionals likely recommend fewer EBIs because in general, making treatment recommendations may be outside their typical practice. It is interesting to note that the OT/PT group does not differ from the rest of the sample on their self-reported *provision* of EBIs. This is despite the fact that sensory and motor interventions are some of the core interventions utilized by OTs and PTs, and these interventions are not captured on the EBI list.

After controlling for familiarity and training, Medical/Nursing group no longer evidences statistically significantly differences from the sample as whole on *recommending* EBIs. This indicates that the Medical/Nursing group is recommending EBIs at a level commensurate with their familiarity and training on EBIs – while their baseline recommendation of EBIs is low, this is likely due to a lack of familiarity and training on EBIs. Previous work has suggested that

primary care providers are less likely to refer children with ASDs for educational interventions and services (Heidgerken et al., 2005). Perhaps with more training to increase familiarity with EBIs, this group may increase their rates of recommending EBIs to families.

After controlling for covariates, the Psychology group no longer has self-reported *recommendation* of EBIs that is statistically significantly higher than the sample as a whole (although this group reports recommending more EBIs prior to taking the influence of these covariates into account). Perhaps increased familiarity and training has not translated into incrementally more recommending of EBIs compared to the sample as a whole. This is likely due to the fact that the Psychology group is more familiar with EBIs and recommends these interventions at a higher rate. The Psychology group (prior to accounting for covariates) recommends more EBIs than the sample as a whole.

In examining *Providing EBIs*, the Education and SLP/Audiology groups both report *providing* more EBIs than the sample as a whole after taking into account their familiarity with and training on EBIs. These disciplines may find the interventions on the EBI list to be very compatible with their practice already, thus providing more of these interventions. After taking covariates into account, the Medical/Nursing group reports *providing* fewer EBIs than the sample as a whole. For the Medical/Nursing group, this does not represent a change from the baseline analysis; before controlling for familiarity and training, this group reported providing fewer interventions than the mean of the sample. Doctors and nurses may not have the time (Migongo, Charnigo, Love, Kryscio, Fleming, & Pearce, 2012) or be aware of how to implement or recommend interventions on the EBI list during office visits. The NAC (2012) notes on their website that they will soon have a manual for medical professionals on counseling families with newly-diagnosed children on EBIs. While Medical/Nursing professionals are recommending

EBIs at a rate that is on par with their familiarity with EBIs, perhaps in their daily practice they are providing the interventions that are most consistent with their disciplinary training. Medical professionals and nurses are focused on the medical concerns (and not treating core symptoms of ASDs) of children with ASDs when they come in for appointments. Alternatively, medical professionals may be providing interventions that are simply not found on the EBI list. For instance, in a study of psychoactive medication use in children and youth with ASDs, Oswald and Sonenklar (2007) found that children with ASDs receive many classes of medication, most frequently antidepressants, stimulants, and tranquilizers/antipsychotics. Most of these medication classes are not intended to treat core symptoms of ASDs (and do not appear on the EBI list), yet physicians may use them to treat children for other mental health concerns under the child's ASD diagnosis (Oswald & Sonenklar, 2007). Medical interventions are beginning to be studied to treat symptoms of ASDs (e.g., stimulant medications; McPheeters et al., 2011), but interventions classified as EBIs are largely Educational/Behavioral interventions.

After taking covariates into account, the Psychology group reports *providing* fewer EBIs than the sample as a whole. Prior to controlling for the influence of familiarity and training, the Psychology group did not differ from the sample as a whole on their rate of *providing* EBIs. After adjusting for the impact of their familiarity with EBIs and their training with EBIs, they *provide* fewer EBIs than the rest of the sample. This group may have substantial familiarity and training on EBIs, but this does not translate into similar increased use of EBIs in practice. Psychologists are familiar with behavioral and educational therapies, but leave much provision of these interventions to Educators and other professionals. Psychologists are likely attending to the other roles they play with children with ASDs and their families (Gillis & Beights, 2012). These roles range from assessment to intervention to consultation (Ozonoff et al., 2005;

Williams et al., 2005; Gills and Beights; 2011; White, 2012). Psychologists may also be using psychological interventions that have been well studied for other disorders but have not yet been sufficiently studied in ASD populations (e.g., cognitive behavioral therapy; Wood et al., 2009). Another role of psychologists in working with children with ASDs is to treat comorbid psychological conditions (Gillis & Beights, 2012). Some Psychology professionals may not focus directly on treating core symptoms of ASDs, focusing instead on treating comorbid conditions. Efficacy research is currently being done to study interventions for co-morbid conditions, such as anxiety, in children with ASDs (Wood, Drahota, Sze, Har, Chiu, & Langer, 2009; White, Ollendick, Scahill, Oswald, & Albano, 2009; White et al., in press).

This study did not include questions asking professionals to describe what their primary role with children with ASDs was (e.g., intervention, assessment, providing treatment recommendations, brief office appointments, etc.). This may be an important component to consider in future research studies with professionals working with children with ASDs. Finally, it is possible that these findings related to discipline differences on EBIs could also indicate that there are variables associated with professional discipline (e.g., training on research methods, familiarity with literature search engines and empirical research, etc.) that went unmeasured in this study. Future work may want to focus on other variables related to professional Discipline in regards to recommending/providing EBIs.

Cohort effect. There is some correlational evidence for a cohort effect related to EBI perspectives, such that individuals in practice longer reported different perspectives on EBIs. The recent emphasis on the concept of "evidence-based practice" represents a chronosystem change regarding service delivery (Bronfenbrenner, 2005). In this study, those in practice for a longer time tended to report being less familiar with the EBIs and having received less training

specifically emphasizing EBIs. In addition, those individuals reporting being in practice longer also reported having less favorable attitudes towards EBIs and experiencing less social pressure to use EBIs. However, there was not a significant correlation between *EBI-Behavior* and *Years in Practice*. All this points to the likelihood that earlier cohorts of professionals were not specifically trained to think about EBIs as a gold standard for care. They feel little social pressure to select EBIs; perhaps they hold more senior positions in their place of employment and are themselves the ones who make decisions for themselves and perhaps for the agency. They are recommending/providing EBIs at the same level as those with lesser years in practice, but this perhaps came from their own experience and clinical judgment rather than their training or from pressure from others. All of this discussion is somewhat moot, however, as although there are correlations between these variables, *Years in Practice*, *Subjective Norms*, and *Perceived Behavioral Control* did not uniquely significantly predicted *EBI-Behavior*.

Hypothesis 2: Professional discipline membership will moderate the relationship between TPB constructs and self-reported recommendation/provision of EBIs (*EBI-Behavior*), such that the association between TPB constructs and *EBI-Behavior* will matter differently for participants from different disciplines, when compared to the average professional working with children with ASDs. This hypothesis assessed if the effects of the TPB predictors found in Hypothesis 1 were more or less powerful in explaining *EBI-Behavior* for each discipline compared with the "average professional." No significant differences were evident in the associations between TPB variables and *EBI-Behavior* across disciplines and no significant interaction effects were noted; Hypothesis 2 was not supported.

While Hypothesis 2 (TPB predictors by Discipline interactions) was not supported, Francis et al. (2004) suggest also exploring Moderator by Covariate interactions when covariates

are controlled for prior to testing interaction effects, to assess for potential directions for future research. Exploration of *Discipline* by covariate interactions indicated that for the Medicine/Nursing discipline, the association between *Unfamiliarity with EBIs* and self-reported recommendation/provision of EBIs was particularly strong compared to the mean of the sample. This indicates that for Medical/Nursing professionals, unfamiliarity with EBIs has an even stronger effect on their recommending/providing of EBIs, when compared to all other discipline groups. This may be due to the low base rate for recommending/providing by members of the Medical/Nursing profession relative to other professionals, in combination with being less familiar with the interventions on the EBI list. So, this group is Unfamiliar with, and they also do less recommending of, EBIs. It is likely that they are busy taking care of medical needs and do not consider it within their scope of practice to direct families to behavioral interventions or use these interventions themselves. Future work may want to further investigate the role of familiarity with interventions and subsequent behavior for different discipline groups; this is beyond the scope of the current study.

As Hypothesis 2 was not supported, we can use the first regression model presented for Hypothesis 1 to best understand the main effects of TPB predictors. Within this framework, *Attitudes* towards EBIs have a significant main effect in explaining professionals' *EBI-Behavior*, and this does not differ significantly within each discipline from the overall sample.

Hypothesis 3: The three relevant constructs of the TPB (attitudes, subjective norms, and perceived behavioral control) will each significantly ($p<.05$) predict professionals' self-reported family-centered care practices, after controlling for relevant covariates and professional discipline membership. Findings indicated that the TPB variables predicted 15.6% of unique variance in self-report on *FCC-Behavior* after controlling for *Discipline*, *Years in*

Practice, *Training Emphasized FCC*, and *Sample*. The TPB predictors were a significant step in the model and had a moderate effect size. In comparison to the variance explained by *Discipline* (2.4%) and other covariates (6.9%), the TPB variables explained a large portion of unique variance in scores on the *MPOC-SP* (*FCC-Behavior*).

TPB predictors. Of the three TPB constructs, *Attitudes* towards FCC and *Perceived Behavioral Control* for using an FCC approach significantly predicted professionals' self-reported *FCC-Behavior* after controlling for covariates. Simply put, having a more positive evaluation towards FCC and having a higher degree of self-efficacy and control in using FCC made a difference in professionals' self-reported use of family-centered care. This provides support for part of Hypothesis 3. In training, education, supervision, etc. it may be helpful to incorporate FCC principles into educating professionals to further encourage a positive evaluation of and increased self-efficacy in using FCC.

There was not a significant contribution for *Subjective Norms*, and this portion of the hypothesis was not supported. For professionals in this sample, perceived social pressure (*Subjective Norms*) to use FCC did not exert a significant unique effect on professionals' self-reported behavior. While the concepts and underlying tenets of FCC have been long-standing parts of the disability and early intervention fields (e.g., Brewer, McPherson, Magrab, & Hutchins, 1989), there is little specific research examining the implementation of FCC approaches for children with ASDs (Gabovitch & Curtin, 2009). "Although there is broad agreement that FCC reflects best practice and brings about improved outcomes for children and families, numerous barriers continue to prevent its successful and universal implementation. At the individual provider level barriers may include lack of provider knowledge about how to

practice FCC [or] poor or absent organizational support for implementing FCC…" (Gabovitch & Curtin, 2009, p. 484).

It may be that, absent organizational support for implementing FCC, professionals do not experience social pressure to perform FCC. A sizeable percentage of individuals in the sample were in private practice settings across disciplines (26%). It is possible that without an organizational structure such as a hospital, school, community service board, professionals perceive less social pressure to use a FCC approach because they are not answering to others in their practice. Perhaps they are at higher levels in their organizations and there is no pressure from their "superiors, " but this is how they prefer to work with the children. They do not feel pressure from others they work with to be family-centered; it is simply their way of working. While currently *Subjective Norms* does not appear to significantly predict *FCC-Behavior*, this begs the question of what might happen if different disciplines (on a microsystem level) and different organizations (on a macrosystem level) incorporated more specific guidelines on how to implement FCC in practice with children with ASDs. According to ecological systems perspectives (e.g., Bronfenbrenner, 1979), changes at the organizational level may trickle down to influence the individual professional and subsequently the child with an ASD.

Covariate predictors. *Years in Practice* significantly predicted self-reported *FCC-Behavior*, such that more *Years in Practice* was associated with more *FCC-Behavior*, after controlling for all other factors. This contrasts with the findings for *Years in Practice* in EBI analyses; there was not a significant predictive relationship between *Years in Practice* and *EBI-Behavior*. There was a trend for more *Training Emphasized FCC* to predict self-reported *FCC-Behavior*, but this finding did not reach significance after correcting for multiple comparisons. *Years in Practice* is negatively correlated with *Training Emphasized FCC*, and positively

correlated with *Perceived Behavioral Control* and *FCC-Behavior*. Professionals who have worked in their disciplines for many years with children with ASDs are using family-centered practices, even though they are less likely to have been specifically trained to do so. They are using more FCC approaches, and they are confident that it is within their own control to work with the children and families in this way. Perhaps they simply have found that this is what works the best for the children and families they have encountered.

It may be that professionals who have been in practice longer feel they can be more flexible in their work and can use more of an FCC approach. Early career professionals may be focused on establishing their roles in their jobs, saying 'yes' to opportunities that arise, attempting to stand out (e.g., by developing new programs; e.g., Sanders, Breland-Noble, King, & Cubic, 2010), and above all, continuing to learn about their field and developing their clinical expertise. Building this clinical expertise is another important component of care of working with children with ASDs (APA Presidential Task Force on Evidence-Based Practice, 2006; Mesibov & Shea, 2010a). Professionals who are later in their careers may have received less formal training and education in FCC. Yet when professionals are more established in their careers and have a degree of expertise, perhaps they feel more comfortable adapting their practice to individual children and their families. Future work may want to further examine the influence of expertise on practice, as this was not examined in this study.

Discipline. After controlling for all other covariates, *Discipline* group added a small but significant amount of unique variance in explaining *FCC-Behavior* (2.4%); this was a smaller contribution than was observed for the effect of *Discipline* group in *EBI-Behavior* (10.5%). None of the disciplines differed significantly from the sample mean after controlling for *Training Emphasized FCC*, etc., except for the Medicine/Nursing discipline group, which engaged in

significantly less FCC than the "average professional" in the sample. This effect existed in the baseline (before partialling out effects of covariates) ANOVA, and after partialling out the effects of covariates. Families whose children have ASD are a population requiring more services than children with other developmental/behavioral concerns and than children generally (Montes et al., 2009). From a chronic disorder care perspective (e.g., Wagner, 2005), children with ASDs receive the best care when the child and family receive adequate support from their team of professionals to manage the chronic condition (McDowell & Klepper, 2000).

This is an interesting finding given the mandates from the American Academy for Pediatrics (AAP) for children with disabilities (and other special health care needs) to have a medical home with their primary care provider (Sia, Tonniges, Osterhus, & Taba, 2004). "The AAP defines medical home care as accessible, continuous, comprehensive, family-centered, compassionate, culturally effective, and coordinated with specialized services" (Brachow, Ness, McPheeters, & Gurney, 2007, p. 400). The concept of the medical home for children with ASDs, where one medical or nursing professional acts as the hub of the wheel for services for a child, has been cited as ideal but is far from being realized (Gabovitch & Curtin, 2009). This may be related to the structure of primary medical care models (and specialty care medical models), as well as a lack of time on the part of medical professionals (Brachow et al., 2007).

Within an ecological systems perspective, the health care system is an important macrosystem influence. Parents consult a child's primary care team regarding developmental concerns, yet medical professionals may not have the time needed to be truly family focused (Gabovitch & Curtin, 2009; Migongo et al., 2012). Physicians see many patients each day and must limit the time they spend with each one. A time analysis of physicians at 24 sites in Kentucky, examining almost 1500 office visits, found that the average visit length was 14.5

minutes (Migongo, Charnigo, Love, Kryscio, Fleming, & Pearce, 2012). Besides face to face time with the patient, physicians, nurses, and office staff must fill out paperwork for records and billing purposes as well as make phone calls and coordinate with other services their patients are using. For clinically complex patients with special health care needs, the unreimbursed time on care coordination is substantial (Antonelli & Antonelli, 2004). Perhaps medical personnel have less time available for their microsystem interactions with the child and family in part because they must spend so much time attending to the mesosystem (other services), lack of infrastructure in their systems of care (exosystem), and the paucity of physicians available to serve children with ASD and other complex conditions (macrosystem). It may also be that parents receive the support they need to manage their child's ASD interventions from other members of their child's team. Future work may want to explore the concordance of parent perspectives of FCC and professional perspectives of FCC in work with children with ASDs.

Hypothesis 4: Professional discipline membership will moderate the relationship between TPB constructs and self-reported *FCC-Behavior* (MPOC-SP total score), such that the association between TPB constructs and *FCC-Behavior* will matter differently for participants from different disciplines, when compared to the average professional working with children with ASDs. This hypothesis examined whether the effects of the TPB predictors were more or less powerful in explaining *FCC-Behavior* for each discipline compared with the "average professional." No significant differences were evident in the associations between TPB variables and self-reported *FCC-Behavior* across disciplines and no significant interaction effects were found; Hypothesis 4 was not supported. In addition, no significant *Discipline* by covariate interactions emerged (Frazier et al., 2004). Given these findings, we can use the first regression model for FCC presented in Hypothesis 3 to best understand the main effects of TPB predictors

in explaining *FCC-Behavior*. Within this framework, *Attitudes* and *Perceived Behavioral Control* have significant effects in terms of explaining professionals' self-reported *FCC-Behavior* on the MPOC-SP; these effects for each discipline do not differ significantly from that of the sample mean.

Context and Caution for Consideration of Study Findings: Implications for Researchers and Practitioners

After discussing the specific findings related to study hypotheses, I feel a responsibility to participants who emailed/called me personally throughout the course of this study to share their personal perspectives on evidence-based interventions and to make a few overarching points regarding EBIs within the ASD field. Thus far, I have primarily highlighted the perspective (theoretical and empirical) that professionals *should* be using EBIs in children with ASDs. This is an important perspective, but it does not tell the full story of ASD intervention research and practice. It should be stated clearly: the aim of this study is not to pass judgment or place pressure on particular disciplines (or individuals). Instead, the aim is to highlight the diversity of intervention approaches being utilized across disciplines (this study specifically focuses on use of those defined as EBIs), and to shed light on the role of psychological constructs in predicting evidence-based practice variables (EBI and FCC). In addition, I aim to outline some recommendations for the ASD intervention field to move forward as a *multidisciplinary* field. A discussion of EBIs for ASDs would not be complete without highlighting the challenges that exist for the field, and for individual professionals, regarding EBI evaluation and use.

Many other interventions are used to treat ASDs. First, the EBI list used in this study represents a limited account of the wide range of interventions that are available for use for ASDs. Most children with ASDs also receive other interventions that are not on the list of EBIs

(Vismara & Rogers, 2010; Akins, Angkustsiri, & Hansen, 2010; Golnik & Ireland, 2009; Christon et al., 2010; Hess, Morrier, Heflin, & Ivey, 2008; Rogers & Vismara, 2008; Schreck & Mazur, 2008; Thomas et al., 2007b; Goin-Kochel et al., 2007). For example, most children receive some sort of sensory/motor and speech-language interventions (Thomas et al., 2007a); children receive between four to seven interventions on average at a given time (Green et al; 2006; Goin-Kochel et al., 2007). Most interventions that have been studied thus far, and that have met the criteria for EBIs, are educational or behavioral in nature. There is a paucity of research on nutritional, sensory/motor, speech-language, medical, and complementary/alternative medicine interventions, to name a few (Levy & Hyman, 2008; Christon et al., 2010; Volkmar et al., 2011). While some interventions have been shown *not* to be efficacious (e.g., secretin; Levy & Hyman, 2008; Krishnaswami et al., 2011), many interventions that are commonly used *have not* been adequately studied.

Speaking from the perspective of the discipline of psychology, even those interventions that have a strong evidence-base for other problem domains (e.g., cognitive behavioral therapy for anxiety disorders, or parent management training for ADHD; Chorpita et al., 2011) are not currently considered EBIs for ASDs. This is not because they have been studied and shown to be ineffective; instead, for many interventions, it is because these interventions simply have not been studied (or studied enough) using research methods that are necessary for classification as EBIs. This is true for many of the large, widely used ASD comprehensive treatment programs as well (e.g., the DIR/Floortime model, Early Start Denver Model, SCERTS, and TEACCH; Volkmar et al., 2011). A critical focus of the ASD intervention field should be evaluating extant interventions that fall outside of the educational/behavioral domain, as these are widely used.

Important work is being done on studying certain interventions and comprehensive treatment programs for children with ASDs within the field of psychology (I outline a few examples for psychology, as it is my "home" discipline). For instance, Dawson and colleagues (2010) recently released the promising results of a randomized-controlled trial of a comprehensive treatment program (the Early Start Denver Model) that led to improvements on IQ, adaptive behavior, and autism diagnosis category. To cite another example, while social skills interventions do not yet meet criteria for being an EBI (Volkmar et al., 2011), important work is being done by a research team at the University of California – Los Angeles studying a social skills group intervention for high-functioning adolescents with ASDs (UCLA PEERS Program; Laugeson, Frankel, Gantman, Dillon, & Mogil, 2012). This intervention has thus far yielded promising results in terms of improved social skills and peer interactions, and decreased autistic mannerisms (Laugeson et al., 2012). Another example is that of Wood and colleagues (2009) who have studied the effects of cognitive behavioral therapy (CBT) on parent-reported ASD symptoms, with promising findings, specifically in terms of making improvements on social communication deficits. While this list is by no means inclusive of all interventions within psychology (and entirely exclusive of the important work being in other disciplines), these are important examples of current ASD intervention research within psychology. Conducting research on interventions outside of the educational/behavioral domain will help to broaden the list of EBIs available to professionals working with children with ASDs. In many cases, findings from these studies may validate the beliefs of many professionals that certain interventions "work" because they have observed gains in children they have worked with. However, relying alone on the anecdotal reports of professionals does not hold the ASD intervention field up to the

same standard as other sciences, and the field must evaluate interventions across disciplines on a specific set of standards (Reichow et al., 2008).

Defining efficacy for ASD interventions is challenging. There are serious challenges surrounding defining "efficacy" for ASDs given the heterogeneity of the symptom presentation. Are the most important gains in cognitive functioning (outside of ASD symptoms) or one of the core areas of impairment (e.g., Mesibov & Shea, 2010a)? What standard should be used for determining efficacy, that is, what level of qualitative or quantitative improvement in some area of functioning is required to say the treatment was efficacious? There is a great deal of disagreement between and within disciplines regarding the standards that should be used to evaluate interventions for ASDs (Reichow et al., 2008). In addition there is disagreement on which outcomes should be examined in ASD research (Mesibov & Shea, 2010a). Thus far, outcomes such as IQ, adaptive functioning, and communicative gains have been focused on, but little is known about long-term outcomes such as quality of life or vocational attainment.

In addition, even though different interventions are classified as EBIs, a more careful examination of the literature clarifies that interventions have been studied for fairly limited age groups and levels of impairment (NAC, 2009). Very little work has been done on interventions for adolescents/adults with ASDs. When considering specific results of studies, how well do interventions work for different groups of children with ASDs? What are the differences in making treatment recommendations for EBIs for children with mild and severe impairments? For children of different ages? Some of these issues were summarized quite aptly in a recent Division 53 (APA) email Listserv dialogue (Keyes, 2012, July 24):

> "Listserve Mates - I'd like to throw out a question for your wise input: After an evaluation (interview, developmental history, ADOS or ADI if needed), & I've diagnosed a child with PDD, Autism or perhaps even Aspergers - HOW would you determine if that child should be referred for ABA treatment, vs. just more intensive speech, social skills,

> extra school treatment, parents support groups (Autism Speaks; FEAT), etc. We know ABA works (Evidence Based Practice), but (if my memory is right it's) especially in medium impaired kids. High Functioning Autism doesn't require that level of intensity (20-30 hrs weekly). Really low functioning (eg., IQ ~50) aren't likely to benefit much (eg., it won't necessarily improve the child to be independently functional). How to know which groups SHOULD be directed toward this (quite expensive ~$3000/ month) treatment…?"

Keyes (2012) highlights some of the challenges of how to make decisions within the context of the ASD EBI literature, especially in regards to making treatment recommendations. The responses to this listserv posting highlighted some of the further challenges across different dimensions. In efficacy research on ASD interventions, there is a lack of evidence of moderators determining who should be directed to specific interventions (White, 2012, July 24). In efficacy research on ASD interventions, there is a lack of evidence for the dosage of intervention needed for children of differing levels of impairment and ability (Jablonski, 2012, July 24). There is a lack of guidelines on what "appropriate" recommendations are for ASD interventions across disciplines for children of different ages and in different settings (Keefe-Cooperman, 2012, July 24). Specifically, Keefe-Cooperman (2012) notes, "outside professionals who evaluate the child prescribe levels of services that cannot be met. An example would be recommending speech therapy for 6 times per week. This will not be completed through a school district usually..." In addition, whether something is an EBI or not may not dictate what services are available in a community, as the state in which the child is and the policies of that state dictate what interventions children receive to a degree (Keefe-Cooperman, 2012, July 24). White (2012, July 24) articulates one of the biggest challenges in choosing interventions: "no single treatment can possibly be right for ALL kids with ASD; it often ends up being a multifaceted approach." These perspectives come from professionals within the field of psychology, but these challenges within in the current body of research apply to professionals from all disciplines.

A related point is that while clearly some standard for defining EBIs is necessary, certain standards used by various reviews may be overly restrictive (e.g., Vanderbilt Evidence-based Practice Center's [VEBPC] Comparative Effectiveness Review for Therapies for Children with Autism Spectrum Disorders, 2011; Cochrane reviews as cited in Lord & Bishop, 2001), yielding little informative material to the individual attempting to make intervention decisions surrounding what interventions to use (Lord & Bishop, 2010; Mesibov & Shea, 2010a). Some of these reviews do not find *any interventions* to meet their stringent criteria for an EBI (e.g., VEBC, 2011); as such, what should a professional in clinical practice do with these findings in terms of making intervention decisions? Reichow et al. (2008) provide a novel way for examining efficacy of interventions that is tailored specifically to ASDs, yet this approach has not been widely used in evaluating interventions. This evaluative method provides specific rubrics for evaluating group research and for evaluating single-subject experimental designs across a range of quality indicators (Reichow, 2011). This approach is novel in that it was designed specifically to identify EBIs for ASDs (along with the approach of the NSP, 2009) and was one of the first to specifically operationalize a method for evaluating multiple research methods on a single practice, providing a more flexible approach (Reichow, 2011).

A related concern is that while studies on EBIs focus on concrete, measurable, outcomes (e.g., IQ scores, etc.) to determine efficacy, most studies do not focus on negative side effects. In medical and pharmacological research, side effects are a common component of the weighing of intervention costs/benefit. For instance, while atypical antipsychotics are considered an EBI for ASDs, there are serious adverse effects such as weight gain, sedation, and extrapyramidal symptoms (McPheeters et al., 2011). What are the side effects (or costs), if any, of a 40-hour per

week ABA program for a child? For the child's family? The literature on ASD interventions has not adequately addressed potential adverse psychosocial effects of EBIs.

Comprehensive treatment models: A unique challenge. This also brings up challenges in how to evaluate efficacy of "comprehensive treatment programs" (e.g., TEACCH, DIR, RDI, etc.). These programs are evaluated on the same standards as focused intervention practices and pharmacological/medical interventions. For the most part, these interventions have not been studied adequately, aside from ABA, due to methodological challenges (e.g., not having a specific manual, etc.). Yet each comprehensive program includes a range of specific components that may be each be classified as EBIs (e.g., focused intervention practices). Each comprehensive program also likely has components that overlap with other programs.

For instance, the comprehensive program TEACCH relies on a framework of "structured teaching" with four primary components: "(a) structuring the environment and activities in ways that are understandable to the individual; (b) using individuals' relative strengths in visual skills and interest in visual details to supplement relatively weaker skills; (c) using individuals' special interests to engage them in learning; and (d) supporting self-initiated use of meaningful communication" (Mesibov & Shea, 2010b, p. 572). While TEACCH as a "comprehensive treatment program" has not been classified by current reviews as an EBI, there are a number of focused intervention practices that TEACCH incorporates that fall on the EBI list (e.g., structured work systems and visual prompts; NAC, 2009; NPDC, 2011; Mesibov & Shea, 2010b). While it is important to understand whether these comprehensive approaches are more than a sum of their parts, there is value to studying the efficacy of the individual parts as well.

There has been little work done on "unpacking" the components of each of the comprehensive treatment program interventions to test their efficacy. In addition, studying

whether the components work within the context of the comprehensive treatment or whether those components would "work" if taken out of the comprehensive treatment would also yield helpful information. A good deal of research on focused intervention practices (e.g., NAC, 2009) already exists; perhaps the focus of the field should be on further expanding and elaborating this list of focused practices. One participant brought up this concern to me in a follow-up email after completing the study survey (personal communication, February 3, 2012[46]):

> "Research for some interventions is hard to do because the intervention is comprehensive. This would apply to DIR Floortime. DIR is a comprehensive approach that includes elements of occupational therapy, play therapy, speech therapy, and parent skills, among others. DIR does not lend itself to traditional research methods."

It could be argued that perhaps as a whole, this program may not "lend itself to traditional research methods," but what about studying the elements (focused interventions) that comprise this program? The perception in the community that certain interventions do not lend themselves to study via traditional research methods likely acts as a barrier to studying these interventions. Studying focused practices that comprise these larger programs may be a very valuable direction to take in studying interventions for ASDs, particularly those for which it may be more challenging to study as a "whole." Mesibov and Shea (2010a, p. 12) have recommended that it is much more helpful to "identify specific strategies that are effective rather than focusing on studies of 'brand name' programs." However, this is not yet a widespread practice; the NAC (2009) and NPDC (2011) reviews used in this study are an exception in their consideration of focused intervention practices.

Research on other childhood psychological disorders has examined the efficacy of modular approaches to intervention. Modular approaches include different "modules" comprised of different intervention techniques. Rather than applying the intervention in an identical fashion

[46] Name is not included to preserve anonymity and confidentiality of the participant.

each time, the order of the modules is guided by the individual client's needs and symptoms. Modular approaches to intervention have "the benefits of standardization inherent in manualized protocols while allowing high levels of flexibility through the use of a guiding algorithm for the application of individual treatment techniques" (Chorpita, Taylor, Francis, Moffitt, & Austin, 2004, p. 265). For instance, in the childhood anxiety literature, modular approaches to treatment allow for the clinician to use a set of core cognitive and behavioral techniques (e.g., exposure, cognitive restructuring, etc.) that have each been demonstrated to be efficacious in treating anxiety (Chorpita et al., 2004). However, the clinician may implement these interventions in a flexible order, tailored to the individual child and family (Chorpita et al., 2004). The individual components have been well studied and deemed efficacious, and work is currently focused on studying the modular treatments as a whole (Chorpita et al., 2004).

It would be helpful to take a similar approach in evaluating comprehensive treatment programs for ASDs. Creators of comprehensive programs could identify the core components or techniques of the program (i.e., focused intervention practices). These individual components or techniques could be tested for efficacy, yielding information on a wider range of focused intervention practices. These programs could also be tested as a whole to see if the combination of focused practices is helpful. This could be applied both to comprehensive treatment programs and interventions that are somewhat nebulously defined. For instance, "sensory integration training" is often used by Occupational Therapists and "speech-language therapy" is used by Speech Language Pathologists to treat children with ASDs. Yet, what components of interventions or focused practices are included in these interventions? Breaking down interventions into the component parts and then testing these parts may provide one way for outlining more practices for professionals to use that are EBIs. Professionals could then apply the

focused intervention practices in a flexible format, based on the presenting concerns of the individual child and family.

In contrast to this "top-down" approach, the field could also begin to take a "bottom-up" approach and build "evidence-based" comprehensive programs from focused intervention practices. This is the approach that Brookman-Frazee and colleagues (2012) used in a program discussed in the Literature Review: *An Individualized Mental Health Intervention for Children with ASD; AIM HI*. Each of the interventions comprising AIM HI were EBIs (focused intervention practices), and this study represents one of the first testing a combination of these practices in a community setting. Brookman-Frazee and colleagues (2012) should be commended for this first effort in studying the effectiveness of a package of EBIs in community setting; more work in this vein should follow.

Using EBIs: Important but not sufficient for true evidence-based practice. When considering EBI use, one cannot omit the other areas of evidence-based practice (APA Presidential Task Force on Evidence-Based Practice, 2006) discussed in the Literature Review: family-centered care and clinical expertise. Simply using EBIs is not adequate; these other components must be integrated into practice. Using EBIs refers more to *what* intervention is being provided; family-centered care and clinical expertise speak more to the quality of *how* the intervention is being provided.

Professionals must be educated about limitations of EBIs. In particular, that EBI use must be balanced with the individual needs of the child and family (using a family-centered care approach; Volkmar et al., 2011). As Lord and Bishop (2010, p. 12) assert, "the heterogeneity of ASD and the need for treatments to be family-centered (Bailey, Buysse, Edmondson, & Smith, 1992) offer challenges to identifying, in any systematic way, which comprehensive treatments

are most appropriate for a particular child and family." We return to the challenges brought on by the heterogeneity of symptoms within ASDs; appropriate tailoring of EBIs and providing them within the context and abilities of the individual child and family is necessary. Measuring the "appropriate tailoring" of interventions, however, presents a challenge.

In addition, clinical expertise is necessary for integrating research evidence within the context of patient characteristics (APA Presidential Task Force on Evidence-Based Practice, 2006; Mesibov & Shea, 2010a). "Once treatments are selected, these professionals have the responsibility to collect data to determine if a treatment is effective" (NAC, 2009, p. 77). It requires both expertise and clinical judgment to determine whether an intervention is adequately effective for any given child. While quantifying a professional's clinical expertise is a challenging endeavor (and this study did not address clinical expertise), future work may want to incorporate this component of evidence-based practice. How might these family-centered care and clinical expertise constructs be incorporated into or evaluated in intervention research? Can a randomized-controlled trial assess the extent to which family-centered care and clinical expertise are being implemented, along with the intervention being studied?

Effectiveness of EBIs in community settings. Finally, implementing evidence-based interventions in community settings (outside of universities or research settings) is often a challenge. Many political, financial, and other issues that are often outside the hands of individual professionals impact the use of EBIs in community settings (Shattuck & Grosse, 2007; Weisz & Addis, 2006). For instance, as one participant wrote to me in a follow-up email after completing the study survey (personal communication, February 3, 2012[47]):

> "Some kinds of intervention seem to attract people who like to do research. The scientists are based at universities and have relatively easy access to research support. Other interventions seem to attract people that like to work as clinicians. This reflects the long-

[47] Name is not included to preserve anonymity and confidentiality of the participant.

> standing division of research and practice, as seen for example in the field of psychology… The idea of using evidence-based intervention is a good idea. Who could disagree with it? The application is much more problematic. For example, in my state, there is a push to use evidence-based interventions. Who is going to decide what is evidence based? What if politicians and state agencies decide that only ABA is evidence based, because that is what ABA practitioners claim?... Your research has the potential to do good or to do much harm. If you over simplify the problem of evidence-based practice, you will be doing a disservice to the children we serve... Your definition was accurate but did not reflect all the problems with how the definition is applied."

This comment highlights the distinct research gap between research and practice within the field of ASDs (Volkmar et al., 2011). There may be differences in the work pressures, constraints, incentive systems, contractual obligations, organizational mandates, etc. between professionals across disciplines practicing in community settings and the conditions within research settings (Weisz & Addis, 2006). Exosystem influences (e.g., organizations in which professionals practice) can play a role in professionals' practice (Bronfenbrenner, 2005). While more efficacy research on ASD interventions is needed, testing the effectiveness of how EBIs for ASDs work when implemented in community settings is also needed. Indeed, effectiveness research on ASD interventions implemented in community settings is sorely lacking (McLeod, Southam-Gerow, Christon, Archer, & Rodriguez, 2012). Brookman-Frazee's and colleagues' (2012) study examining a package of EBIs in a community setting is one study that sets an excellent example of the type of research on EBIs that is needed in the ASD field.

Summary. Measuring professionals' behavior on EBI use is not intended to condemn those disciplines that may not be recommending and providing these interventions at as high a rate as others. Instead, by outlining this list of interventions (which are the treatments currently identified as EBIs for ASDs based on the available reviews) and discussing the points highlighted in the above section, it is hoped that two specific areas of growth for the field of ASD intervention research will be highlighted. First, that research is needed on a great many

more interventions to assess their efficacy and effectiveness for children with ASDs; studying focused intervention practices provides a useful direction for this work. Second, even given that the EBIs on the list in this study are primarily within educational/behavioral domains, it is hoped that some areas for improvement can be identified in terms of how each discipline can increase its awareness and familiarity (and recommendation/provision) of those interventions that we have currently defined as EBIs. These perspectives have been shared in the ASD literature and were echoed by a number of individuals who took the survey in this study and contacted me. Understanding these background issues enhances a discussion of the findings of this study and the reader is urged to consider the findings within this context.

Implications for Practice and Training

The findings of this study can be applied to the research/practice gap in the ASD intervention field. Recommending and providing EBIs to children with ASDs requires a number of things of professionals: being familiar with empirical research and searching electronic databases, engaging in courses or continuing education specific to ASDs, and specific training on interventions with empirical support (Volkmar et al., 2011). Yet "most professionals lack training in even the most basic and most common intervention techniques… and many believe that they are using treatments that are evidence-based when, in fact, they are not…" (Volkmar et al., 2011, p. 374). Being familiar with and receiving training on the EBIs (trend towards a significant correlation) is related to increased recommendation/provision of EBIs in the current study across professional disciplines.

Even if professionals do not have the time or money to undergo formal continuing education on EBIs, there are many dissemination efforts that currently exist that professionals across disciplines should be made aware of. The National Autism Center (NAC; 2009) and the

National Professional Development Center (NPDC; 2011) were responsible for two of the literature reviews used in this study for focused intervention practices, and they have made excellent efforts to a) make the findings of their reviews publically available on their websites[48], and to b) transition the findings into training components within instructions for implementation.

The NAC (2012) offers a number of publications on their website that are free to download: *The National Standards Report* (outlining the findings of their systematic review), *A Parent's Guide to Autism and Evidence-based Practice* (a manual for families on selecting interventions), and *Evidence-Based Practice and Autism in the Schools* (a manual for school systems on implementing EBIs). The NAC also reports on their website that they will soon have a manual for physicians on counseling families with newly diagnosed children, and a manual for professionals working with children with ASDs on how to implement the EBIs identified in the NSP (2009) review (NAC, 2012). The NPDC also has a range of excellent resources on their website. First, for every intervention classified as an EBI for ASDs, they have created evidence-based practice briefs including: a) a description of the practice and how it can be used; b) explicit instructions detailing exactly how to implement the practice based on the literature; c) an implementation checklist so that it is possible to document the extent to which professionals' follow the step-by-step instructions for implementation; and finally d) a list of references in the literature for the practice's use (NPDC, 2012). The NPDC (2012) also suggests the use of another resource: the Ohio Center for Autism and Low Incidence (OCALI) website's Autism Internet Modules (AIM), 2012). These modules include all information in the briefs, but also

[48] NAC's (2012) website has a range of dissemination manuals available, tailored to parents and different disciplines: http://www.nationalautismcenter.org/nsp/dissemination.php. The NPDC's (2012) website http://autismpdc.fpg.unc.edu/content/evidence-based-practices contains links to EBI briefs, in which each intervention is described and instructions are provided for how to implement the interventions. The Ohio Center for Autism and Low Incidence (OCALI) website provides free Autism Internet Modules (AIM) on EBIs: http://www.autisminternetmodules.org/user_mod.php.

include case studies, video examples, discussion questions, activities, and pre-and post-tests. This resource covers both interventions that are classified as EBIs and those interventions for which there is emerging evidence of efficacy (e.g., social skills).

There are some helpful resources on FCC for professionals desiring further information or training on this approach to care. The Association for University Centers on Disabilities and the Leadership Education in Neurodevelopmental and Related Disabilities (LEND, 2012)[49] provides information on participating in a LEND training program, of which a core component of this graduate-level training program. In addition, the Institute for Patient- and Family-Centered Care (IPFCC; 2012)[50] website has a tools/resource page including self-assessments on FCC, information on family advisory boards, and literature on how to increase FCC in different settings. The Maternal and Child Health Training Grantee Network (2011)[51] provides guidelines on FCC for providers, as well as assessment tools and other resources. The organization Family Voices (2012)[52] has a website including principles of FCC and self-assessment tools for providers and families. While these self-assessments may be useful guides or may provide ideas for professionals on how to incorporate aspects of FCC into care, further research is needed on the psychometrics of these instruments. In addition, the ASD field has little formal information published on FCC for ASDs; further work should focus on developing materials on FCC tailored for the ASD population.

Implications for Future Directions in Research

Overall, the TPB is helpful for better understanding professionals' self-reported behaviors. While the TPB was less helpful in explaining professionals'

[49] http://www.aucd.org/template/page.cfm?id=473
[50] http://www.ipfcc.org/tools/downloads-tools.html.
[51] http://leadership.mchtraining.net/?page_id=128
[52] http://www.familyvoices.org/work/family_care

recommendation/provision of EBIs, it was more helpful in explaining professionals' reported use of a FCC approach to care (Attitudes and Perceived Behavioral Control). One important direction for future research may be to delve further into understanding the underlying beliefs related to these constructs. This may be done by conducting elicitation studies (as outlined in Francis et al., 2004) with groups of professionals from different disciplines to better understand the unique beliefs of each discipline. Elicitation studies involve taking a qualitative approach and collecting data from at least 25 participants via focus groups, individual interviews, or mailed questionnaires (Francis et al., 2005). Participants are asked to reflect on their underlying beliefs for each of the TPB constructs using a series of structured questions (e.g., "Are there any individuals or groups who would approve of you recommending/providing EBIs to children with ASDs?" or, "What factors would make it difficult or impossible for your to recommend/provide EBIs for children with ASDs?"). These questions are designed to tap into participants' commonly held beliefs that underlie their attitudes, subjective norms, and perceived behavioral control. Participant responses are content analyzed into themes independently by at least two researchers (Francis et al., 2004). Understanding of these commonly held beliefs may provide a more nuanced understanding of psychological constructs underlying professionals' behaviors.

In particular, future work may want to explore the underlying beliefs that contribute to positive attitudes and self-efficacy in terms of using FCC, especially as these predictors explained an important percentage of *FCC-Behavior* (compared to *EBI-Behavior*). A fuller understanding of these beliefs may help to identify ways to intervene with professionals with negative attitudes and low levels of self-efficacy in using FCC. For instance, exploration of behavioral beliefs regarding FCC (beliefs about the outcomes of behavior; Ajzen, 2005) may help to identify areas of misconception surrounding FCC. For instance, if a professional believes

that FCC does not contribute to patient satisfaction and better care, he is likely to have a poor evaluation of FCC (lower Attitudes score). Providing professionals with information on the positive outcomes of FCC (e.g., Dunst et al., 2007; Gabovitch & Curtin, 2009) may help to modify some problematic underlying behavioral beliefs. In addition, exploration of the control beliefs (beliefs surrounding the presence or absence of resources and opportunities necessary for a behavior to occur; Ajzen, 2005) may help to further clarify our understanding of perceived behavioral control regarding using FCC in working with children with ASDs and their families. If professionals perceive that they do not have the necessary opportunities or resources (e.g., training, time, reimbursement) to incorporate FCC into their care with ASDs, they are more likely to have a lower degree of perceived behavioral control surrounding this behavior. In addition, exploration of other variables that are related to the processes of involvement in interventions may be a useful direction for further enriching our understanding of FCC in ASDs. For instance, studying variables such as therapeutic alliance, family empowerment, family expectancies, and family engagement (Hoagwood, 2005) in ASD intervention implementation may be useful directions for future research. It would be interesting to explore these variables in relation to FCC behavior across professional disciplines as well. Learning more about the underlying beliefs of professionals and other variables related to *FCC-Behavior* may help to further shed light on *FCC-Behavior* and identify systems-level changes (e.g., funding for training) that may increase professionals' self-efficacy around using FCC.

In addition, given the lack of influence by *Subjective Norms*, future work may want to elucidate the beliefs of professionals about what types of social pressure might increase their likelihood of engaging in evidence-based practices (EBIs and FCC) in working with children with ASDs. It may be that this lack of perceived subjective norms indicates that professionals do

not perceive that there is a mandate from their organizations to certain aspects of care (or there may not actually be a mandate present). In some ways, we want for professionals to experience some social pressure to utilize components of evidence-based practice. Understanding the role that organizational guidelines and professional guidelines (or other important players) play in shaping beliefs and subjective norms in professionals may identify areas for encouraging uptake of evidence-based practices.

Next, future work may focus on the role of intentions as mediating the relationship between TPB predictors and professional's behavior. In Ajzen's (1991, 2005) conceptualization of the Theory of Planned Behavior, behavioral intentions (e.g., level of motivation to do the behavior) are considered to be important as they may mediate the relationship between attitudes, subjective norms, and perceived behavioral control, and actual behavior (Baron & Kenney, 1986). Intentions to perform behavior, or motivation to perform a behavior, may also be used as a proxy measurement for behavior. Introduction of a mediator such as intentions is often done after a strong relationship has already been established between a predictor and an outcome (Frazier et al., 2004). A mediator may help to elucidate the mechanisms underlying this relationship (Baron & Kenney, 1986), in this case, especially for *FCC-Behavior* given the moderate contribution of the TPB predictors to understanding *FCC-Behavior*.

Finally, an important direction for future research is examining the perspectives of professionals on the perceived barriers to using evidence-based practices (namely EBI and FCC). It is one thing to make recommendations that professionals engage in evidence-based practices, yet quite another to understand the potential barriers to the implementation of these factors. Further research may be targeted towards identifying and reducing the impact of these barriers.

Study Limitations

A number of methodological limitations to the current study should be considered related to the sample, procedures, and the measures used in the study. This section will outline these limitations and potential threats to statistical conclusion validity, internal validity, construct validity, and external validity will be identified[53]. I will discuss how the findings of the study may be interpreted within the context of these limitations.

Power Limitations. Over-powered analyses is one potential threat to statistical conclusion validity in this study (Shadish, Cook, & Campbell, 2002). Notably, *a priori* power analyses indicated that just fewer than 100 participants were needed in order to detect moderate effects and the sample size of this study (N=709) is considerably larger than this. The current sample size may have over-powered the analysis such that small effects that were statistically significant were detected (e.g., small effect of TPB variables in explaining *EBI-Behavior*). This comes at the cost of these effects being marginally practically significant. It is important for the reader to note the small effect size and not over-interpret the importance of the TPB variables in relation to use of EBIs. The over-powering of the sample also may have potentially inflated Type I error (i.e., finding an effect when in fact there were not effects). Corrections for multiple analyses were used to minimalize the impact of multiple analyses, thereby decreasing the possibility of Type I error. In addition, effect sizes were calculated to provide context regarding the magnitude of the findings to facilitate more accurate interpretation.

Sample Limitations. There were also limitations to the various recruitment methods for each of the samples. These limitations may have implications for the internal validity and

[53] Per Shadish, Cook, & Campbell (2002), *statistical conclusion validity* refers to using the appropriate statistics to infer valid relationships between independent and dependent variables. *Internal validity* refers to whether a study measures the true relationships between variables (taking into account aspects of measurement or study design). *Construct validity* refers to the validity of inferences made about the constructs that are represented by measures and other procedures in the study. *External validity* refers to the extent to which the relationships under study will generalize to other people, settings, etc. (Shadish, Cook, & Campbell, 2002).

external validity of study findings (Shadish et al., 2002). Two different samples were recruited. The advantage of Sample 1, a convenience sample, is that the study reached participants in specific placements (e.g., multidisciplinary teams in hospitals), or with special training (e.g., LEND trainees). These individuals are sometimes not listed in "find a provider"-type listings. The disadvantage of using a convenience sample alone is that it is not possible to know how many people saw, but ignored, the notice, and so an overall response rate is not available. Also, it is possible that responses may have come only from those with a certain set of views and may not represent the broad community of providers. It is a "self-selecting" sample.

The use of a stratified random sampling approach was aimed at recruiting a more representative sample of professionals. The advantage of Sample 2, a stratified random sample constructed from online provider listings, is that it is a random sample (at least, of providers whose contact information was given online) and so may increase the validity of our sample of community providers. In addition, it is possible to know the response rate. As often happens in survey research sent to specific people, there was a relatively low response rate (11.4%); it is possible that this sample is not fully representative of the population of professionals working with children with ASDs. A disadvantage of this approach was the labor and expense of sending mailings to specific professionals, along with follow-up contacts for those who were slow to respond or did not respond. In addition, the online listings may not be representative of all professionals working with individuals with ASDs, as these professionals only represent those professionals with information available on online provider listings. It is likely that many professionals working with children with ASDs are not listed on these websites.

Sample non-equivalence. There were some differences between the two samples on basic demographics and study variables (non-equivalence). This non-equivalence detracts from

the internal validity of study findings (Shadish et al., 2002). For example certain TPB variables (e.g., Subjective Norms) were significantly different between samples, and participants in the two samples significantly differed on their self-reports of training emphasizing EBI and FCC. The reason for these differences is unknown. It is also difficult to know to what extent these differences are an artifact of the response rate in the stratified random sample or true differences between samples. There could also be differences between individuals filling out paper and Internet versions of the survey; the number of individuals from the stratified random sample who filled out their questionnaires using the Internet version was prohibitively small to draw any meaningful comparisons between groups. To control for this threat to internal validity, all variables differing between the two samples for which it was feasible to statistically control for were controlled for. Sample group was also the first step in all analyses to control for any variance from participants being from different samples. Overall, while there were differences on specific variables, there were no significant differences between the two samples in terms of explaining unique variance in the dependent variables. Future work may want to take these findings into consideration when designing survey studies such as this with professionals, as recruiting a stratified random sample does require a good deal of time, money, and effort.

Sample representativeness. Next, it is likely that there are professionals whose views and practices are underrepresented by the current sample. This may detract from the external validity of the study findings (Shadish et al., 2002). In particular, a core approach to recruitment across both samples was to use professional and autism organizations to disseminate the survey and recruit a stratified random sample. Professionals who do not affiliate with organizations and who do not choose to participate in research may differ in unknown ways from the professionals who participated in this study. For instance, professionals who choose not to have membership in

professional or autism organizations may in fact be the professionals who are most isolated in working with children with ASDs. Also, professionals who were part of this sample may have been individuals with certain perspectives on EBIs and FCC that differed from non-participants. It is likely that the participants in this sample had a higher degree of motivation to share their views about these components of practice.

Finally, in regards to the sample, certain discipline and demographic groups may be underrepresented. In particular, it was very challenging to recruit a sample of social workers that provided direct services to children with ASDs. The overall availability of social workers on online provider listings was limited compared to the availability of other disciplines. In addition, even between the two methods of recruitment, social workers comprised the smallest group in the study (n=52); all other discipline groups included at least 100 participants. It is unclear whether this sample of social workers accurately represents social workers in the population of professionals who work with children with ASDs. Minority race/ethnic groups of professionals are also underrepresented in this sample. Males were also largely underrepresented in this sample; however, there were discipline-specific differences in number of males. Certain disciplines (e.g., Medicine) had more males within the sample than did others (e.g., Occupational Therapists). There are no known theoretical reasons to suppose that these demographic characteristics significantly influence professionals' behaviors, but these differences should provide some context for interpreting findings.

Self-report limitations. Next, there were limitations related to the self-report nature of the survey, impacting the internal validity of study findings (Shadish et al., 2002). This study relied on self-report data from professionals. Efforts were made to reduce the potential instrumentation effect of reflecting on one's perceptions (i.e., TPB variables) prior to reporting

on one's behaviors by having participants respond to the measures related to their behaviors prior to asking about their perceptions. However, it is possible that certain participants did not fill the survey out in order, and other participants were influenced by the fact that the measures were all contained within the same survey instrument.

There is the potential that professionals' report about their perceptions of EBI and FCC differ from their true perspectives of these aspects of care. It may be that social desirability played a role in how individuals reported on these measures. Due to the length of the survey, inclusion of another measure was prohibitive. In addition, current short-forms of social desirability measures have been tested primarily on undergraduate populations (e.g., Reynolds' 1982 version of the Marlow Crowne) and were estimated to be inappropriate for use with professionals. Participants were reminded that their responses were entirely anonymous and confidential. To help remind participants that they should aim to report as accurately as possible, statements such as the following were included in the survey instructions:

> "*Please be assured that your CONFIDENTIAL responses will not be viewed as a judgment of you or how you provide services; just because a behavior is addressed here DOES NOT mean that it is necessarily an important behavior for all professions. Thus, do not feel that selecting a low number is equivalent to giving yourself a poor evaluation.*"

However, we have little idea how social desirability may have played a role for participants.

In addition, it is possible that professionals' reports about their behavior differ from their actual behavior. A meta-analysis of work using the TPB suggests that the TPB predicts objectively measured behavior as well as self-reported behavior (Armitage & Conner, 2001). Still, it is likely that this study could be strengthened by more objective measures of professionals' behaviors. For example, it would be useful to have families' points of view on the extent to which the professionals they work with, from varying disciplines, are family centered in

their approach. There was no way within this study to empirically evaluate the error in terms of how professionals reported their behavior on either the *EBI-Behavior* or *FCC-Behavior* (i.e., *MPOC-SP*) measures.

***EBI-Behavior* measure limitations.** Next, there are certain features of the *EBI-Behavior* measure that are limitations with potential for impacting the statistical conclusion validity, internal validity, and construct validity of study findings (Shadish et al., 2002). In looking at the *EBI-Behavior* measure, examination of one item in particular ("providing atypical antipsychotics") indicated that a small number (n=20; 4.19%) of non-Medical/Nursing professionals who originally provided responses to this item (n=477 before multiple imputation) endorsed a value greater than 0 (i.e., "Never/Outside my discipline's scope of practice"). This indicates that there was a certain amount of measurement error on that item, as professionals outside of the Medical/Nursing discipline cannot provide (i.e., prescribe) medications. This represents a threat to statistical conclusion validity and is likely related to the self-report nature of the survey instrument. It is possible that individuals who responded in the positive direction on this item work closely with a Medical/Nursing professional who can prescribe medications and thus answered with a response other than 0. It is possible also that this reflects errors in circling items on paper versions or error in selecting the appropriate response option on the Internet version. There was no way to assess this further with the current dataset. As all other items on the EBI list are feasible for each discipline to do in practice, there is not a way to estimate that error. As such, the *EBI-Behavior* measure should be interpreted with caution.

Future studies using a measure similar to the *EBI-Behavior* might consider including items to assess whether participants are indeed eligible to provide the interventions on the list. Another option might be for professionals to reflect back on a specific amount of time (e.g., the

past month) and identify the specific number of times they have used a specific intervention during that time, rather than using a Likert-scale approach on "past behavior." This measure would likely benefit from an operational definition of "past" behavior. Alternatively, future studies may opt to utilize an observational measure of professionals' behavior, although this may be very hard to implement in practice. In sum, the findings from the *EBI-Behavior* measure should be interpreted with caution and be considered a proxy measure of a person's perceptions of their own behavior, and not their observable behavior.

As has been discussed at length, the *EBI-Behavior* measure has limitations in that the number of interventions on the measure that are typically thought of as associated across disciplines was unequal across disciplines. The practices qualifying as EBIs may be those most commonly used by educators. While this list accurately reflects the list of interventions and practices considered EBIs at the time of this writing, it is possible that this list may not be equally as relevant for all disciplines. However, this is more of a commentary on the state of affairs within the ASD intervention research field, as has been discussed previously. More research is needed use of interventions outside of the Educational/Behavioral intervention domain (e.g., medical interventions, sensory integration, or dietary practices). The content of the *EBI-Behavior* measure included all interventions that met at least two comprehensive reviews criteria's as being an EBI. As Mesibov and Shea (2010a, p. 6) and others have noted, "There really is no agreement within the field about what constitutes effective, evidence-based treatment for the entire range of people with autism." While others may disagree with aspects of this statement, it is clear that there is a great deal of disagreement over defining EBIs for ASDs (Reichow et al., 2008). This detracts from the construct validity of the *EBI-Behavior* measure (Shadish et al., 2002). In constructing the list for this study, efforts were made to do the best

possible job of assembling the EBI list based on the current available information across resources even given this lack of agreement on what constitutes an EBI. In addition, given the composition of the list of interventions, it is likely that certain disciplines were less likely to be exposed to or familiar with a higher proportion of interventions. Efforts were made to take this into account in analyses by controlling both for familiarity with the intervention list (Unfamiliarity variable) and Discipline itself, such that any variance accounted for by a participants' familiarity with the list or discipline group was accounted for prior to assessing the effect of TPB variables on behavior.

TPB measure limitations. There were a few limitations related to the TPB measures developed for use in this study that may represent threats to the construct validity and statistical conclusion validity of these measures (Shadish et al., 2002). First, the TPB measure for EBIs included recommending and providing behaviors within one measure. Participants were asked to consider "recommending" and/or "providing" EBIs as a unified construct. However, it is conceivable that in regards to perceived behavioral control (i.e., self-efficacy), for instance, that self-efficacy may differ between "providing" and "recommending" evidence-based interventions. For instance, a professional may have high self-efficacy for recommending EBIs, but may have low self-efficacy on their ability to provide EBIs themselves, potentially based on their training history. This may detract from the construct validity of this measure. Even if this is the case, the professional's perspectives surrounding providing and recommending EBIs are likely to correlate with one another (although this was not tested empirically in this study). For this study, it was decided that measuring recommendation and/or provision of EBIs with one set of items for each domain was the most parsimonious way of providing an initial measurement of this construct, reducing some of the burden placed on participants filling out the survey. It may

be helpful in future work to break down these questionnaires into two separate measures; the combination may not have been specific enough (e.g., Armitage & Connor, 2001; Francis et al., 2004).

In addition, the TPB measures (both EBI and FCC) evidenced very high scores on average across subscales. This may indicate a potential ceiling effect of the items comprising these measures. Restriction of range can weaken the relationship between variables and is a threat to statistical conclusion validity (Shadish et al., 2002). In general, these measures may not have been as sensitive due to the high overall means. However, if it is true that most professionals "always" do something, there is no point in trying to see if there is a higher value possible. Future work may further refine these measures to increase their sensitivity and reduce the ceiling effect noted in this study.

Finally, a critical limitation of the measures used in this study was that TPB measures were created (albeit following very specific guidelines; Francis et al., 2004; Ajzen, n.d.) for use in this study. While the preliminary psychometric data on each of the measures is promising, future work must be done to establish the construct validity of these measures (Foster & Cone, 1995). Evaluating the relation of the measures to other established measures in the field that assess similar constructs (e.g., Aarons, 2004; King et al., 2003) and examining the underlying factor structure of the measures (DeVellis, 2003), may be initial first steps in this endeavor.

Conclusions

In sum, this study makes a number of contributions, but must be considered within the context of the limitations of the study and the limitations inherent in the field of ASD intervention research. This study provides evidence for the TPB as a useful model for understanding the self-reported behavior of professionals working with children with ASDs,

especially in regards to FCC. This is one of the first studies of its kind to take a multidisciplinary approach to understanding the behavior and perspectives of professionals working with children with ASDs. Within an ecological model of service delivery, information on ways to improve service delivery across different microsystems (i.e. professionals) can have a trickle-down effect on the daily quality of life for children with ASDs.

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Appendix A

Survey Instrument (Note: Pages 3-8 are pictured small here, as this information appears in the text of this dissertation).

Please help us to study interventions and services for children with autism spectrum disorders (ASDs).

Lillian Christon, M.A.
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Department of Psychology

If you would prefer to fill out this survey **on the web**, please visit this link: **http://tinyurl.com/autismprofessionals**

Please answer the following questions before completing the survey:

I spend at least 10% (i.e., approximately half of one workday per week) of my job providing direct services for children and youth (≤18 years old).

○ Yes ○ No (You must spend at least 10% of your job in direct services to participate.)

I have provided services for at least one child or youth (≤18 years old) with an autism spectrum disorder (ASD; includes autistic disorder, Asperger's disorder, and PDD-NOS) in the past year.

○ Yes ○ No (You must have provided services for at least 1 child with an ASD to participate.)

*If **Yes**, approximately how many children with ASDs have you provided services for in the past year?*_____

I primarily work with children of this age: *(check all that apply)*

○ birth-2 years ○ 3-5 years ○ 6-11 years ○ 12-18 years

Survey: Please answer the following questions.

A. My primary discipline/specialty (job title) is: *(check one)*

○ **Education**
- ○ Classroom Teacher
- ○ Special Education Classroom Teacher
- ○ Educational Diagnostician
- ○ Principal or Assistant Principal
- ○ Other *(please specify):* _____

○ **Medicine**
- ○ Pediatrician
- ○ Developmental/behavioral Pediatrician
- ○ Family Practice Physician
- ○ Neurologist
- ○ Osteopathic Physician
- ○ Psychiatrist
- ○ Other *(please specify):* _____

○ **Occupational Therapy**

○ **Psychology**
- ○ Clinical Psychologist
- ○ School Psychologist
- ○ Other *(please specify):* _____

○ **Social Work**

○ **Speech/Language Pathology**

○ **Other** *(please specify):*_____

B. My gender: ○ Male ○ Female

C. My race/ethnicity is: *(check all that apply)*
- ○ American Indian or Alaska Native
- ○ Asian
- ○ Black or African American
- ○ Hispanic or Latino
- ○ Native Hawaiian or Other Pacific Islander
- ○ White/Caucasian
- ○ Other (*please specify*):_____

D. I have participated in the following specialized training: *(check all that apply)*
- ○ Board Certified Behavior Analyst (BCBA) Certification
- ○ Defeat Autism Now! (DAN!)
- ○ Denver Model (or Early Start Denver Model)
- ○ DIR® or Floortime™ Model
- ○ Discrete Trial Training (DTT)
- ○ Leadership Education in Neurodevelopmental and Related Disabilities (LEND)
- ○ Pivotal Response Training (PRT)
- ○ Relationship Development Intervention (RDI)
- ○ SCERTS® Model
- ○ Treatment and Education of Autistic and related Communication-handicapped Children (TEACCH)
- ○ Other (*please specify*):_____

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E. The highest degree that I have completed up to this point is:

- ○ Associate's Degree
- ○ Bachelor's Degree
- ○ Master's Degree
- ○ Doctoral Degree
  - ○ Ed.D.
  - ○ Ph.D.
  - ○ Psy.D.
  - ○ M.D.
  - ○ D.O.
  - ○ Other (*please specify*):_____
- ○ Other (*please specify*):_____

Year completed highest degree:_____

○ I am a graduate student providing direct services as part of my training. When I finish graduate school, I will have this degree:

(***please write in***)_____

F. The area(s) where I primarily provide services is: *(check one)*

○ Urban ○ Suburban ○ Rural

G. The setting(s) where I primarily provide services: *(check all that apply)*

- ○ Clinic or Center
- ○ Community Service Board
- ○ Early Intervention Program
- ○ Hospital (community or private)
- ○ Hospital (academic medical center or university hospital)
- ○ Private practice
- ○ Residential treatment
- ○ School – Public
- ○ School – Private
- ○ Other (*please specify*):_____

H. I have received licensure or certification in my professional discipline:

○ Yes (*if so, please specify*):_____
○ No

I. Please fill in the following information:

- ○ State where I work primarily: _____
- ○ Number of years in practice in this discipline: _____
- ○ My age (in years):_____

Please circle your responses to the questions below. The term "ASDs" refers to all autism spectrum disorders such as autistic disorder, Asperger's disorder, and PDD-NOS.

J. In my training, an explicit emphasis was placed on using evidence-based interventions (i.e., interventions based on the best scientific evidence).	*Strongly disagree*	*Disagree*	*Neutral*	*Agree*	*Strongly agree*
K. In my training, an explicit emphasis was placed on using a family-centered care approach (i.e., collaborative partnerships with families, and considering individual/family values).	*Strongly disagree*	*Disagree*	*Neutral*	*Agree*	*Strongly agree*
L. I have received specific education and training on interventions for ASDs (via either direct teaching or practical experiences).	*Strongly disagree*	*Disagree*	*Neutral*	*Agree*	*Strongly agree*
M. I rely on my clinical judgment and my past experiences in selecting interventions to provide or recommend to children with ASDs.	*Strongly disagree*	*Disagree*	*Neutral*	*Agree*	*Strongly agree*
N. I rely on research evidence in selecting interventions to provide or recommend to children with ASDs.	*Strongly disagree*	*Disagree*	*Neutral*	*Agree*	*Strongly agree*
O. I rely on what my supervisor or organization states that I should do in selecting interventions to provide or recommend to children with ASDs.	*Strongly disagree*	*Disagree*	*Neutral*	*Agree*	*Strongly agree*
P. I rely on what families state that they want in selecting interventions to provide or recommend to children with ASDs.	*Strongly disagree*	*Disagree*	*Neutral*	*Agree*	*Strongly agree*

Q. *The following questions are about interventions for children/youth (from birth to 18 years of age) with ASDs. The term "ASDs" refers to all autism spectrum disorders such as autistic disorder, Asperger's disorder, and PDD-NOS.* ***For each intervention, please circle the number that best represents your response to each of the three questions.***

We know that you may not know about or use all interventions. However, in order to gather the best data possible, we ask that you try to provide responses for each intervention. We would like you to describe your ***actual*** *behavior and beliefs, rather than what you feel like would be "ideal" service. Please be assured that your CONFIDENTIAL and ANONYMOUS responses will not be viewed as a judgment of you or how you provide services. We truly appreciate your contribution!*

INTERVENTIONS LISTED BELOW:	**How EFFECTIVE is this intervention for treating at least one aspect of ASDs?** **U**= Too unfamiliar to rate **0**= Not effective **1**= Slightly effective **2**= Moderately effective **3**= Effective **4**= Very effective	**In the past, how much have you RECOMMENDED* this intervention to treat at least one aspect of ASDs?** *(and/or REFERRED children to an appropriate provider for this intervention?) **X**= Recommended AGAINST using **0**= Never **1**= Rarely **2**= Sometimes **3**= Often **4**= Almost always or always	**In the past, how much have you PROVIDED this intervention to treat at least one aspect of ASDs?** **n/a**= Cannot provide. Not within my discipline's scope of practice **0**= Never **1**= Rarely **2**= Sometimes **3**= Often **4**= Almost always or always
Behavioral Interventions			
1. **Antecedent-based Interventions** (modifying triggers/antecedents of undesirable behaviors to decrease those behaviors)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
2. **Differential Reinforcement** (e.g., ignoring undesirable behaviors/extinction & reinforcing appropriate behaviors)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
3. **Functional Behavior Assessment**	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
4. **Positive Behavioral Support**	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
5. **Prompting** (verbal, physical, etc.) and **Time Delay** (providing "wait time" to fade the use of prompts)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
6. **Reductive Intervention Strategies** to reduce undesirable behavior (e.g., water mist or protective equipment such as splints)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
7. **Reinforcement** (e.g., providing reward after desirable behavior)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
8. **Response Interruption/ Redirection** to stop undesirable behavior and subsequently prompt desired behavior	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4

INTERVENTIONS LISTED BELOW:	**EFFECTIVE for treating at least one aspect of ASDs?** **U**= Too unfamiliar to rate **0**= Not effective **1**= Slightly effective **2**= Moderately effective **3**= Effective **4**= Very effective	**RECOMMENDED? Please answer for all.** **X**= Recommended AGAINST using **0**= Never **1**= Rarely **2**= Sometimes **3**= Often **4**= Almost always or always	**PROVIDED? Please answer for all.** **n/a**= Cannot provide. Not within my discipline's scope of practice **0**= Never **1**= Rarely **2**= Sometimes **3**= Often **4**= Almost always or always
9. **Self-Management** (teaching a child to regulate/monitor his/her own behavior)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
10. **Task Analysis** (breaking a skill down into smaller steps)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
Comprehensive Programs			
11. **Applied behavioral analysis**	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
12. **DIR®/Floortime™ Model** (Developmental, Individual Difference, Relationship-based)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
13. **Discrete Trial Training** or **Lovaas' Institute/UCLA Model**	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
14. **Early Start Denver Model** (or Denver Model)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
15. **LEAP Model** (Learning Experiences: Alternative Program for Preschoolers and Parents)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
16. **Pivotal Response Training**	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
17. **RDI** (Relationship Development Intervention) or **Guided Participation**	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
18. **SCERTS® Model** (Social Communication/ Emotional Regulation/ Transactional Support)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
19. **TEACCH** (Treatment and Education of Autistic and related Communication-handicapped CHildren) or **Structured Teaching**	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
20. **Verbal Behavior Approach**	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
Speech/Language and Educational Interventions			
21. **Augmentative and Alternative Communication Approaches** (e.g., speech-generating devices, communication books)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
22. **Computer/Technology Aided Instruction** to teach skills and promote communication/language	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
23. **Early intervention** as soon as an autism diagnosis is considered	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
24. **Facilitated Communication** (not sign language), where a 'facilitator' who helps a child type on a keyboard	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
25. **Functional Communication Training** (e.g., teaching effective communication skills to replace inappropriate behaviors)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4

INTERVENTIONS LISTED BELOW:	EFFECTIVE for treating at least one aspect of ASDs? **U**= Too unfamiliar to rate **0**= Not effective **1**= Slightly effective **2**= Moderately effective **3**= Effective **4**= Very effective	RECOMMENDED? *Please answer for all. **X**= Recommended AGAINST using **0**= Never **1**= Rarely **2**= Sometimes **3**= Often **4**= Almost always or always	PROVIDED? *Please answer for all. **n/a**= Cannot provide. Not within my discipline's scope of practice **0**= Never **1**= Rarely **2**= Sometimes **3**= Often **4**= Almost always or always
26. **Gentle Teaching program**	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
27. **Intensive instructional programming** (e.g., 25 hours/week)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
28. **Language training to increase speech production and/or understanding** (e.g., Total Communication training)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
29. **Low Student/Teacher Ratios** (sufficient one-to-one time to meet individualized education goals)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
30. **Naturalistic Interventions/Teaching Strategies** (behaviors and skills taught in natural environment based on child's interests)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
31. **Oral Motor or Articulation therapy for autism**	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
32. **Parent/family Coaching** (to become experts in implementing therapeutic interventions)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
33. **Picture Exchange Communication System (PECS)**	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
34. **PROMPT© (Prompts for Restructuring Oral Muscular Phonetic Targets) System**	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
35. **Routines Based Intervention** (Robin McWilliams)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
36. **Sign Language** (e.g., American Sign Language)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
37. **Structured Work Systems** (organized space to independently practice skills previously mastered under supervision)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
38. **Visual Supports** (e.g., labels, schedules)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
Medical and Biomedical Interventions			
39. **Additive-free or Yeast-free Diets**	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
40. **Alter immunization (vaccine) schedule or avoid using them entirely**	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
41. **Anticonvulsant medications** (e.g. Neurontin™)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
42. **Antidepressant medications including serotonin reuptake inhibitors, SRIs (**e.g. Prozac™)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
43. **Anxiolytic medications** (e.g. Xanax™)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
44. **Atypical antipsychotic medications** (e.g. Risperidone)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4

INTERVENTIONS LISTED BELOW:	EFFECTIVE for treating at least one aspect of ASDs? **U**= Too unfamiliar to rate **0**= Not effective **1**= Slightly effective **2**= Moderately effective **3**= Effective **4**= Very effective	RECOMMENDED? *Please answer for all. **X**= Recommended AGAINST using **0**= Never **1**= Rarely **2**= Sometimes **3**= Often **4**= Almost always or always	PROVIDED? *Please answer for all. **n/a**= Cannot provide. Not within my discipline's scope of practice **0**= Never **1**= Rarely **2**= Sometimes **3**= Often **4**= Almost always or always
45. **Chelation** (removing heavy metals from body)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
46. **Craniosacral manipulation**	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
47. **Gluten- and/or Casein-Free Diet**	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
48. **Secretin**	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
49. **Stimulant medications** (e.g. Methylphenidate™, Ritalin)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
50. **Typical neuroleptic medications** (e.g. Haldol™)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
51. **Vitamins, Amino acids, Probiotics, and/or Enzymes**	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
Psychosocial and Other Therapeutic Interventions			
52. **Animal (or animal-assisted-) therapy** (e.g., horseback riding, pets, swimming with dolphins)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
53. **Art therapy**	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
54. **Cognitive behavioral and exposure-based therapies**	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
55. **Imitation-based interactions** (i.e., adults imitate the actions of a child with autism)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
56. **Joint Attention Training** (i.e., teaching how to respond to nonverbal social bids or initiate joint attention interactions)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
57. **Modeling (including Video Modeling),** where an individual is provided a visual demonstration of target skill to imitate	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
58. **Peer-mediated/peer-training interventions** (interacting with typically-developing peers to learn social skills)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
59. **Music therapy** to teach targeted skills (e.g., taking turns)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
60. **Play therapy**	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
61. **Psychodynamic therapy**	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
62. **Scripting**, or practicing repeatedly before entering a situation or using a skill	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
63. **Social Skills Training** (individually or in groups)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
64. **Social Stories (Social Narratives, Story-based Interventions)**	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4

INTERVENTIONS LISTED BELOW:	**EFFECTIVE for treating at least one aspect of ASDs?** **U**= Too unfamiliar to rate **0**= Not effective **1**= Slightly effective **2**= Moderately effective **3**= Effective **4**= Very effective	**RECOMMENDED? *Please answer for all.** **X**= Recommended AGAINST using **0**= Never **1**= Rarely **2**= Sometimes **3**= Often **4**= Almost always or always	**PROVIDED? *Please answer for all.** **n/a**= Cannot provide. Not within my discipline's scope of practice **0**= Never **1**= Rarely **2**= Sometimes **3**= Often **4**= Almost always or always
Sensory and Movement-based Interventions			
65. **Auditory Integration Training** (presenting a child with modulated tones through headphones to retrain auditory system)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
66. **Exercise** (physical exertion to reduce undesirable behaviors or increase appropriate behaviors)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
67. **Massage or Therapeutic Touch Therapy**	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
68. **Sensory Diet** (e.g., deep pressure, joint compression, vestibular/rotary input, etc.)	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
69. **Sensory-Integration Therapy**	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
70. **Using a therapy ball** as a seating alternative to decrease undesirable behaviors	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
71. **Weighted Vest**	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
72. **Wilbarger Brushing Protocol**	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
73. **Yoga, Movement Therapies, and/or Meditation**	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
Are there other interventions that you frequently recommend or provide to children with ASDs? If so, please list each in a separate row below.			
74.	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4
75.	**U** 0 1 2 3 4	**X** 0 1 2 3 4	**n/a** 0 1 2 3 4

Thank you so much for taking the time to answer those questions about ASD interventions. Your answers are very important in helping to learn more about professionals working with children with ASDs!

There are just a few more pages of the survey left to complete!

R. *Each question below asks you to indicate your level of involvement and investment in doing each of the behaviors described below on a scale from 1 (Not at All) to 7 (To a Very Great Extent). Please note that "N/A" (X) is used only if the situation described does not apply to you ("Not Applicable"). For each question, we would like you to think about the degree to which you displayed each of the behaviors described with children (≤ 18 years of age) with* ***ASDs****.*

We would like you to describe your ***"actual"*** *behavior, rather than what you feel would be "ideal" service. We recognize that professionals may be unable to display behavior to the extent they might wish, due to caseload size, policies, and other constraining factors. Please be assured that your* ***CONFIDENTIAL*** *responses will not be viewed as a judgment of you or how you provide services; just because a behavior is addressed here DOES NOT mean that it is necessarily an important behavior for all professions. Thus, do not feel that selecting a low number is equivalent to giving yourself a poor evaluation.*

IN THE PAST YEAR, *TO WHAT EXTENT DID YOU:* … *when working with children* ***with ASDs.***	**Indicate how much this event or situation happens to you.**							
	N/A	Not at All	To a Very Small Extent	To a Small Extent	To a Moderate Extent	To a Fairly Great Extent	To a Great Extent	To a Very Great Extent
1. ...suggest treatment/ management activities that fit with each family's needs and lifestyle?	X	1	2	3	4	5	6	7
2. ...offer parents and children positive feedback or encouragement (e.g., in carrying out a home program)?	X	1	2	3	4	5	6	7
3. ...take the time to establish rapport with parents and children?	X	1	2	3	4	5	6	7
4. ...discuss expectations for each child with other service providers, to ensure consistency of thought and action?	X	1	2	3	4	5	6	7
5. ...tell parents about options for services or treatments for their child (e.g., equipment, school, therapy)?	X	1	2	3	4	5	6	7
6. ...accept parents and their family in a nonjudgmental way?	X	1	2	3	4	5	6	7
7. ...trust parents as the "experts" on their child?	X	1	2	3	4	5	6	7
8. ...discuss/explore each family's feelings about having a child with special needs (e.g., their worries about their child's health or function)?	X	1	2	3	4	5	6	7
9. ...anticipate parents' concerns by offering information even before they ask?	X	1	2	3	4	5	6	7
10. ...make sure parents had a chance to say what was important to them?	X	1	2	3	4	5	6	7
11. ...let parents choose when to receive information and the type of information they wanted?	X	1	2	3	4	5	6	7
12. ...help each family to secure a stable relationship with at least one service provider who works with the child and parents over a long period of time?	X	1	2	3	4	5	6	7
13. ...answer parents' questions completely?	X	1	2	3	4	5	6	7
14. ...tell parents about the results from tests and/or assessments?	X	1	2	3	4	5	6	7

IN THE PAST YEAR, *TO WHAT EXTENT DID YOU:* *… when working with children **with ASDs.***	N/A	Not at All	To a Very Small Extent	To a Small Extent	To a Moderate Extent	To a Fairly Great Extent	To a Great Extent	To a Very Great Extent
15. ...provide parents with written information about their child's condition, progress, or treatment?	X	1	2	3	4	5	6	7
16. ...tell parents details about their child's services, such as the types, reasons for, and durations of treatment/ management?	X	1	2	3	4	5	6	7
17. ...treat each parent as an individual rather than as a "typical" parent of a child with a "problem"?	X	1	2	3	4	5	6	7
18. ...treat parents as equals rather than just as the parent of a patient (e.g., by not referring to them as "Mom" or "Dad")?	X	1	2	3	4	5	6	7
19. ...make sure parents had opportunities to explain their treatment goals and needs (e.g., for services or equipment)?	X	1	2	3	4	5	6	7
20. ...help parents feel like a partner in their child's care?	X	1	2	3	4	5	6	7
21. ...help parents to feel competent in their roles as parents?	X	1	2	3	4	5	6	7
22. ...treat children and their families as people rather than as a "cases" (e.g., by not referring to the child by diagnosis, such as "the autistic child")?	X	1	2	3	4	5	6	7

The next set of questions asks questions about "you (<u>or your organization</u>)." By "organization" we mean the facility or agency from or through which you provide services (e.g., center, school, hospital, etc.).

If you do not work at an "organization," please answer for your program, your team, or yourself.

IN THE PAST YEAR, *TO WHAT EXTENT DID YOU (OR YOUR ORGANIZATION)…* *… when working with children **with ASDs.***	**Indicate <u>how much</u> this event or situation happens to you.**							
	N/A	Not at All	To a Very Small Extent	To a Small Extent	To a Moderate Extent	To a Fairly Great Extent	To a Great Extent	To a Very Great Extent
23. ...promote family-to-family "connections" for social, informational or shared experiences?	X	1	2	3	4	5	6	7
24. ...provide support to help families cope with the impact of their child's chronic condition (e.g., informing parents of assistance programs, or counseling how to work with other service providers)?	X	1	2	3	4	5	6	7
25. ...provide advice on how to get information or to contact other parents (e.g., through a community's resource library, support groups, or the Internet)?	X	1	2	3	4	5	6	7
26. ...provide opportunities for the entire family, including siblings, to obtain information?	X	1	2	3	4	5	6	7
27. ...have general information available about different concerns (e.g., financial costs or assistance, genetic counseling, respite care, dating and sexuality)?	X	1	2	3	4	5	6	7

S. Each question below refers to a different aspect of **RECOMMENDING AND/OR PROVIDING EVIDENCE-BASED INTERVENTIONS to children with ASDs** (i.e., autistic disorder, Asperger's disorder, & PDD-NOS). We would like you to describe your "**actual**" perspectives, rather than what you feel would be an "ideal" perspective. Please be assured that your CONFIDENTIAL responses are not viewed as a judgment of you or the services you provide.

EVIDENCE-BASED INTERVENTIONS are those interventions for which efficacy has been demonstrated by a credible body of scientific work and high-quality research published in peer-reviewed scientific journals.

Evidence-based interventions: **(1)** have manuals or standardized instructions for use; **(2)** have demonstrated efficacy over a placebo or equal to an established intervention in at least 2 experimental or quasi-experimental design experiments OR a large series of single-case design experiments (in both cases, the characteristics of samples must be clearly specified, e.g., how diagnoses of participants was assigned); **(3)** have findings of efficacy replicated by different investigators or research groups.

	PLEASE CIRCLE THE NUMBER BELOW THAT BEST REPRESENTS YOUR RESPONSE:								
1. Recommending and/or providing evidence-based interventions to children with ASDs is:	Harmful	1	2	3	4	5	6	7	Beneficial
	A poor use of my time	1	2	3	4	5	6	7	A good use of my time
	Worthless	1	2	3	4	5	6	7	Valuable
	Bad	1	2	3	4	5	6	7	Good
	Irrelevant (to me)	1	2	3	4	5	6	7	Important (to me)
	Ineffective	1	2	3	4	5	6	7	Effective
Regarding recommending and/or providing evidence-based interventions to children with ASDs:									
2. Most people who are important to me think that…_____ …do this.	I should not	1	2	3	4	5	6	7	I should
3. It is expected of me that I do this.	Strongly disagree	1	2	3	4	5	6	7	Strongly agree
4. I feel under social pressure to do this.	Strongly disagree	1	2	3	4	5	6	7	Strongly agree
5. People who are important to me want me to do this.	Strongly disagree	1	2	3	4	5	6	7	Strongly agree
Regarding recommending and/or providing evidence-based interventions to children with ASDs:									
6. For me, to do this is:_____.	Difficult	1	2	3	4	5	6	7	Easy
7. I am confident that I can do this.	Strongly disagree	1	2	3	4	5	6	7	Strongly agree
8. The decision to do this is within my control.	Strongly disagree	1	2	3	4	5	6	7	Strongly agree
9. Whether I do this is entirely up to me.	Strongly disagree	1	2	3	4	5	6	7	Strongly agree
10. I _____ to recommend and/or provide evidence-based interventions to children with ASDs.	Do not expect at all	1	2	3	4	5	6	7	Strongly expect
	Do not want at all	1	2	3	4	5	6	7	Strongly want
	Do not intend at all	1	2	3	4	5	6	7	Strongly intend
11. Out of the next 10 children with ASDs that you work with, for how many would you expect to recommend and/or provide an evidence-based intervention?	0	1	2	3	4	5	6	7	8	9	10

T. Each question in this section refers to a different aspect of **PROVIDING CARE USING A FAMILY-CENTERED APPROACH to children with ASDs** (i.e., autistic disorder, Asperger's disorder, & PDD-NOS). We would like you to describe your "**actual**" perspectives, rather than what you feel would be an "ideal" perspective. Please be assured that your CONFIDENTIAL responses are not viewed as a judgment of you or the services you provide.

A FAMILY-CENTERED APPROACH to care refers to collaborative and respectful partnerships between professionals and families.

This includes having: **(1)** an appreciation for the culture, values, and customs of each child and family; **(2)** an understanding that the family is the child's primary source of strength and support, and that psychosocial support is important to care; **(3)** open and honest communication about child/family perspectives and information related to care (e.g., interventions); and **(4)** a goal of empowering families in their children's care.

	PLEASE CIRCLE THE NUMBER BELOW THAT BEST REPRESENTS YOUR RESPONSE:							
1. Providing care for children with ASDs using a family-centered approach is:	Harmful	1	2	3	4	5	6	7	Beneficial
	A poor use of my time	1	2	3	4	5	6	7	A good use of my time
	Worthless	1	2	3	4	5	6	7	Valuable
	Bad	1	2	3	4	5	6	7	Good
	Irrelevant (to me)	1	2	3	4	5	6	7	Important (to me)
	Ineffective	1	2	3	4	5	6	7	Effective
Regarding providing care for children with ASDs using a family-centered approach:									
2. Most people who are important to me think that…_____ …do this.	I should not	1	2	3	4	5	6	7	I should
3. It is expected of me that I do this.	Strongly disagree	1	2	3	4	5	6	7	Strongly agree
4. I feel under social pressure to do this.	Strongly disagree	1	2	3	4	5	6	7	Strongly agree
5. People who are important to me want me to do this.	Strongly disagree	1	2	3	4	5	6	7	Strongly agree
Regarding providing care for children with ASDs using a family-centered approach:									
6. For me, to do this is:_____.	Difficult	1	2	3	4	5	6	7	Easy
7. I am confident that I can do this.	Strongly disagree	1	2	3	4	5	6	7	Strongly agree
8. The decision to do this is within my control.	Strongly disagree	1	2	3	4	5	6	7	Strongly agree
9. Whether I do this is entirely up to me.	Strongly disagree	1	2	3	4	5	6	7	Strongly agree
10. I _____ to provide care for children with ASDs using a family-centered approach.	Do not expect at all	1	2	3	4	5	6	7	Strongly expect
	Do not want at all	1	2	3	4	5	6	7	Strongly want
	Do not intend at all	1	2	3	4	5	6	7	Strongly intend
11. Out of the next 10 children with ASDs that you work with, for how many would you expect to use a family-centered approach?	0	1	2	3	4	5	6	7	8	9	10	

U. If you have a couple extra minutes, we'd love to hear your thoughts on the following question. If not, please return this pamphlet in the enclosed pre-paid envelope.

From your perspective, what are the biggest challenges or barriers in working with and/or treating children with ASDs and their families?

If you have any additional thoughts or comments, please feel free to write them in below.

THANK YOU SO MUCH FOR YOUR TIME AND FOR YOUR PARTICIPATION!

Please return in the enclosed pre-paid envelope to:

Lillian Christon, M.A.
Virginia Commonwealth University
Department of Psychology
806 West Franklin Street
P.O. Box 842018
Richmond, Virginia 23284-2018

If you have any questions about the rights of research subjects or research-related injury, please contact VCU Office of Research Subjects Protection, 800 East Leigh Street, Suite 114, Box 980568, Richmond, VA 23298 or by phone at (804) 828-0868 or email: ORSP@vcu.edu.

Appendix B

General Steps for Assembling Each Discipline's Sampling Frame

1. For each discipline, identify at least one professional organization and one autism-specific organization that includes provider listings. (Note: see Appendix C for variations on this general guideline).
2. Generate comprehensive list of names from each of the two listings in separate Excel documents (one per organization). If there is the option to select individuals who work with children with ASDs, use this selection option.
    a. For AutismSpeaks listings for which there was a website and a business/organization/group practice listed, but no individual professional name, go to the listed website and identify the first professional listed on their list that is within the desired discipline.
3. Within each organization's list, eliminate listings as non-eligible if:
    a. A professional clearly states they do not work with ASD populations.
    b. A professional clearly states they do not work with children/youth.
    c. There is not a clearly identifiable individual professional at the listing (with the exception of the Education discipline, for which this information was not available).
    d. A professional is working for an organization (e.g., EasterSeals, Devereaux) that does not provide individual professionals' names.
    e. There are not last names included for professionals listed.
4. Combine listings of names across two (professional and autism) organizations and merge into one Excel document.
5. Remove multiple listings (same professional listed multiple times). Two independent individuals (the primary researcher, and an undergraduate research assistant) checked the listings for any repeat listings, which were then removed to yield a comprehensive list of individuals within each discipline.
    a. If the individual is listed two times within the same state, use the first listing (alphabetically) and delete the other listing.
    b. If the individual appears to be listed two times but in two different states, keep both listings (assumption that it is likely another professional in a different state with the same name).
6. Randomly select 200 individuals from the full combined listing using the SPSS random number generator. Each individual in the entire list was assigned a random number.
7. Go back to professional/autism organization listings for each of the 200 selected and identify address of each professional.
8. In the instance that there was no address available, the individual was no longer listed at the organization, or there was another problem with the listing, we went back to the main list and re-sampled (i.e., moved down to the next applicable number of listings) until 200 participants were achieved.
9. Once addresses were obtained, they were provided via Excel document to VCU Mail Services with printing instructions. Any poorly formed or inaccurate addresses for listings were removed and we re-sampled from the original random list until a list of 200 names per discipline was achieved.

Appendix C

Specific Steps for each Discipline's Sampling Frame

Discipline	First source: Professional organization	Second source: Autism-specific organization	Third source: (If Applicable)
Education (*n* = 4079 after removing duplicate listings, problematic listings, incomplete addresses, etc.)			
Name of Organization or Search Engine	National Center for Education Statistics	Autism Speaks Resource Guide	Autism Source (by the Autism Society)
Website of Organization or Search Engine	http://nces.ed.gov/ccd/schoolsearch/	http://www.autismspeaks.org/family-services/resource-guide	http://www.autismsource.org/
Search Terms	1. Public Schools - By State: Special Education; Type: All; Grade-Span: All 2. Private Schools - By State: School Type: Special Education; Grade-Span: All	1. Preschool 2. School-Age 3. Schools - Nonpublic (Private) 4. Schools - Residential	1. Private/Non-public School 2. Public School System - Charter 3. Public School System – Prep/Preparatory school 4. Public School System - Autism
Special Notes:	1. Downloaded excel file of complete listings by state. 2. Listings did not include professionals' names, so addressed envelopes to "Lead Special Education Teacher/Autism Teacher."	1. Created listings by searching for search terms by state. 2. Listings did not include professionals' names, so addressed envelopes to "Lead Special Education Teacher/Autism Teacher."	1. Included third source to include preparatory and charter schools that were not necessarily included on the NCES and AS listings. 2. Listings did not include professionals' names, so addressed envelopes to "Lead Special Education Teacher/Autism Teacher."
Number of unique listings initially identified	3468	906	1081

Discipline	First source: Professional organization	Second source: Autism-specific organization	Third source: (If Applicable)
Medicine (*n* = 1447 after removing duplicate listings, problematic listings, incomplete addresses, etc.)			
Name of Organization or Search Engine	American Academy of Pediatrics: "Find a Pediatrician or Pediatric Specialist" Search Tool	Autism Speaks Resource Guide	N/A
Website of Organization or Search Engine	http://www.healthychildren.org/English/tips-tools/find-pediatrician/pages/pediatrician-referral-service.aspx	http://www.autismspeaks.org/family-services/resource-guide	
Search Terms	1. Children with Disabilities 2. Developmental and Behavioral Pediatrics 3. Neurology	1. DAN! Practitioners 2. Neurologists 3. Pediatricians - Developmental 4. Pediatricians - General 5. Psychiatrists	
Special Notes:	1. Created listings by searching for search terms by state. 2. First searched for all listings with search term "Children with Disabilities." Next, searched for "Developmental and Behavioral Pediatrics." Same procedure for "Neurology." Finally, went back through and sorted names alphabetically and eliminated any repeat listings.	1. Created listings by searching for search terms by state. 2. If no individual professional identified and website is present, go to website and search using search term and "ASD" or "autism". Identify first individual's name and include on listing.	
Number of unique listings initially identified	1026	517	

Occupational Therapy **(*n* = 1451 after removing duplicate listings, problematic listings, incomplete addresses, etc.)**			
Name of Organization or Search Engine	Sensory Processing Disorder Foundation Treatment Directory	Autism Speaks Resource Guide	N/A
Website of Organization or Search Engine	http://www.sinetwork.org/directory/index.html	http://www.autismspeaks.org/family-services/resource-guide	
Search Terms	Occupational Therapist	Occupational Therapy	
Special Notes:	None.	1. Created listings by searching for search terms by state. 2. If no individual professional identified and website is present, go to website and search using search term and "ASD" or "autism". Identify first individual's name and include on listing. 3. Permutations surrounding name listings: a. If an individual's name was listed and tag is only Occupational Therapy, but no credentials are listed, the listing was included in the list. b. If a name was listed and no credentials are listed, and there were multiple tags/search terms, but there was a website available, then went to website and used Step #2 above to identify professional with correct credentials. c. If a name was listed and no credentials are listed, and there were multiple tags/search terms and no website, the listing was not included in the list (i.e., no way to verify that the individual listed was within this professional group).	
Number of unique listings initially identified	1072	474	

Discipline	First source:	Second source:	Third source:
	Professional organization	**Autism-specific organization**	**(If Applicable)**
Psychology (*n* = 1207 after removing duplicate listings, problematic listings, incomplete addresses, etc.)			
Name of Organization or Search Engine	American Psychological Association (APA)	Autism Speaks Resource Guide	N/A
Website of Organization or Search Engine	http://locator.apa.org/	http://www.autismspeaks.org/family-services/resource-guide	
Search Terms	1. Autism/PDD 2. Age groups served: Children	1. Psychologists	
Special Notes:	1. Created listings by searching for search term by state. 2. Deleted Master's degree providers (e.g., LMFTs) that the search yielded.	1. Created listings by searching for search term by state. 2. Deleted Master's degree providers (e.g., LMFTs) that the search yielded. If no individual professional identified and website is present, go to website and search using search term and "ASD" or "autism". Identify first individual's name and include on listing.	
Number of unique listings initially identified	797	531	

Discipline	First source: Professional organization	Second source: Autism-specific organization	Third source: (If Applicable)
Social Work (*n* = 256 after removing duplicate listings, problematic listings, incomplete addresses, etc.)			
Name of Organization or Search Engine	National Social Worker Finder: HelpPro	Autism Speaks Resource Guide	Autism Source (by the Autism Society)
Website of Organization or Search Engine	http://www.helppro.com/HP/AdvancedSearch.aspx	http://www.autismspeaks.org/family-services/resource-guide	http://www.autismsource.org/
Search Terms	1. Specializes in 'Autism' or 'Asperger's Syndrome.' 2. Must be 100% match.	1. Social Worker 2. MSW and M.S.W. 3. LSW and L.S.W. 4. LCSW and L.C.S.W. 5. LICSW and L.I.C.S.W.	1. Social Worker 2. MSW and M.S.W. 3. LSW and L.S.W. 4. LCSW and L.C.S.W. 5. LICSW and L.I.C.S.W.
Special Notes:	1. Used "Basic Search" feature. 2. Unable to look up listings by state, only by zip code. 3. As such, here are the steps followed to identify zip code: a. Identified most populated cities in state via US Bureau of the Census (2000 and 2010 figures). b. Within each city, looked up possible zip codes in that city using USPS Zip code search function. c. Selected first zip code on the list that was not associated with a specific PO Box for inputting into HelpPro. 4. Selected highest option (90 mile radius) from zip code selected. 5. One zip code identified per state (most populated city).	1. AutismSpeaks does not have a search category by state for "Social Workers." 2. As such, here are the steps followed to identify individuals listed as social workers: a. Used general search function for website and typed in all permutations of search terms listed above. b. When results received, selected only "Resources" to be viewed. c. Each individual was input into the list. 3. Removed listings that endorsed solely running "SibShops" (i.e., support program for siblings of children with ASDs).	1. Included third source, as there were very few social workers identifiable through first two search sources. 2. Autism Source does not have a search category by state for "Social Workers." 3. As such, here are the steps followed to identify individuals listed as social workers: a. Used general search function for website and typed in all permutations of search terms listed above. b. Each individual was input into the list. 4. Removed listings that endorsed solely running "SibShops" (i.e., support program for siblings of children with ASDs).
Number of unique listings initially identified	103	73	77

Discipline	First source:	Second source:	Third source:
	Professional organization	**Autism-specific organization**	**(If Applicable)**
Speech-Language Pathology (*n* = 10175 after removing duplicate listings, problematic listings, incomplete addresses, etc.)			
Name of Organization or Search Engine	American Speech-Language-Hearing Association (ASHA)	Autism Speaks Resource Guide	N/A
Website of Organization or Search Engine	http://www.asha.org/proserv/	http://www.autismspeaks.org/family-services/resource-guide	
Search Terms	1. (In initial assembly of listings): 'Ages 3-5', 'Ages 6-11', and 'Ages 12-17.' 2. (In review of randomly selected participants): 'Autism', 'Asperger's', or 'Autism Spectrum Disorders.'	1. Speech and Language Therapy	
Special Notes:	1. Created listings by searching for search term by state. 2. Selected "Help is needed for: speech, language, or swallowing." 3. There were a number of modifications needed to use this search tool within the constraints of the current project: a. Due to the magnitude of available listings and the inability to search for listings by necessary terms (e.g., 'Autism'), it was determined that a comprehensive listing from all states would be completed. b. However, we were interested in professionals serving each age group. c. SPSS Random Number function was used to assign each of the 50 states	1. Created listings by searching for search term by state. 2. If no individual professional identified and website is present, go to website and search using search term and "ASD" or "autism". Identify first individual's name for this profession and include on listing. 3. Permutations surrounding name listings: a. If an individual's name was listed and tag is only 'Speech and Language Therapy', but no credentials are listed, the listing was included in the list. b. If a name was listed and no credentials are listed, and there were multiple tags/search terms, but there was a website available, then went to website and used Step #2 above to identify professional with correct credentials. If a name was listed and no credentials are listed, and there were multiple tags/search terms and no website, the listing was not included in the list (i.e., no way to verify that the individual listed was within this professional group).	

	and DC to one of the three age groups ('Ages 3-5', 'Ages 6-11', and 'Ages 12-17'), and then comprehensive listings based on the randomly selected age were completed for each state. 4. After combination with the Autism Speaks dataset, random selection occurred. 5. If the individual randomly selected was from the ASHA dataset, we went back and verified that the individual had one of the key search terms listed in their listing (i.e., 'Autism', 'Asperger's', or 'Autism Spectrum Disorders'). 6. If their listing did not include one of these search terms, they were removed from the random sample, and replaced by the next randomly selected individual on the list. 7. Note: Many listings identified were individuals providing services in rehabilitation hospital or home rehabilitation (e.g., post-traumatic brain injury). It was decided that those listings with "Rehabilitation" in the name would be removed, unless they clearly identified that their practice included "Neurorehabilitation" or rehabilitation for autism or developmental disabilities.	
Number of unique listings initially identified	11599	818

Appendix D

Study Invitation Letter

Version 2. 2011-10-06

VCU

Monroe Campus

Virginia Commonwealth University

Department of Psychology
White House
806 West Franklin Street
P.O. Box 842018
Richmond, Virginia 23284-2018
Phone: 804 828-4804 x7
Fax: 804 828-2237

Dear Colleague,

I am writing to ask for your help with my dissertation research project, a survey aiming to expand the knowledge base about the experiences of professionals providing services for children with autism spectrum disorders.

You are one of only a small number of professionals randomly selected from thousands of professionals on online provider lists to be selected for participation in this study. **You are eligible to participate if you have provided direct services for at least one child (birth-18 years) with an autism spectrum disorder, and currently spend at least 10% (i.e., approximately half of one workday per week) of your job providing direct services for children (birth-18 years).** The survey takes **approximately 20-25 minutes** to complete. Your responses are voluntary and will be kept confidential. No personally identifiable information will be associated with your responses. Sending back the survey or participating online indicates that you have read the information contained in this letter and agree to participate in this study. If you have any questions about the study, you may contact me at christonlm@vcu.edu, or Barbara Myers, Ph.D., the principal investigator, at 804-828-6752 or by email at bmyers@vcu.edu. This study is approved by the Virginia Commonwealth University Institutional Review Board.

You can **mail** the survey included with this letter back to me in the enclosed pre-paid envelope, or you can take the survey **on the web** by typing in either of the links below directly into your web browser. Both links will access the survey, and responses submitted online will be kept confidential and secure:

***LINKS*: https://redcap.vcu.edu/rc/surveys/?s=d61c50 OR http://tinyurl.com/autismprofessionals**

In appreciation of your participation in this study, you can enter a drawing for **one of four $50 dollar gift cards to a store of your choosing**, either by submitting the contact information below with your completed survey or by providing your contact information following your completion of the survey online. This information will be kept SEPARATE from your responses and used solely to contact you if you are a winner of the drawing.

Little research has been done in this area, and better understanding of professionals' perspectives on interventions and services for autism can help to improve care for these children and their families. This project can only be successful with the generous help of people like you. I look forward to receiving your response and truly appreciate your time.

Many thanks,

Lillian Christon, M.A., Doctoral Candidate
Department of Psychology, Virginia Commonwealth University

Detach here (Please keep the above letter for your records)

You are welcome to join the drawing to win one of four $50 gift cards by entering your information below and returning it with your survey. The drawing will be done after data collection is complete and the winner will be notified by email. Please fill in your information below to join the drawing. THANK YOU!

Name: _____

Email address: _____

Appendix E

Missing Data and Multiple Imputation

Missing Data. Multiple imputation (MI) was the approach selected to address the missing data. The procedures for imputation to assess and account for missing data in the dataset are outlined in detail in this appendix. In general, guidelines for missing data were followed as outlined in three authorities: (a) Cole (2008) Missingness Imputation Sequential System (MISS); (b) Schafer and Graham (2002); and (c) Schlomer, Bauman, and Card (2010).

***Assessment of Missingness Mechanism*.** On analyzed measures, missing data ranged from a low of 1.03% (e.g., on the MPOC-SP) to a high of 10.40% on *Recommending* Evidence-based Interventions (Appendix E Table). I first assessed the extent to which the missing data for each measure was missing at random (MAR; probability of missing values is related to other observed variables in dataset, but not to the variable of interest) or missing completely at random (MCAR; missing values do not depend on any values or potential values of other variables), which is a special case of MAR (Schafer & Graham, 2002)[54]. One assumption of multiple imputation (MI) is that the data are at least MAR (or MCAR), and are not "missing not at random" (MNAR; where there is a pattern to the missingness such that missing values are related to the score on that same variable had the participant responded). In MNAR, whether a value is missing or not depends on the unseen observations (Howell, 2007).

It should be noted that while there are methods to assess the extent to which the missing data conform to MCAR or MAR cases, it is never possible to determine unequivocally that data are in fact MCAR/MAR and not MNAR. However, in absence of evidence to the contrary, it is reasonable to assume that data are MCAR/MAR (Schlomer, Bauman, & Card, 2010). While MAR is an assumption of MI, it is important to note that MI has been shown to be quite robust even under situations where data are MNAR (and the MAR assumption is violated), especially when more variables are entered into the imputation model and there are strong covariates for included variables (Schafer, 1997, pp. 27-28; van Buuren, Boshuizen, and Knook, 1999, p. 687; Osborne, 2013; Sinharay, Stern, & Russell, 2001).

To differentiate between MAR and MCAR, a few different strategies were used. First, as recommended in Schlomer, Bauman, and Card's (2010) suggested steps for reporting and managing missing data in quantitative analyses, Little's (1988) MCAR test (an omnibus test to assess whether data are MCAR) was computed using all observed variables to be used for analyses[55] that were part of the missingness augmentation (MA) model (see Appendix E Table). IBM SPSS v19.0 calculates Little's test as part of the Expectation Maximization (EM) feature in

[54] Determining whether data are MCAR or MAR is an important distinction with implications for both multiple imputation and subsequent analyses. First, when data are MAR, the missing values are, by definition, dependent or related to other observed values in the dataset. As such, when imputing these values using a multiple imputation approach, one must include these additional (auxiliary) variables into the imputation algorithm to better inform the imputation algorithm; such is not the case for MCAR (Cole, 2008). Second, when data are MAR, one must include the variables upon which the missing values are dependent upon in the analysis (e.g., as a covariate) to avoid bias (Schlomer et al., 2010). In this study, Unfamiliarity is included as an auxiliary variable (covariate) for EBI analyses. MCAR data require little remediation, as the missing values are not related to any other variables under study and are randomly distributed across variables and cases (Schlomer et al., 2010).

[55] Observed variables are those variables that are to be included in study analyses. Auxiliary variables are those variables that are not directly analyzed, but are highly correlated with observed variables (Cole, 2008). Both types of variables should be included in multiple imputation (Cole, 2008).

the Missing Values Analysis (a maximum-likelihood procedure based in regression). As shown in the Appendix E Table, Little's test of the entire MA model was significant indicating that the entire MA model is not MCAR, yet certain measures did contain data that was MCAR.

Appendix E Table.

Missing data characteristics of variables and measures prior to imputation (N = 709)

Study variable or measure	% of missing data	% of cases with at least one missing value	% of variables with at least one missing value	Is the missing data MCAR?[a]
Demographics/ background variables	0.61%	17.77%	39.47%	**No** (Little's MCAR test: χ^2 = 432.988, DF = 342, p = .001)
TPB-FCC (14 items)	3.16%	11.85%	100.00%	**Yes** (Little's MCAR test: χ^2 = 284.857, DF = 310, p = .844)
MPOC-SP (27 items)	1.03%	8.18%	100.00%	**Yes** (Little's MCAR test: χ^2 = 770.456, DF = 801, p = .775)
TPB-EBI (14 items)	3.10%	14.53%	100.00%	**No** (Little's MCAR test: χ^2 = 394.458, DF = 341, p = .024)
EBI-Beh: Recommend (24 items)	10.40%	42.02%	100.00%	**Yes** (Little's MCAR test: χ^2 = 3513.607, DF = 3714, p = .991)
EBI-Beh: Provide (24 items)	9.98%	41.61%	100.00%	**Yes** (Little's MCAR test: χ^2 = 3679.120, DF = 3659, p = .404)
EBI-Beh: Total (48 items)	10.19%	44.99%	100%	**No** (Little's MCAR test: χ^2 = 8879.236, DF = 8607, p = .020)
All Measures	4.45%	62.91%	83.69%	**Yes** [b](Little's MCAR test: χ^2= 40164.742, DF = 39919, p = .192)

[a] MCAR: Missing Completely at Random. MCAR was examined using Little's (1988) MCAR test in SPSS Missing Value Analysis. Significant values indicate that the missing data are not MCAR.
[b] The EM model for the entire MA model failed to converge in 50 iterations, but converged when the iterations were increased to 100. In SPSS, the EM model must converge in order for Little's MCAR test to be valid.

By examining the missing data percentages by measure, some interesting features emerge. Certain measures account for a much higher percentage of missing data (i.e. the percent of missing values for EBI *Recommend* and *Provide* variables is 10.19%) than do others (the percentage of missing values for all other measures combined is 1.49%). In addition, the EBI *Recommend* and *Provide* measures together did not meet the MCAR assumption. This information indicated that further examination of the missing data for EBI measures was necessary to see if these data better met the MAR assumption.

Schlomer et al. (2010) recommend empirically evaluating the relationships between observed values and missing values to see if the missing data better fit a MAR assumption (e.g., if the missing values on observed variables are dependent upon another series of measured variables). Participants were asked to rate the efficacy of each intervention, and to indicate if they were "unfamiliar" with each intervention. Examination of the data indicated that many individuals who indicated they were "unfamiliar" with a particular intervention did not go on to fill out subsequent Recommend and Provide questions. Thus, I had the hypothesis that the missingness on *Recommend* and *Provide* would be highly related to whether the individuals had indicated that they were unfamiliar with the intervention (thus providing support for the MAR assumption). To assess whether the data appeared to meet MAR assumptions, "Missingness" dummy codes were created for the analyzed observed variables Recommend and Provide (such that *1=missing* and *0=not missing*) and also for *Unfamiliarity* (such that *1=unfamiliar with intervention* and *0=familiar with intervention*). To evaluate potential patterns of missingness, the *Recommend* and *Provide* variables were compared to the *Unfamiliarity* variable. If the Missingness dummy codes were significantly related to the *Unfamiliarity* dummy code, then the pattern can be considered MAR (although it is never possible to entirely rule out MNAR; Schlomer et al. 2010).

Chi-Square tests of independence were performed to examine the relationship between being *Unfamiliar* with interventions and leaving the *Recommend* and *Provide* variables blank across all interventions (calculated separately for Recommend and Provide across all EBI interventions). Across all interventions, individuals who were *Unfamiliar* with an intervention were significantly less likely to provide a response to either *Recommend* or *Provide* variables. In addition, sums of the number of missing values for *Recommend* and *Provide* and a sum of the number of interventions each participant was *Unfamiliar* with were calculated. Bivariate correlations indicated that the overall rate of *Unfamiliarity* was significantly correlated with the overall rate of missing values on *Recommend* ($r = .591$, $n=640$, $p<.001$) and *Provide* ($r = .544$, $n=640$, $p<.001$)[56]. These findings provide support towards the assumption that the *Recommend* and *Provide* missing data are MAR (in that the missing values are significantly dependent upon *Unfamiliarity*). Given this relationship, *Unfamiliarity* must also be included in the MI procedure as an auxiliary variable in order to avoid bias (Schlomer et al., 2010).

Little's MCAR analyses indicated that the TPB-EBI variables did not meet criteria for MCAR. To evaluate potential patterns of missingness on TPB-EBI variables that might provide support for the data being MAR, dummy codes were created for the analyzed observed variables within TPB-EBI (such that *1=missing* and *0=not missing*; Schlomer et al., 2010). Then, the relationship between these dummy-coded variables was compared with other variables in the dataset. There were significant correlations between the missing TPB-EBI data and other

[56] The degrees of freedom are lower than the total for these correlations, as there was missing data on the Unfamiliar Summary score.

variables (e.g., rate of provision of various EBIs) in the dataset (these are not reported here due to the sheer number of variables in the dataset). According to Schlomer et al. (2010), when the dummy variables are associated with other variables, then the data are likely MAR or MNAR. In addition, the dummy-coded variables were analyzed by discipline using ANOVAs to assess whether there were significant differences in amounts of missing data between our primary groups of interest. All *p*-values were not significant. As we do not have any evidence that the data are MNAR, the TPB-EBI data were assumed to be MAR, and that the propensity for an individual to skip an item was related to other measurable variables.

Rationale for use of multiple imputation. Given the evidence for MAR on the missing data for *Recommend* and *Provide* EBI dependent variables (i.e., missing values were related to whether an individual was familiar with the intervention), and the much higher rates of missing data when compared to the rest of the sample, it was decided that casewise or listwise/pair-wise deletion should not be used (Schafer & Graham, 2002). Doing so would mean a significant loss in power for analyses testing the relationship between TPB constructs and *Recommending* or *Providing* EBIs. In addition, the presence of non-MCAR data and high percentages of missing data on certain measures indicates that missing data methods such as casewise deletion (or available case analysis and listwise/pairwise deletion) are not recommended as these factors can introduce substantial bias into analyses (Schafer & Graham, 2002). In general, casewise and listwise/pairwise deletion approaches are only valid approaches when the Missingness Augmentation model assumes MCAR; when missing data are not MCAR, results from deletion methods may be biased because the complete cases are not representative of the population (Schafer & Graham, 2002; Osborne, 2013). Deleting those with missing data from analyses might misestimate population parameters and can significantly decrease power (Osborne, 2013). Mean substitution, another approach, is also not recommended as it can create more inaccurate population estimates and artificially reduces the variance in the variables, even when data are MAR or MCAR (Osborne, 2013).

As such, multiple imputation (MI) was the approach selected to address the missing data. The MI procedure (Rubin, 1987; Rubin, 1996; Schafer, 1997; Schafer 1999) generates *m* imputed datasets by estimating missing values using a Markov Chain Monte Carlo (MCMC) technique (the number of imputed datasets, *m*, is determined by the guidelines set out by Rubin, 1987). In MI, the missing values for each participant are predicted from his or her own observed values, with "random noise added to preserve a correct amount of variability in the imputed data" (Schafer & Graham, 2002, p. 167). As such, MI preserves both the variability of the values, as well as the relationships between variables. The goal of MI is not to correctly predict individual values, but to yield accurate parameter estimates for the relationships of interest (i.e., between analyzed variables). In using MI, "the point of imputation is not that the imputed values should *look* like observed values... [but] that the imputed variable should *act* like the observed variable when used in analysis" (von Hippel, in press; p. 2). Imputed datasets (usually at least 5) are then analyzed separately using the statistical analyses specified by the researcher and are combined using averaging the analysis results for each of these imputations. In IBM SPSS v 19.0, analysis procedures run on a MI dataset will yield results for each imputation, the original (un-imputed data), and the final data (that are pooled across all completed imputations).

Decision to impute at the item-level. There is some controversy in the literature regarding whether to impute values at the item-level or the scale-level. Some argue that the imputation should occur on the level at which analyses will occur (i.e., if you will analyze at the scale-level, scale-level imputation should be used; Cole, 2008). Consistent with this approach, it

is a widespread practice to average the available items within a scale when a participant is missing one or more items rather than to report a missing value at the scale-level (Schafer & Graham, 2002). However, this is not recommended as the "scale has been redefined from the average of a given set of to the average of the available items, a definition that now depends on the particular rates and patterns of nonresponse in the current sample, and that also varies from one participant to another" (Schafer & Graham, 2002, p. 158). Others argue that imputation should always occur at the item-level, as there are significant power advantages (Gottschall, West, & Enders, 2012), and doing so preserves the intercorrelations between items (Schafer & Graham, 2002). In the current project, it was decided to impute values at the item-level for independent (IV) and dependent variables (DV) of interest. When missing data were found on individual items that were used to calculate a total or scale score (e.g., measures for IV and DV calculation), the values were imputed first, and then the scale or total score was calculated.

MI assumption of normality. MI procedures have an assumption of normality, although they have been found to be very robust to departures from normality (Schafer & Graham, 2002; Graham, 2009; Lee, 2011; Osborne, 2013). The literature gives little guidance on how to address the normality of individual variables for imputation, when they will later be summed or averaged into a scale-level item. Some recommend generally transforming variables prior to imputation (Sinharay et al., 2001; Cole, 2008). However, following general rules of transformations (Field, 2005), transformations must be applied to all analyzed variables. In a situation where there are both positively and negatively skewed item-level variables (as in this dataset), one unilateral transformation is not likely to provide satisfactory corrections to normality. This can make the decision of which transformation to choose a confusing endeavor (von Hippel, in press). Examination of the impact of transformations on univariate and bivariate analyses has shown that transformations can have a negative impact on the bivariate relationships between variables (von Hippel, in press). "The imputation model should preserve not just the marginal distribution of the skewed variable, but also aspects of the relationship between the skewed variable and other variables," and transforming these relationships can make the bias in the data potentially much worse rather than better (von Hippel, in press, p. 8). As such, it is recommended that imputation occur with skewed variables without normality transformations (von Hippel, in press).

Visual inspection of histograms and examination of skewness statistics indicated that there were both positively and negatively skewed variables in the dataset. In addition, a majority of variables that are to be imputed were items to be used in computing scale scores after imputation. Given the bi-directionality of the skewness, the fact that imputations are being done at the item-level, the importance of preserving bivariate relationships between variables (von Hippel, in press), and the robustness of MI to violations of normality (Schafer & Graham, 2002; Graham, 2009; Lee & Huber, 2011; Osborne, 2013), skewed data were not transformed prior to imputation. As such, the lesser risk associated with violations of normality was accepted, to avoid a potentially greater risk of introducing additional bias by using transformations.

MI procedure. Graham (2009) recommends that MI procedures should keep the total number of variables imputed under 100 (including auxiliary variables), even with large sample sizes. There would be significant computational limitations of MI with the full dataset for this study when imputations are to be calculated at the item-level for this study (over 300 variables; Graham, 2009). Cole (2008) recommends including in the imputation process only those variables that you have a theoretical reason for assuming a relationship. For this study, as we were interested in EBI and FCC as separate constructs, data were imputed separately for the

variables relevant to each of these analyses. Although they were imputed separately, the EBI and FCC imputations included key demographic variables and auxiliary variables as predictors in the MI process to preserve the relationship of the analyzed variables with other relevant variables in the dataset (Cole, 2008; Graham, 2009).

Ten imputed datasets (Bodner, 2008; Schafer, n.d.; Starkweather & Herrington, 2012) were generated for each set of data (EBI, FCC) using IBM SPSS 19.0. Ten datasets yielded greater than 99% efficiency[57] and yielded an acceptable level of power as estimated by the percent missing data and number of imputations (4.45% missing overall; Rubin, 1987; Schafer, n.d.; Graham, Olchowski, & Gilreath, 2007). In all cases where there were either binary variables (e.g., gender) or categorical variables (e.g., degree), I completed the imputation as if the scores were on a continuous scale and then rounded the imputed score to the nearest integer value (Fichman & Cummings, 2003; Graham, 2009), converting the variable back to a categorical variable after imputation via rounding to the nearest whole number. For all continuous variables, I imputed within the expected range for the variable, but did not round the values to the nearest whole number, consistent with recommendations in Graham (2009). Subsequent analyses and parameter estimation were conducted on each of the ten datasets independently, and then pooled values were calculated using Rubin's (1987) rules for combining parameter estimates across imputations.

[57] Here, "efficiency" refers to the extent to which the imputations provide a precise estimate of the missing data (Schafer & Graham, 2002) or how strongly the imputations are influenced by the missing data, with lower percentages indicating a greater degree of influence by the missing data (Schafer, n.d.). Efficiency calculation takes into account the rate of missing data as well as the proposed number of imputations to yield an estimate of the efficiency of the MI inferences (Schafer, n.d.; Graham et al., 2007).

Appendix F

Regression Diagnostics for EBI Multiple Regression Analyses

As noted in the Assumptions of Multiple Regression section, the EBI regression analyses met the assumptions of reliability, normality, linearity, homoscedasticity, and multicollinearity. Regression diagnostics are procedures to allow one to assess how well a model fits the sampled data (Field, 2005). Regression diagnostics were conducted following guidelines in Cohen et al. (2003), Field (2005), and Tabachnick and Fidell (2007) to assess the existence of multivariate outliers and influential cases (this was conducted on the final model including interaction terms).

When examining centered leverage values, several cases (n = 84; 11.84%) screened above suggested cut-off scores on this index, indicating the potential for unusual values on independent variables[58]. None of the Mahalanobis Distance values were above the critical cut-off. There was one case (#6) on Imputation number 6 with a standardized residual of 3.09 and a Studentized residual of 3.4. One other case (#109) had standardized residuals and Studentized residuals less than -3, indicating possible discrepancies between the predicted and observed values. Neither of these cases had concerning values on Cook's D, Centered Leverage, or Mahalanobis Distances, and, as such, they were maintained in the model. Across all other imputations and cases, there were no other externally Studentized residuals or the standardized residuals were above suggested cut-off scores of ±3. This indicates that while there may be individuals who have somewhat unusual responses on independent/predictor variables (assessed via centered leverage), these cases do not cause a discrepancy between predicted and observed values (Y-outliers, assessed via examining standardized and externally Studentized residuals) in the model (i.e., none of the cases "pulled" the regression line towards themselves; Cohen et al., 2003). Further, none of the cases across imputations had Cook's D values above the critical cut-off[59], indicating that none of the cases exerted significant global influence on the model; as such, these cases should be left in the model (Field, 2005).

[58] Cases were considered to be potential multivariate outliers when both Mahalanobis Distances were above 76.0838 (calculated using the Chi-square critical values at .001 for 42 predictors; Tabachnick & Fidell, 2007) and Centered Leverage values were above $2k/n$ (the suggested cut-off for large samples; Cohen et al., 2003), or 0.11848, where k is the number of predictors and n is the sample size. No Mahalanobis Distances for any cases were above 50.6922.

[59] Critical cut-off scores for Cook's D were calculated by identifying the critical value of the F-distribution at alpha = .50 with df = (k+1, n-k-1). Here, the critical cut-off was 0.9855; none of the cases had Cook's D values above 0.0972.

Appendix G

Regression Diagnostics for FCC Multiple Regression Analyses

As noted in the Assumptions of Multiple Regression section, the FCC regression analysis met the assumptions of reliability, normality, linearity, homoscedasticity, and multicollinearity. The same regression diagnostic procedures followed in the EBI section were also completed here, following guidelines in Cohen et al. (2003), Field (2005), and Tabachnick and Fidell (2007), to assess the existence of multivariate outliers and influential cases (this was conducted on the final model including interaction terms).

When examining centered leverage values and Mahalanobis distances, several cases (n = 69; 9.7%) screened above suggested cut-off scores on *both* indices, indicating the potential for unusual values on independent variables[60]. There were two cases (#17 and #316) with standardized and Studentized residuals above the critical cut-off of ±3 across imputations. No other externally Studentized residuals or the standardized residuals suggested cut-off scores of ±3. Further, none of the cases had Cook's D values above the critical cut-off[61], indicating that none of the cases exerted significant global influence on the model; as such, their removal does not change the form of the model so they should be left in for analyses (Field, 2005). It should be noted that I ran the regression model without the cases for which the Centered Leverage values were above cut-off levels to assess the impact on the regression model (findings available upon request). The findings indicated that while the direction of the effects in the model did not change, this alteration did change the final step (in which the interaction terms between TPB variables and Discipline were entered) a significant step in the regression model. Yet there is some danger in relying on data with such a large portion of the cases removed. Field (2005) and Cohen et al. (2003) caution that while leverage and Mahalanobis Distances may be useful tools to assess how well your model fits the sampled data, "… they are not, however, a way of justifying the removal of data points to effect some desirable change in the regression parameters (e.g., deleting a case that changes a non-significant *b*-value into a significant one" (Field, 2005, p. 169).

One should not remove outliers merely to increase the fit of the model without theoretical reason to do so. In this case, a theoretical reason is lacking – I have no reason to assume the outliers in my sample should not be members of my population. In addition, there is a certain amount of error present in the Mahalanobis Distance procedure such that it is possible to yield false-positives and false-negatives, and as such this diagnostic tool should be used with caution (Tabachnick & Fidell, 2007). Removal of the cases with elevated centered leverage and Mahalanobis distance values, while making the regression step with interactions significant, also increases the likelihood of Type I errors being made. In addition, it is critical to examine whether the cases are also significant outliers on Y, the dependent variable (no cases were significant outliers on Y), and whether each case exerted influence on the regression model (no cases had Cook's D values close to the cut-off; Field, 2005). This is further supported by the fact that the direction of the model did not change when these individuals were removed from the analysis. A conservative approach was taken here (to decrease the likelihood of Type I error), and all cases were maintained in the regression analyses.

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[60] Cases were considered to be potential multivariate outliers when both Mahalanobis Distances were above 67.9851 (calculated using the Chi-square critical values .001 for 36 predictors; Tabachnick & Fidell, 2007) and Centered Leverage values were above $2k/n$ (the suggested cut-off for large samples; Cohen et al., 2003), or 0.1016, where k is the number of predictors and n is the sample size.

[61] Critical cut-off scores for Cook's D were calculated by identifying the critical value of the F-distribution at alpha = .50 with df = (k+1, n-k-1). Here, the critical cut-off was 0.9764; none of the cases had Cook's D values above 0.03779.

Vita

Lillian Maria Christon (Arnold) was born on December 29, 1983 in Los Angeles, California, and is an American citizen. She graduated from Wilde Lake High School, Columbia, Maryland, in 2001. She received her Bachelor of Arts in Psychology *cum laude* with a minor in International Studies. She received her Master of Arts in Psychology from the University of Richmond in 2007. Lillian is currently pursuing her Doctor of Philosophy degree in Clinical Psychology from Virginia Commonwealth University (VCU), and is in the Developmental/Clinical Scholars program. Lillian was the 2009-2010 Autism Fellow for the Virginia Leadership Education in Neurodevelopmental Disabilities (Va-LEND) Program, and has had a range of clinical experiences while at VCU, including working in a community mental health clinic for urban youth, a developmental disabilities diagnostic assessment clinic, and a cystic fibrosis medical clinic, and teaching parenting classes in male and female prison facilities. Lillian is beginning her predoctoral clinical psychology internship training at the University of North Carolina – Chapel Hill School of Medicine in August 2012.