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DISCUSSION AND REVIEW PAPER

Collaboration between Behavior Analysts and Occupational Therapists in Autism Service Provision: Bridging the Gap

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Abstract

Interdisciplinary collaboration is challenging, but necessary, to meet the needs of individuals with autism spectrum disorder. Among the dyadic interactions in interdisciplinary teams, the relationships between occupational therapy practitioners and board certified behavior analysts are uniquely challenging. The disciplines define evidence-based practice differently and approach intervention from different angles. Furthermore, there are fundamental differences in worldview between the disciplines. Both disciplines offer necessary treatment, and successful collaboration between these disciplines is essential for maximizing outcomes. Hence, finding ways to help bridge the gap between these professions, in particular, is essential. Common barriers to developing collaborative alliances include misperceptions of the other discipline, differences in terminology, and unprofessional behavior. This article reviews the history and foundational concepts of both disciplines, and the common approaches associated with each. In addition, models of collaboration are discussed, with suggestions for enhancing interdisciplinary communication and treatment. Successful collaborative treatment is predicated on an understanding of the value and expertise offered by different disciplines, and requires mutual respect and professional dialogue.

Keywords autism spectrum disorder · applied behavior analysis · board certified behavior analyst · collaboration · evidence-based practice · occupational therapy · OT practitioner

The prevalence of autism spectrum disorder (ASD) continues to increase (Barnett & O'Shaughnessy, 2015; Christensen et al., 2016). It currently affects 1 in every 59 individuals (Centers for Disease Control & Prevention [CDC], 2019a). This is an increase from the report in 2002, estimating 1 in every 150 individuals (Christensen et al., 2016). Because the prevalence is increasing, the need for effective interventions is imperative.

Individuals with ASD may have significant impairments in social, emotional and communication skills, and may have behavioral challenges as well (CDC, 2019b; American Occupational Therapy Association [AOTA], 2015). They usually have different ways of learning compared to typical children, and may regress in skills they had once learned (Case-Smith & Arbesman, 2008; CDC, 2019b). Some individuals with ASD can have difficulty completing activities of daily living independently (CDC, 2019b; AOTA, 2015). The severity of ASD differs for each individual. This spectrum of needs creates an even greater necessity for effective treatment, supported by empirical evidence that is individualized to the person in order to address deficits and promote independence (CDC, 2019b).

The overarching goals for effective treatment are skill acquisition, removing barriers to learning, and improving functional skills and quality of life (Anagnostou et al., 2014). These goals are shared across disciplines, and reflect the goals of several related professionals including board certified behavior analysts (BCBAs), occupational therapists (OT practitioners), physical therapists (PTs), social workers, and speech language pathologists (SLPs; Kelly & Tincani, 2013; Lafrance et al., 2019). Because there are typically multiple professionals across various disciplines working together to serve individuals with ASD, there is a great need to collaborate effectively with one another.

According to Koenig and Gerenser (2006) collaboration can be defined as a variety of activities that involve each

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discipline's contribution towards providing a package of evidence-based practice (EBP) with the aim to improve services for the client. This can be through teamwork within clinical practice, referring to research literature of other disciplines, communicating and dialoging with each profession, and by participating in conferences with professionals from different fields (Koenig & Gerenser, 2006). In collaboration, the professional participants have equal responsibility in making shared decisions with shared accountability for the outcomes (Friend & Cook, 2007).

According to Welch and Polatajko (2016), OT is one of the more common therapies provided to individuals with ASD. OT practitioners support the individual and their families through engagement in occupations such as self-care and play, as well as school and job skills (AOTA, 2015; Welch & Polatajko, 2016). In addition, Welch and Polatajko noted that applied behavior analysis (ABA) services are also a predominately common therapy provided for individuals with ASD, often provided by a BCBA and those they supervise. Research supports ABA based interventions in reducing disruptive behaviors, as well as improving activities of daily living skills, motor skills, communication, and social skills (Peters-Scheffer et al., 2011; Virues-Ortega, 2010). Despite this overlap in areas of function and scope of practice, there is little literature discussing the connection with these disciplines (Welch & Polatajko, 2016).

However, there are more studies on the interface between SLPs and the field of ABA. Koenig and Gerenser (2006) compared SLP and BCBAs, describing both as having common goals with an overlapping focus. For example, both disciplines come to the table with valuable perspective and the expertise needed to treat the whole individual. Despite historical differences in philosophy, some SLPs have explored learning more about ABA, with some even attending ABA conferences or becoming dual-certified (Koenig & Gerenser, 2006).

There are currently few articles on the collaboration between OT and ABA, even though both disciplines share similar areas of practice (e.g., Kelly & Tincani, 2013; Scheibel & Watling, 2016; Welch & Polatajko, 2016). These articles shed light on barriers and misperceptions each profession has of each other as well as suggestions on how to collaborate more effectively.

The purpose of this article is to discuss and expand upon the current literature on collaboration between OT professionals and BCBAs. As two professions commonly charged with serving people with ASD, much is to be gained by working to improve this alliance. How can these professions work more effectively together? What is to be gained by improvements in this area? How can this goal be achieved?

Elements of this collaboration might include increasing a mutual understanding and respect for the professions, identifying opportunities for bidisciplinary collaboration in the treatment of ASD, and creating mechanisms for teaching, training, and measuring the success of this collaboration. By gaining an understanding of each profession, one can start bridging the gap towards more successful collaboration. Commonalities and misperceptions are addressed, which illustrates the need for open communication and mutual respect among disciplines. Some models of collaboration are discussed along with suggestions on how to promote collaboration within common practice challenges. In addition, selecting skills for training students and practitioners to collaborate is important. Although every professional may agree that collaboration is necessary, at times it may be easier said than done. Further areas of research are suggested in order to add to the growing body of research within this area, which is needed to truly work towards bridging the gap, and improving collaboration between BCBAs and OT practitioners.

Applied Behavior Analysis

ABA is the science of understanding human behavior and through the use of behavioral principles producing socially significant behavior change (Baer et al., 1968; Baer et al., 1987; Cooper et al., 2020). ABA is derived from empirically validated learning principles, including operant and classical conditioning. The overarching goal is to change behavior, either by increasing or decreasing the occurrence, and is achieved through various principles of behavior (e.g., reinforcement, punishment, stimulus control, environmental contingencies). The behaviors targeted are observable, measurable, and of social relevance to the individual. Continuous monitoring and evaluating of intervention programming occurs in order to ensure effectiveness (Cooper et al., 2020).

ABA emerged as a distinct scientific field in the late 1950s and 1960s (Baer et al., 1968; Matson & Neal, 2009). In 1968, two significant events marked the formal beginning of ABA: the *Journal of Applied Behavior Analysis* began publication, and Baer et al. (1968) published their seminal article in the first issue of the *Journal of Applied Behavior Analysis*, which identified seven current dimensions of ABA. Baer et al. recommended that ABA should be applied, behavioral, analytic, technological, conceptually systematic, effective, and behavior change should have generality. This influential article outlined the future scope of work for BCBAs and defined the criteria for assessing research and practice in ABA (Cooper et al., 2020).

In 1987, Lovaas published a seminal article that continued the development of the field of ABA and was the impetus for significant developments in the implementation of ABA for children with ASD (Harris & Delmolino, 2002). Lovaas reported on gains in intelligence and educational achievement for young children with ASD after receiving intensive behavior treatment. There is substantial research documenting the

effectiveness of ABA intervention for children with ASD (e.g., Bimbrauer & Leach, 1993; Lovaas, 1987; Maurice, 1993; McEachin et al., 1993; Perry et al., 1995). The use of ABA as an intervention has been proven effective for targeting skills across multiple domains for children with ASD, as well as for other populations (Donaldson & Stahmer, 2014; Thompson, 2014).

With respect to research, in the field of ABA there is an emphasis on within-subject (or single-subject) experimental comparisons, direct observation, and ensuring the reliability of observations (Cooper et al., 2020). BCBAs value and utilize single-case design studies, which allow for a more in-depth examination of relational effects of the intervention and the individual (Chambless et al., 1998; Horner et al., 2005; O'Neil et al., 2011). Other disciplines may be unaware of the breadth and depth of ABA-based interventions (Donaldson & Stahmer, 2014).

ABA's application to ASD has transformed the outcomes associated with the disorder, as many individuals who receive intensive ABA intervention at early ages can be educated in the mainstream environment. BCBAs focus on both skill acquisition and on behavior reduction. Reducing the interference posed by challenging behavior enables more effective instruction, increases the opportunities for social integration, and expands educational and vocational options. ABA focuses on understanding the function of challenging behavior, and works to prevent its occurrence with environmental/antecedent management and to replace the maladaptive behavior with a functional alternative. Outcomes must include the generalization of the skill to the natural environment to be considered successful.

Occupational Therapy

The field of occupational therapy (OT) was first established in 1917, and focuses on teaching individuals the skills needed to promote independence and participation in daily life activities. As described throughout the *Occupational Therapy Practice Framework*, 4th edition (OTPF-4; 2020), OT practitioners aim to promote engagement in meaningful occupations through adapting or modifying the environment or task. OT practitioners define occupations as any activity in which an individual engages in throughout their day (OTPF-4, 2020; Schell & Gillen, 2019).

The OTPF-4 (2020) outlines how OT practitioners are to use theoretical principles and models, the knowledge about participation, and available evidence of effective interventions as a guide for clinical reasoning and intervention. OT interventions are focused on the client's individualized needs as well as their goals for participation. The OTPF-4 explains that through the evaluation process, an OT practitioner identifies the client's occupational profile and performance (AOTA, 2015; OTPF, 2020).

Autism Spectrum Disorder and Occupational Therapy

OT practitioners have the knowledge and skill sets to address many of the difficulties individuals with ASD may face (AOTA, 2015; Barnett & O'Shaughnessy, 2015; Case-Smith & Arbesman, 2008). For instance, OT professionals address activities of daily living such as feeding, dressing, and grooming skills (AOTA, 2015). When teaching these skills, OT professionals have extensive training in breaking a skill down into smaller parts and develop an intervention plan based on the individual's fine motor abilities and cognitive level as well as cultural and environmental factors. Knowledge of the individual's pathology and prognosis of impairments further guide an OT practitioner's intervention plan with what skills are developmentally and functionally appropriate to focus on as well as meaningful to the individual and their family. In addition, OT professionals have the knowledge on the use of various adaptive equipment (e.g., adaptive feeding equipment such as built up handle utensils, adapted dressing equipment such as sock aids). OT professionals also are skilled on how to modify or adapt the environment in order to best promote independence (e.g., adding grab bars to improve independence within the bathroom, repositioning of materials to give the individual the best physical support; Case-Smith & Arbesman 2008; James & Pitonyak, 2019; OTPF, 2020).

Some additional areas of focus for individuals with ASD include OT practitioners working on refining fine motor manipulation (e.g., finger dexterity, in-hand manipulation, bilateral coordination) in order to improve overall function of a skill (e.g., self-care skill, handwriting, keyboarding). OT practitioner also have the expertise to assess core strength and develop an intervention plan for postural control, or may provide adaptive seating equipment. In addition, an OT practitioner may work with an individual to improve processing skills such as organizational skills, teaching calming strategies, and work on improving visual perceptual skills (Case-Smith & Arbesman 2008; Dorsey et al., 2019; Swinth, 2019). Many OTs will also provide opinions and suggestions on behavior regulation, because these issues are related to sensory processing and adaptive skills.

When occupational therapists are added to the interdisciplinary team serving individuals with ASD, it is more likely that their motor skills will be properly assessed and functionally addressed. It is also likely that issues in motor planning, in motor execution, and in daily living skills will be identified and creatively solved. Adaptations of the environment and the provision of equipment to facilitate independence are likely to speed the acquisition of crucial skills.

Sensory Interventions

Individuals with ASD often experience uncommon responses to sensory experiences, such as touch, sound, or smell (Case-Smith & Arbesman 2008; Thompson-Hodgetts & Magill-Evans, 2018). OT practitioners tend to attribute these responses to difficulties modulating sensory information, and this has led to the use of sensory interventions within the OT profession (Thompson-Hodgetts & Magill-Evan, 2018).

Although there has been controversy over sensory integration theory because of its lack of empirical evidence, information on it is presented here in order to bridge the gap between disciplines. Jean Ayres (1979) established sensory integration and sensory processing theory in the 1950s. Sensory processing refers to how the nervous system interprets the senses, and turns them into motor and behavioral responses (Ayres, 1979). Through the combination of neuroscience, motor learning, and developmental theory as guiding frames of reference, Ayres identified how adaptive behavior appeared to be dependent on how the child perceived and processed sensation (Ayres, 1979; Bodison & Parham, 2018; Schoen et al., 2014).

Within the literature, different terminology has been used to describe sensory interventions. In general, OT practitioners implement sensory interventions through the means of two distinct interventions: Ayres sensory integration (ASI) and sensory based interventions (SBIs; Bodison & Parham, 2018; Roley et al., 2015; Schoen et al., 2014). ASI is provided by a trained therapist, typically in a clinic setting, through a course of intensive OT sessions. ASI involves the client participating in individualized activities intended to improve deficits within the individual's sensory integration functioning (Aryes, 1979; Bodison & Parham, 2018). The premise is that through ASI treatment, internal neurophysiological processes are modified, and therefore observable changes should occur in how the individual responds to sensory input and functional behavior (Bodison & Parham, 2018; Roley et al., 2015; Schoen et al., 2014; Watling & Hauer, 2015).

On the other hand, the second sensory intervention is SBI, which occurs in the natural environment with the intent of having short-term effects on self-regulation, attention, or behavioral organization. Some examples of SBIs include sensory diets, weighted vests, and fidgets (Bodison & Parham, 2018; Roley et al., 2015; Schoen et al., 2014; Watling & Hauer, 2015). For the purpose of this article, the authors refer to sensory intervention as any intervention based on the principles of sensory integration theory.

OT practitioners should rely on interventions that are evidence based when working with individuals with ASD (Case-Smith & Arbesman, 2008). There continues to be debate regarding the evidence and effectiveness of ASI and SBIs (Smith et al., 2016). It is important to note that there has been recent research literature, including systematic reviews on the different methods of sensory interventions within the OT profession, with a push for more rigorous empirically validated studies (e.g., Bodison & Parham, 2018; Case-Smith & Arbesman, 2008; Thompson-Hodgetts & Magill-Evans, 2018; Watling & Hauer, 2015). Schaaf et al. (2018) discussed previous study limitations with ASI on children with ASD. Some studies lack replicable intervention protocols, whereas other studies presented interventions that did not stay true to the core principles of ASI. Furthermore, other studies demonstrated a lack of thorough assessment of sensory motor factors, which would disqualify the overall need for ASI (Schaaf et al., 2018).

Watling and Hauer (2015) completed a systematic review in which they found moderate evidence supporting ASI for individualized goals. However, this same review (as well as others) concluded that sensory interventions for children with ASD have limited or inconclusive empirical evidence (Thompson-Hodgetts & Magill-Evans, 2018), and should be utilized with caution (Case-Smith & Arbesman, 2008). Moreover, Bodison and Parham (2018), during their systematic review of SBIs, found that there is limited and insufficient evidence for weighted vests with children with ASD, as well as limited evidence for regularly implementing sensory techniques for preschoolers with ASD into their classroom routine, and OT practitioners should use caution. There was moderate evidence for sensory modifications within dental care environments (Bodison & Parham, 2018).

Overall, there is a call for more examination of the effectiveness regarding sustainability and generalization for other functional skills (Case-Smith & Arbesman, 2008). In addition, it is strongly recommended that sensory interventions should be paired with functional tasks (Baranek, 2002; Case-Smith & Arbesman, 2008), and should only be utilized with individuals with documented difficulties with sensory processing as determined by evaluation results (Bodison & Parham, 2018; Case-Smith & Arbesman, 2008).

ABA and OT

As is evident from the description of both professions, there is some shared scope of practice in OT and ABA. Both fields serve individuals with ASD as a significant portion of their clinical work. In addition, both fields focus on skill acquisition and on behavioral regulation. OT and ABA both value change in the real-world, natural environment. Both fields have unique philosophies, histories, and approaches to intervention. The sensory debate may be the central point of contention between the professions, but the approaches do differ fundamentally. BCBAs tend to rely on more objective measures of progress and change, and to emphasize data collection to a greater extent than OT practitioners. OT practitioners tend to emphasize outcomes and performance in the natural environment. Although these differences can be bridged, they do highlight how the worldviews are not entirely aligned.

Evidence-Based Practice for Autism Spectrum Disorder

As illustrated above, EBP is an especially sensitive issue for the collaboration between BCBAs and OT practitioners in the context of ASD service provision. The field of ASD interventions has been overwhelmed by unsupported and often controversial interventions (e.g., Zane et al., 2016). Time, effort, and hope are wasted as parents and practitioners invest in fruitless interventions. There are several interventions (e.g., discrete trial teaching, task analysis, video modeling, and prompting) that are suggested for individuals with autism (Steinbrenner et al., 2020). These interventions are empirically verified as effective, adding to the likelihood of socially significant and meaningful outcomes. Ensuring that a treatment is empirically validated can help to ensure effective intervention (Zane et al., 2016).

As noted earlier, ASD is a complex disability, requiring the expertise of many disciplines to address the myriad needs. Individuals with ASD routinely require intervention from BCBAs, educators, OT practitioners, and SLPs. Interdisciplinary collaboration involves combining each discipline's strengths in order to maximize best outcomes for the client (Brodhead, 2015; LaFrance et al., 2019). Coordinating the efforts of these professionals is a challenge. In addition to the logistical and communication obstacles involved in coordinated care, there are also challenges with differing philosophies and worldviews. These discrepancies create challenges in achieving agreement on a definition of effective intervention, or evidence-based practice (EBP).

EBP can be defined differently among various professions and disciplines. The American Psychological Association (2019) defines EBP in psychology as integrating both clinical expertise with the best available research within the individual's characteristics, preferences, and culture. Likewise, the American Speech-Language-Hearing Association (ASHA) defines EBP as the inclusion of both clinical expertise and expert opinion, integrated with external scientific evidence as well as the client's perspective (ASHA, 2019). ASHA states that EBP should assist in providing services geared towards the client's needs as well as their values, choices, and interests (ASHA, 2019; Leaf et al., 2018). AOTA also supports an integration of research and professional skills. They state EBP is "based on the integration of critically appraised research results with the clinical expertise, and the client's preferences, beliefs and values" (AOTA, 2020). Another perspective described by Spring (2007) is the three-legged stool, or the three circles of evidence-based clinical practice. This model emphasizes patient values, clinical expertise, and the best available research (Spring, 2007). Hence, some subjectivity is assumed within commonly used definitions.

The National Autism Center (NAC) defines EBP as combining professional judgment, the client and family values and preferences, and knowledge of the best evident research (NAC, 2015). In order to identify evidence-based interventions, the NAC has established the National Standards Project (NSP). Interventions and procedures are reviewed, evaluated, and classified as being evidence based or not. The NSP is now on phase 2 of this project, but it should be noted that phase 3 is anticipated to be published in 2021**.** Likewise, the National Professional Development Center (NPDC) is also a resource regarding evidence-based interventions for individuals with ASD. The NPDC refers to EBP as utilizing interventions that have shown to be effective. An intervention is considered effective if the research was published in peer-reviewed scientific journals, and meets additional criteria, including research design strength, replication status, and the internal validity of existing studies (NPDC, 2017).

Barriers to Collaboration

Evidence-Based Practice and Misperceptions

One barrier impeding effective collaboration between OT practitioners and BCBAs is the misperception of the use of EBP within OT, as well as the definition of what EBP entails. Welch and Polatajko (2016) discussed how there is a common misperception among BCBAs about OT practitioners not utilizing EBP; however, it is important to recognize that key documents in the OT discipline stress the need for EBP. The utilization of EBP is listed throughout the OTPF-4 (2020), as well as the Standards of Practice for Occupational Therapy (2015), and the Occupational Therapy Code of Ethics (2015). Although there is a current movement within the OT profession to employ EBP, this is a relatively new push compared to other professions. In contrast, the ABA profession has been rooted in EBP from the beginnings of the field, and it is embedded within the seven dimensions of ABA (Baer et al., 1968), as well as in the Task List (Behavior Analyst Certification Board [BACB], 2012, 2017) and Ethics Code (BACB, 2020).

To further illustrate, the first OT publication on EBP was in 1999 in the Canadian OT literature. This same year, the *American Journal of Occupational Therapy* (AJOT) introduced the forum for EBP, and suggested that OT practitioners employ the evidence-based model (Ottenbacher et al., 2002). Christiansen and Haertl (2019) explained how OT practitioners have historically tended to be doers, and have little interest in proving the practical benefits or explaining the theoretical framework behind their therapeutic interventions. This mindset can be a disadvantage when in a dialogue with members of the ABA profession. As science-based practice has become the standard, expert opinions, single-published

studies, and experiential reference are no longer acceptable rationales for integration of procedures into care (Christiansen & Haertl, 2019).

There continues to be a growing movement for OT practitioners to utilize EBP, and momentum is building. Ottenbacher et al. (2002) further expressed how OT practitioners need to "wake up" (p. 247) and join the world of health-care research. Welch and Polatajko (2016) also emphasized the need for more research focusing on why OT practitioners choose the treatments they use, as well as their effectiveness. AOTA has increased available resources to help support the use of clinical and scientific research. Some examples include access to academic journals and practice guidelines, as well as information on how to understand and analyze research, and ways to promote EBP (AOTA, 2020).

Differences in Terminology

Continuing with differences in views of EBP, another aspect is the varying definitions of EBP. Across disciplines, definitions of EBP vary, and this affects the choices for selected treatments, the evaluation of progress, and the definitions of treatment acceptability. Scheibel and Watling (2016) note that when a team member utilizes a different (and perceived as lower) standard of evidence than others on the team, this can risk credibility and compromise the ability to build collaborative relationships. Moreover, BCBAs are held to their Professional and Ethical Compliance Code for Behavior Analysts, which emphasizes that BCBAs utilize and advocate for scientifically validated and most effective treatment procedures (BACB, 2014). An updated version of the Ethics Code continues to emphasize science-based treatments (BACB, 2020). In the versions of the Ethics Code (2014, 2020), there is acknowledgement of the need to collaborate with professionals, including those from other disciplines. Scheibel and Watling (2016) describe how a BCBAs may feel it is their ethical duty to question all interventions for their clients, including those provided by OT practitioners. Indeed, given the risks associated with nonevidence-based interventions, BCBAs may approach these conversations with concern about using an intervention that has not been shown to be effective. This can be perceived by other members of the team as a lack of mutual respect. OT practitioners are trained to utilize evidence informed interventions and outcomes as they related to occupational performance, though this emphasis is less intense than in the field of behavior analysis. But BCBAs will often question the validity of the approach, imply that OT is not evidence based, or suggest that the OT practitioner is not selecting interventions based on efficacy (Stephenson & Costello, 2020). This can be viewed as disrespectful (from the OT's perspective) and can be a deterrent to collaboration.

Even speaking across the professions can pose a barrier. The terminology utilized by both professions can increase the difficulty with collaboration (Koenig & Gerenser, 2006). At times, it may be the case that unfamiliarity prevents engagement and understanding. At other times, the consequences might be more detrimental, especially with the use of jargon others find off-putting. Critchfield et al. (2017) discuss how others outside of the ABA profession, find ABA terminology "abrasive, harsh, and unpleasant" (p. 97). Critchfield et al. conducted a study to determine how the public view behavior-analytic terminology. Participants were asked to assign emotional ratings to nearly 14,000 words. The findings suggest that in general people do not find the ABA terminology to be user-friendly, and the researchers suggested that BCBAs minimize their use of jargon (Critchfield et al., 2017).

Terms are often used by a professional when talking to a member of a different discipline, with the expectation that the terms are universally understood; however, this may not be the case. Also, terms may be used in a novel or unique way that is not understood. For instance, BCBAs may utilize the word "probe" to describe assessing or taking baseline data on a skill (Cooper, 2020). OT practitioners, in this same context, may utilize the term "screen" or "assess" (Schell & Gillen, 2019). Within the ABA profession, terms like "task analysis," "noncontingent," and "model" are routinely utilized (Cooper, 2020); however, within the OT profession, these terms would be more likely referred to as "activity analysis," "proactive strategies," and "demonstrates," respectively (Schell & Gillen, 2019).

Reputation as a Barrier

Welch and Polatajko (2016) identified specific problems regarding the mutual perceptions of these fields that can disrupt collaboration. First, many professionals outside of the field of ABA only view it as discrete trial instruction, and do not understand the full extent of what ABA principles and procedures entail (Cooper et al., 2020; Welch & Polatajko, 2016).

Another impression of ABA is that it is perceived as failing to consider and plan for generalization (Matson et al., 2012; Schreck & Miller, 2010; Welch & Polatajko, 2016). A behavior change is said to have generality if it lasts over time, and occur in various environments outside of the intervention setting, and spreads to other behaviors not initially targeted (Baer et al., 1968; Cooper et al., 2020). Current applications of ABA plan for generalization from the start of intervention, and address generalization across environmental stimuli, people, and settings (Baer et al., 1987; Cooper et al., 2020). However, this is not the general impression that OTs have of the field. This may reflect a historical reality that early ABA interventions did not focus adequately on generality (Baer et al., 1987).

Welch and Polatajko (2016) also discussed the misperception that the field of ABA fails to consider the client's wants and interests. In fact, some literature showed that OT practitioners might avoid using ABA principles, because they

perceive them to not be client centered (Welch & Polatajko, 2016). On the contrary, ABA is highly individualized as it focuses on helping individuals achieve a high quality of life. ABA includes the individual in the goal development process, treatment selection, and the evaluation of outcomes (Cooper et al., 2020). However, these are not the characteristics associated with BCBAs; in fact, the opposite is assumed by OT practitioners.

Occupational Therapy's Reputation

Likewise, although not all OT practitioners approach intervention identically, there is a perception that OT practitioners provide mostly sensory-based interventions for individuals with ASD (Welch & Polatajko, 2016). As described in the OT section of this article, OT practitioners provide a wide range of interventions beyond sensory interventions. Over the past 2 decades, however, sensory interventions have been a predominant part of treatment packages for individuals with ASD (Thompson-Hodgetts & Magill-Evans, 2018; Welch & Polatajko, 2016). Welch & Polatajko (2016) reported there are articles within the ABA literature that warn ABA therapists against ASI and SBIs (e.g., Devlin et al., 2011; McGinnis et al., 2013; Schreck & Miller, 2010). In addition, Smith et al. (2016) illustrates that evidence does not strongly support these procedures. BCBAs do not view the current body of research on these interventions as empirically validated or as conducted with sufficient scientific rigor (e.g., Foxx & Mulick, 2016). Furthermore, the broader ASD literature describes sensory interventions as complementary or alternative medicine, with limited and inconclusive evidence (Brondino et al., 2015). Hence, the prominence and utility of sensory approaches are viewed in entirely discrepant ways by these professions.

Thompson-Hodgetts and Magill-Evans (2018) surveyed 211 pediatric OT practitioners residing in Australia, the United States, and Canada to determine why and when sensory interventions are utilized with individuals with ASD by OT practitioners. Sensory interventions were recommended by OT practitioners for 50% of their clients with ASD. The most frequently recommended approaches included sensory diets, weighted or pressure modalities, ASI, and auditory therapies. Contributing factors to this list of approaches included experience, country of OT practitioner, and mentorship (Thompson-Hodgetts & Magill-Evan, 2018). Thompson-Hodgetts and Magill-Evans (2018) identified a trend that OT practitioners newer to the profession recommended sensory interventions less frequently compared to established OT practitioners. They further hypothesize that this trend could be a result of the greater awareness and push for EBP within the profession (Thompson-Hodgetts & Magill-Evan, 2018).

Furthermore, one can begin to see the nature of the divide between the professions when looking at frequent interventions utilized within the OT profession. SBIs such as auditory therapies and weighted vests are examples of approaches for which there are position statements against. For example, both the American Academy of Pediatrics (1998) and ASHA (2004) have published a position statement advising against auditory integration training. In addition, the American Academy of Pediatrics (2012) posted a policy statement on sensory integration therapies advising pediatricians to educate families on the lack of evidence for sensory interventions as well as to educate families on how to determine the effectiveness of interventions for their own child. Likewise, both NCAEP and NSP do not classify sensory integration as an evidence-based intervention (Steinbrenner, et al., 2020; NAC, 2015).

Obstacles during Interactions

Beyond Welch and Polatajko's (2016) three misconceptions of ABA, there are additional barriers to collaboration, all of which relate to the central problem of perceptions regarding the other profession. Scheibel and Watling (2016) described that OT practitioners working on interdisciplinary teams sometimes experience resistance from BCBAs about the services they are providing. There tends to be disagreement on which interventions to utilize and what the goals for the clients should be. Furthermore, conflicting opinions on how deficit areas should be addressed, as well as who is best suited to focus on such skills are common (Kelly & Tincani, 2013). Such challenges can be due to confusion about professional roles and misunderstandings related to overlapping scopes of practice, and also reflect the substantial negative perceptions that each field holds of the other (LaFrance et al., 2019; Scheibel & Watling, 2016).

Kelly and Tincani (2013) provided a survey to 302 behavioral professionals regarding collaboration. Questions ranged from training on collaboration, type and extent of collaboration interactions, perceived inhibitors of collaboration, and on views of benefits. BCBAs, although often collaborating with a variety of professions, are largely not trained on collaboration (Kelly & Tincani, 2013). In addition, they may devalue collaboration with fields they perceive to be less grounded in science and less committed to EBP. Their obligations to the ethical code may further complicate collaboration in these contexts, and their objections may come across as arrogant, unyielding, or dismissive. As noted above, they are unlikely to have been taught strategies for resolving conflict in collaborative contexts.

OT practitioners, however, have a long tradition of valuing collaboration, as it is part of the educational programming for OT students (Scheibel & Watling, 2016). Kelly and Tincani (2013) found that BCBAs expressed a lower likelihood of adopting recommendations that were made from OT practitioners. Overall, BCBAs view interdisciplinary collaboration

as beneficial, but they only expected it to result in minor changes to tasks and solutions (Kelly & Tincani, 2013). With this difference in training and perspective between both professions, interprofessional misunderstandings, challenges in communication, and strained professional relationships are likely to occur, which will ultimately affect the quality of service delivery (Brodhead, 2015; Scheibel & Watling, 2016).

Collaboration versus Eclectic Intervention

There has been research within the ABA profession demonstrating that an eclectic approach to intervention is not as effective as a purely behavior analytic approach. Howard et al. (2005) completed a study involving preschool-age children with ASD. It evaluated an intensive behavioral treatment (IBT) consisting of 25–40 hr per week of ABA through a 1:1 adult-to-child ratio. One comparison group consisted of an intensive eclectic intervention, which combined methods in public education classrooms for 30 hr on either a 1:1 or 1:2, adult-to-child ratio. An additional comparison group attending a nonintensive public early intervention program received a combination of methods and were provided 15 hr a week in small groups. This study concluded IBT was more effective than an eclectic approach (Howard et al., 2005). Howard et al. (2014) conducted a follow up study, looking at the same 61 participants after 2 years of additional intervention, finding sustained benefits during years 2 and 3. This study strengthened earlier findings concluding that IBT intervention at an early age is more likely to yield significant improvements for children with ASD, compared to common eclectic interventions (Howard et al., 2014). Likewise, Odom et al. (2012) reviewed research literature pertaining to the comparison of IBT and eclectic approach, validating the positive outcomes from IBT.

In addition, however, Odom et al. further concluded that a mixed approach can, however, be beneficial if it involves evidence based interventions, focused on individual needs, and was properly executed with fidelity (Odom et al., 2012). Collaboration is not the same as eclectic intervention, and should not be equated with it. The benefits of collaboration stem from the infusion of expertise that exceeds that available within only one discipline.

Beyond the inaccurate reputations, misperceptions of each discipline, differences of terminology, and the discrepant ideas as to what constitutes evidence-based intervention, there are also foundational and philosophical differences between OT and ABA disciplines. These conceptual challenges make it difficult for practitioners of these two disciplines to view the individuals served similarly, and create difficulties in the development of treatment plans. How can effective collaboration occur when each profession has different worldviews, foundational differences, and different terminology?

Models and Strategies for Improving Collaboration

To improve collaboration between OT practitioners and BCBAs, Welch and Polatajko (2016) suggested utilizing a model in which both developmental science and behavior science are considered. The researchers emphasized that both disciplines are compatible, and should work together to provide client-centered, occupation-focused, and behaviorally sound interventions (Welch & Polatajko, 2016). Although this sounds promising, there are also some differing opinions about the strength of evidence regarding developmental interventions. When collaborating, it is important to abide by the respective discipline's ethical code. Both the BACB and AOTA stress the need for EBP, and above all, avoid causing any harm to the individual. Utilizing a universal guideline to systematically determine if a treatment should be used is needed. A collaborative cross-disciplinary decision tree could assist in this process, but does not currently exist.

Implementing an interdisciplinary service delivery model is complex, and can lead to significant challenges. These difficulties may result in mediocre service delivery. Integration of each discipline is essential, and Cox (2012) proposes that ethical principles and common language among contributing professions should be the main focus in developing an effective multidisciplinary program. Having a unified ethical code of conduct ensures proper professional behavior and high standards of quality of care. Cox argues that having an interdisciplinary code of ethics would prevent subpar or poor quality programming.

Having a means to evaluate the quality of interventions being proposed and/or implemented by team members is necessary. Newhouse-Oisten et al. (2017) created a decision-making tree for BCBAs to collaborate with medical/prescribing professionals. It categorizes interventions into four categories: evidence based and compatible (with ABA), evidence and incompatible, nonevidence based and compatible, and nonevidence based and incompatible. Although it may not have been the authors' original intent, this model may also be useful with other professionals on interdisciplinary teams. Newhouse-Oisten et al. recommend that all team members should exercise good communication, so that each profession is aware of all possible interventions, as well as supportive evidence and associated risks. In addition, any interventions provided must be monitored, and if changes are to occur with the intervention package, it should not only be documented, but also communicated to all individuals of the team. Intervention changes should be compatible with other interventions currently in place as well as align with the client's goals (Newhouse-Oisten et al., 2017).

Furthermore, Newhouse-Oisten et al. (2017) recommended that interventions that are both evidence based and compatible can be continued. For those that are evidence based but not

compatible, the team should determine which intervention should be tried first. Newhouse-Oisten et al. noted that the benefits and any disadvantages, as well as the client's preference, should be considered. If the proposed intervention is not evidence based but is compatible, there should be a discussion on the need to use scientifically validated interventions. A discussion of pros and cons for the proposed intervention should occur, with emphasis on the safety of the client. Likewise, if a nonevidence-based and incompatible intervention is suggested, the team should take a strong stance to not implement the procedure. Reviewing the research as a team and discussing alternative, evidence-based interventions may be an appropriate solution (Newhouse-Oisten et al., 2017).

Likewise, Brodhead (2015) suggested a decision-making model for behavioral analysts to utilize when faced with a nonbehavioral intervention proposed by a team member. This model can help guide the team determine if an intervention may be beneficial for the client. The first step is to identify the treatment, then determine if it may be harmful to the individual. If there are no safety concerns, one should familiarize themselves with the proposed treatment. The BCBA should determine if it is possible to align with behavioral principles, or if it may affect goals of the client (Brodhead, 2015).

Brodhead (2015) suggested that the Checklist for Analyzing Proposed Treatments (CAPT) be utilized in order to determine if the possible impact is worth a compromise. The CAPT has six domains including function based treatment, skill acquisition, social outcomes, data collection, treatment integrity, and social validity. The likelihood of each component is then assessed as either low, medium, or high. Then the BCBA would assess resources. This can aid in determining if a given treatment may have a negative impact, and to what extent it poses risk. In addition, this can help to guide collaboration through effective communication,, or when there may be a need to caution a nonbehavioral professional on a proposed intervention that may be harmful or ineffective (Brodhead, 2015).

Although it is suggested that BCBAs utilize the CAPT for nonbehavioral interventions, it can be useful for all members of an interdisciplinary team when viewing all intervention proposals. Luiselli (2015) added to Brodhead's decision-making model, stating that the role or authority of the BCBA within the interdisciplinary team will affect their ability to follow the decision tree. Role clarification is an issue that needs to be addressed within collaborative teams.

Getting to Decision Making within Teams

Brodhead's (2015) decision tree ends with a focus on whether the intervention needs to be addressed. Brodhead has commented on the need to assess interpersonal risk within the team. The tool he proposed helps the practitioner evaluate the safety, risk, and ability to translate the intervention into an individualized trial, assuming that the intervention is safe and appropriate. Such a model inspires the team to devise an individualized trial of the approach, and to collect data to determine continuance or discontinuance.

Cook and Friend (1991) defined collaboration as "a style for direct interaction between at least two co-equal parties voluntarily engaged in shared decision making as they work toward a common goal" (p. 25). Collaboration distinctly differs from consultation, in that collaborators have joint responsibilities, where in consultation the consultant retrains ownership or authority to lead decision making (Hansen et al., 1990). If one party has ownership, sharing their knowledge with another, this can signal an unequal status between the two professionals (Coben et al., 1997). This distinction is critical to understand when navigating collaborative partnerships, and needs to be clarified at the outset of the collaboration and periodically revisited by all parties to ensure clarity and comfort.

As it is an obligation of BCBAs to ensure evidence-based interventions are being utilized, it is also the OT practitioner's duty to advocate for effective interventions for their clients. Stephenson and Costello (2020) urge OT practitioners to communicate with team members OT's full scope of practice and the evidence that supports their practice. It is not one profession's obligation to determine evidenced-based treatment; it is the responsibility of the entire interdisciplinary team (Luiselli, 2015). This shared responsibility will truly promote respect within the team; and when there is mutual respect, collaboration can occur (LaFrance et al., 2019). Following a systematic model can enhance collaboration and ensure the most effective treatment for the clients served (Luiselli, 2015).

Additional Strategies

Although not a specific model of collaboration, Koenig and Gerenser (2006) provided several ways to support collaboration between SLPs and BCBAs, which can be useful if expanded across other disciplines as well. Professionals can share with other fields' data based research, either through conferences, journals, or even through a listserv. Koenig and Gerenser (2006) provide the example of (the former) *Journal of Applied Behavior Analysis and Speech-Language Pathology (JSLP-ABA)*. Welch and Polatajko (2016) discussed the need for more OT literature regarding the ASD population, because there are many more studies published within the ABA literature. In addition, reading research articles published by professionals of different disciplines can improve collaboration by exposing professionals to additional terminology and by providing insight on overlap. Koenig and Gerenser made the argument that there is a benefit even if a professional completely disagrees with the concept, theory, or philosophy of the article, because it will aid in the ability to provide constructive professional disagreement. This can

inspire new and improved interventions in the long run (Koenig & Gerenser, 2006).

Sharing innovative interventions or teaching procedures across disciplines can allow for feedback from professionals who share similar interests (Koenig & Gerenser, 2006). Welch and Polatajko (2016) discussed how the OT and ABA literature suggests the approaches of both disciplines can be combined to improve client outcomes. For instance, one intriguing application Welch and Polatajko identified is the combination of developmental science and behavior science. Another suggestion made was utilizing pivotal response treatment, which uses natural and play-based methods along with ABA (Welch & Polatajko, 2016).

Basic information about each discipline can also be shared in order to collaborate more effectively. Due to the many common misconceptions of each profession, discussions can aid in alleviating these misguided perceptions. Sharing lunch with members of multiple disciplines can be a productive way to have a dialogue about professional roles and how they may overlap. This can facilitate improved communication and assist in seeing each other as a valuable resource to the team. Any concerns about collaboration breakdown within the team should also be addressed. Furthermore, sharing positive experiences of collaboration can provide a model for effective collaboration (Koenig & Gerenser, 2006).

Some additional strategies for increasing clinical collaboration within teams might include observing treatment/instructional sessions, cotreatment with both clinicians actively engaged in jointly delivered treatment, and holding case conferences in which each discipline provides perspective and then the team decides on a unified treatment approach going forward. These clinical strategies might help in achieving an increased understanding of each discipline's expertise and contribution to the treatment context. Along with the suggestions offered by Koenig and Gerenser (2006), these might help facilitate a dialogue, joint problem solving, and increased camaraderie.

Benefits of Collaboration

Perhaps the greatest benefit of collaboration is the improved outcomes for the learners (LaFrance et al., 2019). The infusion of expertise from multiple disciplines ensures that assessment and treatment are comprehensive, and that all needs are fully addressed. Occupational therapists bring a deep knowledge of the human body, motor functions, motor planning, and body mechanics. Furthermore, they bring a vast knowledge of environmental accommodations and the strategic use of equipment to address challenges. BCBAs bring an understanding of the functions of challenging behavior, and ways to intervene that lead to behavioral improvements.

Both of these professions have some information about the other profession's area of greater expertise. Improved collaboration may occur by building on these areas of knowledge. Within OT, the principles of learning and behavior change is one of the theories and guiding frames of references utilized within the profession. OT practitioners are given a basic knowledge of principles such as reinforcement, shaping, and chaining within their education (Helfrich, 2019). OT practitioners may also benefit from mutual collaboration to enhance the use of these behavioral concepts in a consistent manner across disciplines. Likewise, BCBAs seek to build skills in all areas, including motor skills and daily living skills. They frequently create programs to address deficits in these areas. Some shared scope of practice exists, and some overlap in fundamental knowledge is evident. Collaboration can improve integration of supports provided by both professionals. With better collaboration, clients and their families will benefit from having better integrated services (McGinnis, 2013; Koenig & Gerenser, 2006).

In addition, OT practitioners and BCBAs can collaborate to better develop appropriate goals for clients. For instance, an OT practitioner can explain why a child may be struggling with a certain task, in relation to fine motor or visual motor deficits, and can provide strategies or modifications to improve independence with such skills (McGinnis, 2013). OT practitioners can evaluate and treat issues in fine motor skills, gross motor skills, and strength training, and both OT practitioners and BCBAs can create individualized, functional adaptations to achieve progress in daily living skills.

Furthermore, BCBAs are well-trained in conducting functional behavior assessments (FBAs). The purpose of these assessments are to identify the function of an individuals' specific behaviors. Behaviors may occur to gain access or avoid different stimuli, including serving an automatic function (Cooper et al., 2020). Both OT and ABA disciplines address automatic or sensory-based behaviors, and this provides a context for collaboration. For example, when a BCBA identifies an automatic function to a behavior, through collaboration with the OT practitioner, alternative sensory activities can be identified matching the same sensory function as the interfering behavior. In addition, when an OT practitioner identifies sensory activities that stimulate a client, through collaboration with the BCBA, these activities can be used as contingent or noncontingent reinforcement as part of an individualized behavior plan.

Koenig and Gerenser (2006) describe benefits of collaboration between the SLP and ABA professions. One is the creation and refinement of evidence-based approaches and practices. Likewise, this would be a benefit of OT and ABA collaboration as well. Welch and Polatajko explained how there is a great need for OT research with individuals

with ASD, including a great deal outside of SBIs. OT interventions need to be more descriptive in the methods of implementation, because this would assist with testing and replication. The authors also stress the need for OT literature to support the use of ABA principles, because there is strong evidence to support ABA procedures (Welch & Polatajko, 2016).

Koenig and Gerenser (2006) also discuss how collaboration reduces the likelihood of reinventing the wheel. Consulting other disciplines' literature before researching an intervention technique or principle can avoid duplicating work. It can also lead to the adoption of a more effective strategy from the other profession. Integrated care ensures the integration of expert opinion from multiple relevant professions. As a result, outcomes will be maximized, which is a shared value across professions (Koenig & Gerenser, 2006).

Finally, collaboration leaves all parties feeling valued and appreciated for their expert knowledge and for their contribution to the team effort. It is most certainly a universal wish to be respected, and collaborative environments enhance professional respect, creating mutual admiration and functional, effective work environments.

Areas for Training, Implications, and Future Research

It is clear that both OT and ABA have common core principles that promote socially significant behaviors that foster independence for clients. Each discipline values EBP and strives to utilize evidence within their scope of practice. There is a need for effective collaboration between disciplines in order to provide the best services and interventions for individuals with ASD. When determining the appropriate intervention, utilizing a model that stresses effective treatment may be beneficial.

Future research on adapting decision-making models for interprofessional collaboration would be beneficial, especially to determine if it would indeed foster better collaboration across disciplines. As each discipline is defining, analyzing, and categorizing EBP differently, providing a unified framework for decision making could aid in bridging this gap. This would also lead to a shared responsibility for the whole team in deciding about interventions, as Luiselli (2015) suggested. Each team member would have the same common focus to deliver the most evidence-based intervention package in an appropriate, individually tailored manner.

Furthermore, exploring Koenig and Gerenser's (2006) recommendations for SLP and BCBA collaboration may help determine if such strategies could also aid in avoiding barriers to effective collaboration between OT practitioners and BCBAs. In general, conversing with the other professions to understand roles, and to clear up any misperceptions the other may have, can foster better relationships. Gaining a mutual understanding, as well as recognizing common ground between professions, can enhance successful collaboration. Sharing expertise across team members is important to provide the most effective treatment. The impact of observing the work of allied disciplines, as well as of cotreating with other disciplines, should be examined. In particular, the impact could be examined for both the effect on individual case outcomes and on the perceptions of the professionals involved regarding collaborative value. Further research into what types of collaboration are occurring or can be initiated between the OT and ABA professions would be beneficial. In addition, examining the impact of these strategies on collaboration between OT practitioners and BCBAs and client outcomes is needed.

From a skill acquisition perspective, it seems important to address the skills needed to navigate discussions within the interdisciplinary team. Equipping professionals with the skills to disagree respectfully, come to a plan to empirically evaluate interventions, and drive data-driven decisions within the team that seem essential. From a research perspective, it is important to teach the skills needed for interprofessional collaboration, and to assess the impact of these skills on the process and outcomes of the collaborative experience. Within behavior analysis, the behavior skills training (BST) approach could be used to identify the skills, model them, practice and rehearse them, and use them in real-world contexts (Schaefer & Andzik, 2020).

Potential skills to target in student and practitioner training across disciplines include the identification of concerns with suggested procedures, research skills in order to find the current state of evidence for procedures, knowledge of position statements for interventions across disciplines, familiarity with the skills and foundations of different related disciplines, ability to respectfully raise questions on interventions, use of decision-making tools for addressing intervention choices, ability to disagree respectfully, compromising skills, capacity to design a single case trial of a procedure, and data-based decision making. In addition, skills must include the ability to repair damaged relationships, own mistakes, and create rapport and trust with colleagues.

In addition, clinicians should be taught to focus explicitly on the advantages of the interdisciplinary treatment of individuals, rather than on the differences between how the disciplines approach intervention. This will lead to improved, evidence-based care for the individuals we serve. The outcomes for the individuals who are served will be more meaningful if expertise is collective, contributions across disciplines are respected, and we work to create environments in which the effectiveness of our procedures is augmented by contributions from other disciplines.

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