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June 2018

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Examining the effects of peer mediation on the social skills of students with autism spectrum disorder as compared to their peers. Stephanie L. Hart and Devender R. Banda, Office of the Provost, Texas Tech University, 2500 Broadway, Lubbock, TX 79409.

Effects of direct instruction on reading comprehension for individuals with autism or developmental disabilities. Cynthia Head, Margaret M. Flores and Margaret E. Shippen, Dept. of Literacy and Special Education, University of West Georgia, 1601 Maple Street, Carrollton, GA 30118.


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Experiences of African American Mothers of Sons with Autism Spectrum Disorder: Lessons for Improving Service Delivery

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Abstract: Previous research has indicated that having a child with autism spectrum disorder (ASD) presents a unique set of challenges that impacts the entire family unit and individual family members’ health, well-being, and experiences across the lifespan (Patterson, 2005; Turnbull, Turnbull, Erwin, & Soodak, 2006). Very few studies have addressed the role that racial and cultural identity may play in the experiences of these families, in particular, the experiences of African American families with children with ASD. The purpose of the present study was to qualitatively interview three African American caregivers of children with ASD to gain their perspectives on their experiences with their child and examine whether there may be a unique set of experiences associated with being an African American family of a child with ASD. Several themes emerged that suggested increased hardships for African American mothers of children with ASD. Implications of findings, including the need for a culturally-responsive approach across many domains of service (e.g., diagnosis, autism services, and special education services), are provided.

Autism spectrum disorder (ASD) is considered to be a severe disability due in part to the intense lifelong effects it has on the diagnosed individual and his or her family (Dyches, Wilder, Sudweeks, Obiakor, & Algozzine, 2004). Caregivers of children with ASD are presented with numerous obstacles. Studies suggest that caring for a child with ASD can be an overwhelming experience for caregivers and often cause increased levels of stress, anxiety, and strained marital relationships (Dumas, Wolf, Fisman, & Culligan, 1991; Plant & Sanders, 2007). The behavioral challenges often associated with ASD can leave families feeling isolated (Woodgate, Ateah, & Secco, 2008). Parents are often faced with the obstacle of navigating through the myriad of educational, medical, and behavioral services (Plant & Sanders, 2007). Social support has been cited as a contributing factor in counteracting the negative outcomes of stress and develops from the relationships and interactions between the individual, family, peer group, and larger social systems (Boyd, 2002).

Experience of Diagnosis, Treatment, and Support for Parents with Autism

One of the first steps that parents of children with ASD encounter is the diagnosis stage. Martínez-Pedraza and Carter (2009) found that parents report noticing several developmental problems early on, which leads them to seek out answers from medical professionals. This is often a time of stress and uncertainty for parents. This uncertainty, combined with difficulties in obtaining a diagnostic assessment, can increase parental stress levels. This stress can often continue post-diagnosis. Following a diagnosis, parental distress may result from such factors as the intensity, magnitude, duration, and unpredictability of ASDs (Noh, Dumas, Wolf, & Fisman, 1989; Sanders-Dewey, Mullins, & Chaney, 2001).
While it can be said that all parents experience major obstacles for caring for a child with ASD, these difficulties may be magnified for children from diverse backgrounds. Researchers have found evidence of cultural differences in ASD diagnoses and treatment but few studies have investigated these differences in detail (Cuccaro et al., 1996; Mandell, Ittenbach, Levy & Pinto-Martin, 2007; Mandell, Listerud, Levy & Pinto-Martin, 2002; Mandell & Novak, 2005; Sell, Giarelli, Blum, Hanlon & Levy, 2012).

Cultural Differences in Family Experience with Autism

Parents of children with ASD have several experiences in common across ethnicities. Many parents find that caring for a child with autism reduces personal relationships with others, can impact finances to a great degree, and can face mental health difficulties (Heofman et al., 2014). Specifically, many parents experience feelings of depression, devastation and despair upon learning of their child’s diagnosis (Alteiere & Von Kluge, 2009).

Nevertheless, research indicates some experiences of families with children with ASD may differ by race or ethnicity. For example, Mandell et al. (2002) found that African American children were diagnosed an average of 2 years later than white children. The literature has replicated this finding that African American children were on average diagnosed with ASD 1.5 to 2 years later than Caucasian children (Ennis-Cole, Durodoye & Harris, 2013; Mandell et al., 2007; Sell et al., 2012). In addition to the diagnosis age, research has also shown that African American children are more likely to receive an initial diagnosis other than ASD, such as adjustment disorder or conduct disorder, when they have their first specialty care visit (Mandell et al., 2007). A report of ASD cases by Girarelli et al. (2010) identified aggression and defiance as behavioral features identified more often in 8-year-old African American children with ASD compared to white children with ASD. In this study, only 9% of African American children had a previous diagnosis of ASD compared to 65% of white children.

There are several hypotheses for why there are delays in an ASD diagnosis for African American children. Differences in culture, core symptoms, access to care and care seeking behaviors could contribute to these disparities (Burkett, Morris, Manning-Courtney, Anthony, & Shambley-Ebron, 2015; Mandell, et al., 2007; Mandell & Novak, 2005; Sell et al., 2012). Cultural factors are intertwined with thoughts and behaviors thus resulting in differences in how parents understand their child’s development. Cuccaro and colleagues (2007) found that African American children with ASD were more likely to have delayed language compared to white children. Parents may see this delay in language as a part of the normal developmental process their child is going through and not as an indication that the delay could be a core symptom of ASD (Mandell et al., 2007). Ethnic differences in how parents describe symptoms may lead to an incomplete representation or misattribution of symptoms. Mandell et al. (2007) found that African American children with autism were more likely than children of other ethnicities to receive a diagnosis of conduct disorder before a diagnosis of ASD. Additionally, it was found that African American children and children from other ethnicities were more likely than white children to receive a diagnosis of adjustment disorder before an ASD diagnosis. These findings suggest that parents could potentially over report their child’s disruptive behaviors and underreport other core symptoms of ASD.

Culturally diverse families of children with ASD have historically been under-researched (Zhang & Bennett, 2003). Specifically, the intersection of race, family coping mechanisms, and ASD has been overlooked (Dyches et al., 2004). Because ASD affects children from all ethnicities, it is critical that future research examine the intersection of these constructs. Additionally, although researchers have begun to examine experiences of African American families in obtaining an ASD diagnosis (Burkett et al., 2015), very little information has been gathered on these families’ experiences navigating special education and whether the cultural and bias factors similar to those affecting delayed diagnoses may be influential in other areas of ASD family life as well. Overall, the lack of research on coping strategies and lived experiences of culturally diverse primary caregivers of individuals with
ASD is problematic as it has the potential to provide professionals with the information they need to improve service accessibility for individuals with ASD and their families. To address current gaps in ASD literature regarding diverse families, this study sought to highlight the lived experiences of African American caregivers in relation to providing care for their child with ASD.

The purpose of this qualitative study was to explore the impact of race on the lived experiences of three African American families with boys with ASD. As a research team, we sought to address two primary questions: 1) What caregiving experiences do participating African American mothers of children with ASD directly attribute to their race? 2) Do participant reports provide evidence of a unique experience for African American families of children with ASD? It was hypothesized that the experiences these mothers have had with school personnel and service providers would add to the limited literature on the unique and potentially important factors affecting the experiences of African American families of children with ASD and provide initial implications for ways to support and improve service delivery to culturally diverse families of children with autism.

Method

We selected narrative inquiry in order to construct central themes around parenting African American children with Autism. Narrative inquiry allows for the researchers to understand how individuals perceive their experiences in the context of their lived experiences (Connelly & Clandinin, 1990). The interview occurred while the parent participated in an intervention study focused on providing African American caregivers with strategies to improve difficult behavior in their children with ASD (Robertson, 2016). We used a general interview guide so that we could gather the same core information from each participant, but allowed for several open-ended and follow-up questions so that the participant could fully share their story.

Participants and Recruitment

Participants for this study were gathered from the participant pool in the previously described intervention study (Robertson, 2016). Participants for that study were recruited through flyers sent to local schools, community centers, autism agencies, and summer camps. Four mothers responded to recruitment materials. One mother (Tasha) participated in the present interview study but did not meet criteria to participate in the intervention study; alternatively, one mother (Talia, described in Robertson, 2016) participated in the intervention study but did not participate in the interview study. Therefore, three mothers participated in the present qualitative study.

Viola was 35 years old, married, possessed a master’s degree, and was a stay-at-home mother to five children at the time of the study. Viola’s husband frequently traveled for work. Viola reported their household income to be above $80,000. Viola’s son, Evan, was a 7-year-old boy diagnosed with Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS) who attended a public first grade general education classroom for the full day with a 30-min pull-out service for speech.

Latisha was a 37-year-old full-time student working towards a bachelor’s degree. Her son, Prince, was a 16-year-old boy diagnosed with autism who attended an all-day self-contained special education class at a public junior high school. She had another son who was 14 years old who also resided with Prince and her. Latisha was divorced from Prince’s father and remarried; however, her husband was incarcerated out of state. She had also been recently incarcerated and resided in a supportive housing program for homeless women. Latisha did not return a form requesting demographic information so her income level is unknown, but she did verbally report having little money past what was needed to cover necessities. She did not possess a vehicle and relied on public transportation.

Tasha was 30 years old, single, and worked part-time as a nurse while taking classes to further her career. Her son, Michael, was an 8-year-old boy diagnosed with autistic disorder who attended his local public school where he split his day between a second grade general education classroom and an autistic support classroom. Tasha did not return a form requesting demographic information so her in-
come level is unknown, but she did verbally report having little money past what was needed to cover necessities. She did possess a vehicle.

**Interview Process**

The interviews were conducted in a comfortable place in each interviewee’s home. The entire interview was conducted in one sitting and was led by an African American doctoral-level research assistant. Each of the interviews was video recorded after obtaining consent from the participant.

To ensure greater consistency across all interviews, the same research assistant conducted each interview. The interview guide for each interview included 16 standardized questions: two on what led them to respond to recruitment materials; three on their child’s challenging behavior and behavior management strategies; one on their experiences as an ASD parent in general; two on their experiences and perspectives specifically as an African American ASD parent; three on the diagnosis process; and five on school-based and other therapeutic services and obstacles to accessing those services (see Table 1). Follow-up questions were asked of the participants to clarify or gain relevant information and detail. Examples of follow up questions were: “Can you tell me a little more about that?” or “Do you think that has been helpful so far?”

**Data Analysis**

The data were analyzed using a multi-step approach. Using Grounded Theory as a framework, relationships from the data were analyzed from the broad categories (Willig, 2013). Following this framework, analytic meetings with the research team were held to review codes. The research team consisted of five members across two universi-

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**Table 1**

**Interview Questions**

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<td>Introduction to Study</td>
<td>How did you find out about the study  \n</td>
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ties. Using a very traditional approach to qualitative data analysis, research-team initiated codes were developed prior to coding individual interviews in order to cover descriptive and explanatory categories (Creswell, 2014, Creswell & Clark, 2011). Based upon a review of literature before data collection, researchers were familiar with some of the themes that might emerge from the analysis. A constant comparative method was used to analyze the data and identify and confirm if the participants’ experiences were consistent with previous experiences as highlighted in the literature (Fram, 2013). After the initial codes were established, the research team reviewed transcripts looking for disconfirming evidence in relationship to the initial set of codes. In subsequent reviews of the transcripts, we moved to an emergent coding process where additional codes were added as needed to the initial codes identified at outset. As comparisons across interviews were made, the research team added new codes and similar codes were grouped together to represent the appropriate broader themes. During the final analysis a final set of themes were chosen across all interviews to represent the lived experiences of all participants. This process was completed to account for all instances of variation across all interviews (Willig, 2013).

Results
The present study examined the experiences and perceptions of three mothers of sons with ASD. Four emergent themes emerged from the lived experiences of these mothers. These emergent themes are organized as follows: Racial Discrimination, Complex Collaboration, Family Dynamics, and Community Dynamics.

Racial Discrimination
A salient theme of discussion throughout all of the interviews was the notion that race did impact the experiences that each of the mothers had in their medical and educational spaces. The experiences of the mothers covered under racial discrimination are the covert and overt acts that implicate race as the reason for the differential treatment of themselves or their sons by educational and medical professionals. Although the circumstances were different, each one of the mothers shared very similar experiences of racial discrimination as they sought to work with professionals. There were far more covert acts of racial discrimination shared by each of the mothers, and at many times each was hesitant to state that the treatment she and her son received was due to race. For example, Tasha stated, “I don’t want to say that it’s a racial thing. I don’t want to say that it has to do with him being African American but sometimes it is questionable where his placement is in school.” Yet as each of the mothers got more comfortable in the interview, they were less hesitant to mention race as a factor. Tasha followed up with: “He’s easily slipped through the cracks sometimes and I’m not sure if that is because of his race. I’m not sure.”

In discussing community outings, Latisha shared that she had a wraparound service specialist that “didn’t want to go out in the community.” As she explored the reasoning behind her repeated denial by the specialist for community outings, she mentions her surroundings, stating “I didn’t live right in the ‘shoot ‘em up central.’” In relating what she believed to be an overt act of racism, Latisha describes:

“She took it upon herself to call the agency because somebody was knocking, ringing my doorbell. It was actually the police, they were ringing my doorbell, and I didn’t answer the door. Now I lived in an apartment building at the time . . . they rang everybody’s door . . . nobody answered the door. [If] there is an issue with the police, I feel as though that’s a private issue and that’s none of your business as her being a [wraparound service specialist] . . .”

She continues,

“My experience – it sucked. I couldn’t believe that. Like I’ve said I’ve had lots of bad experiences. I can’t think of anything else to put it on other than my color . . . and you know we’re in [primarily White neighborhood]. I hate to think that way. You have to say it’s because of your color. I hate to say that. I try to look at everything else and then when everything else doesn’t all line up then you have to say maybe it was my color.
Maybe it was because I was black... You don’t want to think that way but you have to look at that. It’s too blatant for you not to."

In more covert ways, the mothers shared that they had to constantly negotiate what they knew related to the diagnosis and care of their children with the expectations and answers they were receiving from others. These negotiations started at the point that each of the mothers began to seek a diagnosis through present-day interactions with professionals. Throughout their interviews, the feeling that their knowledge about the situation was somehow diminished or not taken seriously emerged for each mother. Latisha stated:

“people will try to talk to me like I don’t know what I’m talking about and they will make suggestions and I’m looking at them like I’ve done that or I do that, and they’re like “oh” (sounding shocked). Like I had a BSC [behavioral specialist consultant] at one agency and um she was just very condescending when she spoke to me and I had to tell her, “with all due respect, this does not work with my child, I’ve tried this.”

In addition, similar patterns were seen at the point of seeking a diagnosis for their sons. When asked whether being African American had impacted her experience parenting a child with ASD, Viola stated, “It took longer to actually get a diagnosis. Let’s say this politically correct, I don’t want to offend, but, knowing . . . that African Americans tend to get diagnosed much later than children of other races. So, it’s been a lot more difficult . . . with cultural differences.” Latisha: “I felt like a lot of the psychiatrists and stuff that, like, do you think I’m lying? . . . I was ignored or what I was saying was trivial to them, and it was very demeaning.”

For many families, each stage from diagnosis to receiving the proper services was fraught with difficulty. Latisha described being denied services by a center. “My mother was sick. She was like what? You’ve got to be kidding. She couldn’t believe it. No one could believe it.” Often parents have to resort to code-switching or speaking in a manner that can mask another’s perceptions as to their race or ethnicity. While on a phone call, Latisha said that on the phone she can speak “prim and proper” and doesn’t always “sound” African American, but the person figured it out and didn’t let her son in.

**Complex Collaboration**

Collaboration is such a big part of the experiences that caregivers have as they access services for their children. In all of the experiences the mothers shared, complexity defined every step. Collaborative attempts were complex because often they reported having to fight harder to access services, make difficult decisions due to inequitable treatment of their sons, or being placed in uncomfortable situations by educators or service providers. The subthemes of resilient advocacy and difficult interactions further delineate the experiences that each of the mothers shared.

**Resilient advocate.** Resiliency on the part of the mothers was a constant theme whether talking about interactions with family, service providers, or with the larger community. The codes that were applied most to their collaborative experiences were: overwhelmed, emotions, and negative experiences. Resiliency was seen in how each of the mothers tried many times to advocate for their children. This resiliency was seen in many areas, but Tasha crystallizes how difficult a plea for communication could get,

“I mean tell me something. I don’t want to keep getting these ‘yeah I know he’s a good kid’ . . . AND what did he do today? Tell me something. Give me some form of communication . . . I’m very open. Whatever you need me to do I will do it. No hesitation but you have to be willing to do the same for me and I’m very serious. . . . Because I want to know. I want to know what’s going on with my kid . . . I want you to communicate with me. If not daily, weekly. Something. I had no clue my son was in speech. I had no clue he was in OT in the school. I have him going outside . . . for speech and OT. How was I supposed to know?”

Each of the mothers described experiences where they had to weigh accessing services and the well-being of their child, that there were “just so many different excuses that . . . I’m not going to force my child to go some-
where where they don’t really want him, because that’s going to be a bad experience for him.” Similarly, Latisha describes that working in partnership with others became “[a] type of ‘hateration’. I hate to use that but it was. It had to be because there was no real medical reason for them to say that he didn’t need help. My child needed help. . . . I just didn’t understand it.”

The type of resiliency needed by these mothers on behalf of their children was seen by others as excessive. In response to the difficulty needed to access wrap around services, Latisha shares,

“My mother was sick. She couldn’t believe it. No one could believe it. My sister was like file a lawsuit [for] discrimination. I thought maybe it’s just this location so I’ll go to the [other] location. I go to the [other] location, the same lady. I don’t really know what it was. I don’t know if it was me. I don’t know if it was my child.”

However, the path to resiliency for each of the mothers created a confidence that led to improved collaborative experiences. Mothers became very direct, as Latisha states, “first and foremost, I said I deserve respect, if you had something to discuss with me, approach me as a person” and shared that their experiences improved once they found their voice as advocates for their children. Tasha: “I’m going to make you do this right because I’m holding up my end of the bargain but I’m going to make you hold up yours.” They also began to know their rights as caregivers and Latisha shared, “there shouldn’t be anything that anyone can say to you to knock you off your square because you know what you’re doing.” In addition, Tasha described how she approached old situations differently,

“Yeah. I’m going to hold you to it. Because if I’m sending him and I’m trusting you with my kid, my kid is not a game. Sometimes I go into those meetings and I’m thinking to myself ‘Please, I really don’t know how to say this nicely.’ I really don’t. So I would say it as nicely as possible but still say it because it was so necessary.”

**Difficult interactions.** As each of the mothers shared their collaborative experiences, a majority of their complex interactions were found with school personnel and related service providers. Latisha stated, regarding interacting with teachers, “I always felt pacified. Don’t tell me what you think I want to hear.”

Tasha added, “I had to ask questions that I was so uncomfortable with, like, are you qualified to work with him? I have to question those things. It wasn’t inappropriate.” Viola noted, “This school year so far we have changed his IEP twice, and we have another meeting next month; his needs are not being met at all . . .” She describes her son’s school day as “It is as if he was gone for 7 hours for nothing.”

At times, Tasha states that she was unable to find the words to express her feelings, yet she knew she had to speak up for her son. Tasha relays “I was speaking up but I wasn’t. I wasn’t able to say that was a problem. I wasn’t able to articulate my conversation. Basically what changed was my knowledge of what they’re required to do, what my rights were, how far I could go.” She often had to go through an inner dialogue and preparation prior to her interactions with educators. “It was a struggle for me because I didn’t know how to go in there and say I’m not okay with this. I couldn’t breathe going into that meeting, and then on top of that meeting is the principal, the assistant principal, and all of his teachers. You know there’s six, seven, eight other women in the room with me.”

Although the mothers shared overwhelmingly negative experiences related to advocating for their sons, they did note that when they met service providers that met their needs, their interactions changed. For example, Tasha notes, “Once I had the knowledge to go in there and say no I’m going to make you do this right because I’m holding up my end of the bargain but I’m going to make you hold up yours.” In addition, she states, “I just got more comfortable with knowing what they were required to do. And that’s what made the change.”

As she described a great collaborative experience, Latisha stated:

“They were not trying to rush me out his office, they listened, they observed. It seemed like they had a genuine interest in my child, not like he was just a patient. They cared. And I think that’s so impor-
tant because, you want people to see the good things in your child that you see. So when you have somebody when they come in and they are taking their time and talking, and engaging and with the child and stuff. That’s what you want to see.”

**Family Dynamics**

The next prominent theme that emerged from the interviews was that of family dynamics. Family dynamics introduce the experiences that each of the mothers had with their nuclear and extended families related to all areas of supporting their sons with ASD. The subthemes in family dynamics are: single parenthood and familial interpretations of ASD.

**Single parenthood.** Two participants were single parents and and their experiences bring to light some of arresting issues that stand in the way of effective interventions and support. Each of our mothers sought support groups as a source of footing as they went from diagnosis to receiving services, however the reality of single parenthood mitigated any positive effects they may have gained from other families’ experiences. Tasha shares, “Even though there are support groups it would be nice to have another single mother that understands that even with a child that doesn’t have a disability just those struggles.” She stated that participation “was awkward for me because when I went to support groups it was married couples. I was the only single parent. I’m like your struggles are not my struggles at all. That’s how I felt. So I felt out of place even at support groups.” When describing that “out of place” feeling, Tasha states “Their struggles were like how are we going to get the new iPad and I’m like . . . it just wasn’t the same. I couldn’t communicate with parents that don’t do it by themselves.”

The importance of support for each of these women was critical to them continuing their agency with their children. In describing how single parenthood affected their reality, Latisha said “. . . no one appreciated what I was going through.” Each mother reported that single parenthood changed how they parented, Tasha admits “it wasn’t just the fact that he was autistic. It was the fact that I was a single parent that made me become overbearing . . . it’s all on me. I went to see five doctors even about his surgery. Five . . . that’s what I needed to do.” Very similarly, Latisha shared, “It made me be overbearing, protective, very worrisome as a single parent. Just overly worrisome to the point where I had to relax and I was hindering my son’s growth.” When continuing to describe why this intense level of parenting, she states, “being a single parent it just makes it that much harder, because you don’t have anyone to turn to.”

Single parenthood is difficult, not only with the well-being of the caregiver, but also with an understanding of how single-parenthood can affect commitment to interventions and the ability to support multiple providers. In talking about how to balance the necessary supports, Tasha notes, “I struggle with during the week I have no one to get my kid on and off the school bus so I cannot work during the week. I’m going to school during the week so when he’s in school, I’m in school. And then when he comes home he has his TSS, PT, OT, speech and then on the weekends I’m at work all weekend. I have absolutely no life. Ever.” Additionally, Latisha relayed a conversation with her husband, who was incarcerated:

Oh, definitely it’s hard. Oh, God, I mean, before my husband went away [to prison] I just broke down crying. He was like “what’s wrong” and I said, you just don’t know what it feels like to have help, that (and I’m about to cry now just thinking about it) because it’s like, wow, I can sleep in, and you can get them up for a change. And he was like “I can’t imagine” and he saw all the stuff I had to do, and he was like “oh my god, I can’t believe you’ve been doing all this by yourself.

The true loneliness of being a single parent and its effect on the caregiver is tremendous. In talking about the true cost of support, Tasha shares “I guess I wonder sometimes do a lot of people feel like that? Because I know I do every day. Sometimes I want to cancel therapy just because I don’t feel like going. But just because I’m tired and I need a nap does not mean that I have the luxury of not taking my kid to therapy.” The lack of support also had an emotional impact. Tasha ends with the emotional toil of single parenthood wishing she had, “Someone to lean on and tell
you things are going to be okay. Someone who’s advocating with you working with you. It’s always just me by myself. I always felt that way. That it was just me.”

Familial interpretations. During the diagnosis period, each of the mothers mentioned that their families did not believe in the diagnosis or the cause of ASD in their family member. Two mothers shared that their families blamed them for the disorder. Latisha stated, “my family just assumed that it was something that I did wrong because [he] came out with autism; it was my fault. ‘You must have been drinking, or you must have been using drugs.’ No, I didn’t do anything. They didn’t want to accept it.” In addition, Viola stated, “Our family – some know and some do not know about his diagnosis. Some of them don’t quite understand what autism is and trying to explain it to them - it’s pretty difficult. They just don’t understand it.” Additionally, Latisha described her family turning to their faith, sometimes at the expense of therapy: “I have a religious family and they just ‘pray it away, pray it away.’ Look, ok, you can pray all you want, I’m going to pray and go ahead and get treatment and therapy, I’m not going to say that I’m just praying to Jesus, and it’s going away.”

When asked about why each family had difficulty with the diagnosis, the reason given most often was not understanding the disorder. Latisha stated, “They just could not understand that. My mother especially [sigh]. Like my friends are like ‘he’s just taking his time.’” That continued into family support for interventions. Each of the mothers relayed the differential support of interventions by extended family members. Two mothers shared how their families didn’t understand the level of intervention. Tasha shared, “A lot of my family actually for a long time was like he doesn’t need that and he’s normal and he’s this and that but I knew . . . ‘I think it’s just a culture that they’re just so used to. I mean my grandmother, my mother on both sides for years they were like he does not need to be in all that therapy.” The cultural component of understanding ASD is a significant one and Viola frames how her family views the characteristics her son displays.

“They don’t see it until there’s a problem so if everything is smooth going they won’t see the behaviors. They may hear some of the speech and think, ‘oh well, he just stutters.’ He’s processing. But they don’t see it that way and if there are no problem behaviors they don’t think that he has a diagnosis at all. Some of the family members keep telling me that he’s going to grow out of it. Trying to explain to them that autism is something that you can’t outgrow, you just learn to better deal with the symptoms - it falls flat.”

Community Dynamics

The theme community dynamics reflects two types of community that the mothers refer to in their narratives. The first is a physical space that a person inhabits, like their town. The second definition refers to a group of people that share customs, origins, and values. For each of the mothers, they referenced experiences across two cultural communities, the African American community, the Autism community, and in some instances, the intersection of each. Their thoughts can best be organized under the following sub themes: community interpretations, lack of resources, and lack of connection.

Community interpretations. Each of the mothers talked about how the variety of interpretations of ASD in the African American community often detracted from forward progress. These interpretations were often negative or non-supportive of the experiences of each of the families. According to each of the mothers, interactions with friends and family were characterized by less understanding and fewer instances of acceptance of ASD. Behaviors that are sometimes associated with ASD were expressed by family members as the result of bad parenting. According to each of the mothers, interactions with friends and family were characterized by less understanding and fewer instances of acceptance of ASD. Behaviors that are sometimes associated with ASD were expressed by family members as the result of bad parenting. In addition, there was a level of shame associated with needing to access services. Tasha states that “We’re so used to doing our own so much that we just don’t reach out for help.” As she shared, she spoke of a co-worker that didn’t want others to know her child needed services and family members that decided not to access services for their children.

Shouldering these interpretations were often frustrating for the mothers. As Latisha
described her experiences in the African American community she says, “I’ve had problems with African Americans where I’ve had to put them in their place as well: You’re ignorant and you don’t know about autism.”

Lack of resources. In speaking of their lived experiences each of the mothers mentioned that there was a lack of resources in every area of their journey. Viola shares that “early diagnosis and screening are one of the biggest issues that African Americans face.” Another area of concern was described by Latisha: “They have nice programs but they’re always in the suburbs, they’re always far out. If you don’t have a vehicle you can’t get to them.” The chief emotion that the mothers seemed to display when talking about the lack of resources was a sense of exasperation. Latisha: “And I think it’s horrible that everything is so fragmented like that. I think they need to have these types of programs accessible in urban communities . . . there was no place in my own community that I could go to so I was forced to go travel far out.”

The lack of resources was not simply in reaction to physical places to access services. The absence of educational information was also noted by Latisha. She states, “I had to educate myself, I had to read up on autism, I went to the [advocacy] center and got parent advocate certified because I needed to know what to do that for my child.” In addition, Latisha also took on the role of educator by “educating everybody. Everybody in my circle started getting educated.”

Lack of connection. A consequence of the absence of resources is distance from ASD advocacy communities. Only one of the mothers mentioned being a part of a community organization or using a web-based community for anything other than looking up information when seeking a diagnosis. Effective sources of support for each woman were their extended families. As each mother relayed their experiences, there was the sense of tokenism as they entered new spaces. As Latisha describes, “there are not a lot of African American children in particular at his summer camp . . . So, it was kind of hard always being the only person of color.” Even in instances where there were other families of color, there was not an immediate sense of community. For example, Latisha: “By the time another African American family finally came . . . it took a while for the parent, the mother to warm up to me . . . we are both the same, both African American women, we both have special needs children, what’s the problem?” In another instance, Tasha relays “there’s a girl at my job that actually talks to me through another girl because . . . I think she might be embarrassed about her kid needing services.”

When thinking of causes for this lack of connection, Viola states, “I think that putting more knowledge out there specifically geared towards African Americans. Examples of African Americans that have children on the spectrum that are getting services, that are actually benefiting in some way, and encouraging them to be more involved in their child’s services, and their child’s education as well, it would really, really, really, really, really, help.”

All mothers stated that the focus on the African American experience was what drew her to this study. “Well when they said about African Americans and autism I was pretty glad to hear about that because that’s an area they didn’t feel there was a lot of information about I agreed; because a lot times I, you know there’s not many African American families participating in a lot of the things that my son participates in so I want to lend my voice and his voice to see what, what can be done, and just to help out.”

By having a focus on African American families, there is a greater connection to the intervention experience. Latisha describes a positive experience that she and her son had with an agency. She states, “They worked with him, they had expectations that matched mines, just they were willing to do things with my other son too, they didn’t exclude him.”

Discussion

While a large body of research exists examining the experiences of families of children with ASD (Bayat, 2007; Gau et al., 2012; Gray, 2009), very few previous studies have purposefully examined the experiences of African American families with children with ASD (Burkett et al., 2015). In the present study, three African American mothers of children with ASD were interviewed to add to the limited research base investigating African Americans’ own perspectives on raising children.
with ASD and the ways in which race has impacted their experience. Specifically, our research questions were: 1) What experiences do participating African American mothers of children with ASD directly attribute to their race? 2) Do participant reports provide evidence of a unique experience for African American families of children with ASD?

Mothers described a range of perceptions and experiences they associated with being members of Black families with children with ASD; as a primary organizing theme, these mothers described a constant sense of vigilance and maintaining an almost exhaustive fight for their sons on multiple fronts, including family, community, and school and service providers. While advocating strongly for a child with ASD is a common experience for parents of all races and ethnicities (Bayat, 2007; Boshoff, Gibbs, Phillips, Wiles, & Porter, 2016; Trainor, 2010), it is possible that being an African American family with a child with ASD poses unique and powerful obstacles. For example, all mothers described a lack of understanding of autism in the African American community and the toll that those misunderstandings took on them and their families. In particular, participants described other African Americans thinking their children behaved the way they did due to a lack of parental discipline. Mothers described responding to this obstacle in different ways, including arguing with members of the community about ASD, informing members about ASD, offering to help members with children who may have ASD, and simply enduring misinformed judgments.

Additionally, all mothers described a lack of understanding of autism by their immediate family members and pressure from family and friends to avoid a diagnosis for their child and not seek services, triggering feelings of isolation from family and friends. Despite these pressures, all mothers in our study did obtain a diagnosis and services for their child, in contrast to the initial wishes of their families. In this and other ways, these mothers demonstrated a tremendous amount of resilience. While families with children with ASD regardless of race are known to experience feelings of isolation (Corcoran, Berry, & Hill, 2015; Hayes & Watson, 2013), African American mothers may be at greater risk for more severe isolation due in part to lack of understanding by family and community members. Furthermore, single motherhood, as two of our participating mothers described, may severely increase the sense of isolation and exhaustion experienced by that parent. It is well-established that a large source of stress reduction for parents of children with ASD comes from social supports (Boyd, 2002; Dunn, Burbine, Bowers, & Tantleff-Dunn, 2001), therefore African American single mothers whose friends and family do not support their decision to pursue an ASD diagnosis and services may face even greater stress. In addition, previous research has found that African Americans may seek recommendations and opinions from family, friends, or their church members before they seek professional assistance, while Caucasians may be more likely to initially take the route of traditional treatments and professional services (Sue & Sue, 2008). Based on the findings of the present study, seeking help from friends and family members who do not support diagnosis and treatment could contribute to a delayed diagnosis of ASD.

An additional obstacle described across participants was the belief that they had been discriminated against because of their race in one or more aspects of getting help for their children. From being brushed off by pediatricians, to inappropriate educational placements, to being denied center-based services, all mothers interviewed in this study felt that their race had made their experience of navigating services for their child more difficult. Again, while many parents of a variety of races experience these difficulties, it is possible that due to forms of racial discrimination ranging from overt racism to implicit biases (Blair et al., 2013), African American families may experience a heightened degree of difficulty in getting timely diagnoses (Mandell, et al., 2002; Mandell et al., 2007) and effective services for their children with ASD. While only one participant raised the possibility that some of her challenges in the special education system may have been due to issues of color, all mothers described difficult and often confrontational interactions with their sons’ special education teachers and school staff. Previous researchers have raised concerns about poor treatment of African American families by special education teams (Harry, Kling-
ner, & Hart, 2005), suggesting that the strengths of African American families with children with disabilities may be less likely to be perceived by predominantly Caucasian special educators.

**Limitations**

This study possessed a number of limitations. First, as a qualitative study of three African American mothers residing in one northeastern urban area, the findings of this study are not clearly generalizable to other African American families; however, the fact that a number of the themes found in the participants’ narratives connect with previous research on African American families with children with ASD or other disabilities raises the likelihood that the experiences of these three families reflect experiences shared by other families. That said, it is highly likely that these participants demonstrate a selection bias in that they represent a group that responded to recruitment materials and volunteered to be in an intervention study with their child. As only four families total responded to recruitment efforts, it is likely that participants possess unique characteristics and may be unlike other African American families in a number of unknown ways.

**Implications for Research and Practice**

The findings of this study, reinforced by previous research in African American families of children with autism and other disabilities (e.g., Burkett et al., 2015; Fernandez, Butler, & Eyeberg, 2011; Harry et al., 2005), suggest the need for future research and practice in two primary areas: 1) increasing ASD awareness and information in African American communities, and 2) developing culturally-responsive models of diagnosis and service delivery. The mothers in our study echoed previous findings that a lack of information about autism in the African American community was a major obstacle they all encountered. Future research should be undertaken to examine the best methods and channels of supplying information on ASD to African American communities, as well as content and formats of information outreach that effectively increase knowledge and change attitudes towards ASD. Second, findings of this and previous studies show the need for a more culturally-informed process of diagnosing and servicing African American children with ASD. For example, medical professionals should be aware of potential community and family pressures African Americans may face not getting their children diagnosed or serviced, and provide information on the benefits of both of these processes in a manner that is sensitive to the contradicting information families may be hearing from those closest to them. Additionally, teachers and service providers need to undertake more culturally-responsive practices with African American families of children with ASD, which may involve reflecting on potential biases these practitioners hold and learning more about the cultural norms and strengths of African Americans. Future research should develop and test training packages aimed at mitigating the obstacles African American families of children with ASD encounter that are based in implicit or explicit bias exerted through systems and structures that are predominantly Caucasian. In terms of practice, service providers, teachers, doctors, community-based specialists, and all professionals who are charged with improving outcomes in children with ASD should learn about the unique obstacles encountered by African American families of children with ASD and use this knowledge to inform their practices and to contribute more culturally-sensitive information and outreach regarding ASD in African American communities.

**References**


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African American Parents’ Perceptions of Diagnosis and Services for Children with Autism

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Abstract: The identification of children with autism spectrum disorder (ASD) during the first two years of life has become more promising; however, the probability of early ASD diagnoses does not always extend to African American children. This disparity has decreased the likelihood that African American children will benefit from early intervention services. This qualitative inquiry explored, via semi-structured interviews, the perceived factors that facilitate and impede early diagnoses and access to services among African American parents of young children with ASD. A constant comparative approach was employed and 15 themes related to diagnoses, services, and recommendations emerged (e.g., parent knowledge of ASD as a facilitator to diagnosis, “aggressive advocacy” as a barrier to accessing services, and parent education as a recommendation for addressing identified barriers). Parent advocacy and partnerships with professionals were overarching themes in this study. Implications for parent training related to knowledge of ASD, parent advocacy, and partnerships with professionals are discussed.

Recent findings have indicated that the prevalence of ASD is 1 in 68 children (CDC, 2016). Over the past several years, the increased prevalence of ASD has heightened the need for more educational and therapeutic services and interventions for individuals with ASD (Wong et al., 2014). The early childhood years are critical for children with ASD because early identification is associated with increased benefits from interventions and services (Bruder, 2010; Irvin, McBee, Boyd, Hume, & Odom, 2012). Although the identification of ASD in children younger than two years has become more promising in recent years (Boyd, Odom, Humphreys, & Sam, 2010), this likelihood of early ASD diagnoses is not consistent among African American children. African American children are often diagnosed months or even years after the onset of symptoms and can go undiagnosed until school age or later (Hilton et al., 2010; Mandell et al., 2009).

Access to Services

Across racial and ethnic backgrounds, services for individuals with ASD have been described as limited, inaccessible, and costly (Dymond, Gilson, & Myran, 2007; Irvin et al., 2012). Among families of color however, access to appropriate services is further compounded by factors such as socioeconomic status and living environment (Reichard, Sacco, & Turnbull, 2004). Some of the work around the intersection of culture, race and disability has highlighted the challenges that families of color face when seeking access to services. For example, Blanchett, Klinger, and Harry (2009) argue that minority families of children with developmental disabilities face barriers to accessing services such as: (a) differing cultural perspectives of disability, (b) limited access and unfamiliarity with available service delivery options, and (c) service providers’ lack of understanding of factors such as race, social class, cultural values, and experiences. Blanchett et al. (2009) suggest that when families of color seek services for children with developmental disabilities, they are likely to face systems and structures...
(e.g., human and community services, special education system) that are not adequately prepared to help them navigate services. In many cases, this results in families of color receiving culturally unresponsive and inappropriate services and interventions.

Other researchers argue that healthcare providers’ (HCP) knowledge and perceptions of African American families impedes access to services for these children (Gourdine, Baffour, & Teasley, 2011; Liptak et al., 2008; Mandell, Listerud, Levy, & Pinto-Martin, 2002; Thomas et al., 2007). For example, Reichard et al. (2004) found that many families of children with developmental disabilities from minority backgrounds reported difficulties finding competent and trustworthy practitioners who were empathetic and understanding of their concerns. On the other hand, Gourdine et al. (2011) purported that African American parents are less likely to view certain treatment methods as helpful for their children because of the history of stereotyping, discrimination, and racism that they have experienced when seeking mental health services in the past.

Barriers to Diagnoses for African American Children

Among African American children in particular, the three primary categories that contribute to the disparate access to diagnoses and services include: differential diagnoses, socioeconomic status, and cultural divergence (Pearson, 2015). Previous researchers (e.g., Blanchett et al., 2009) have described similar barriers and challenges related to children of color with ASD.

Differential diagnoses. Differential diagnoses among African American children are defined as rates and timing of diagnoses of ASD that are less than or more delayed than those of European American children (Pearson, 2015). Access to services for African American parents of children with ASD is a common barrier to obtaining accurate and timely diagnoses. In their work, Mandell et al. (2002) found that on average, African American children were 7.9 years old when they first received a diagnosis. Mandell and colleagues also found that 50% of the European American children in their sample received an ASD diagnosis by the age of 5.5 while less than 30% of African American children received a diagnosis of ASD by age 5.5.

Socioeconomic status. Socioeconomic status (SES) is viewed as a barrier when financial resources inhibit access to services for this population. Low SES, however, does not account for the under diagnosis and misdiagnosis of ASD in African American children. Low SES impacts families across racial and ethnic backgrounds (Irvin et al., 2011); however, given the disproportionate number of African American children under 18 living in poverty (DeNavas-Walt, & Proctor, 2015), it is believed that low SES further exacerbates delayed diagnoses and access to services among this population (Pearson, 2015). For example, Liptak et al. (2008) found that families living in poverty had decreased access in getting care from a specialist, having a personal physician, getting acute care, and receiving preventative care for their children.

Cultural divergence. “Cultural divergence is the idea that there exists a disconnection between parents of color and the medical professionals who treat their children” (Pearson, 2015, p. 54). Cultural divergence is a barrier described as cultural phenomenon that impacts access to services for African American families of children with ASD. As a result, many African American families face culturally unresponsive and untimely access to early intervention.

Cultural divergence also highlights the notion that HCP knowledge and perceptions of African American families impedes diagnoses and access to services (Liptak et al., 2008). For example, in their case study, Gourdine et al. (2011) found that a two-parent, college-educated, middle-class African American family faced many challenges obtaining an initial diagnosis and subsequent access to services. During their first clinical visit, HCPs assumed the parents were uneducated and immediately recommended placing their son in an institution. Reichard, Sacco, and Turnbull (2004) found that culturally and linguistically diverse families of children with developmental disabilities reported difficulties finding competent and trustworthy practitioners and wanted them to show more concern. Zuckerman et al. (2013) identified disparate diagnoses and referrals for Latino and African American children with ASD based on the cultural perceptions of the medical professionals who treated them. Their findings indicated that HCP perceptions

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of families of children with ASD suggested that Latino and African American children had less knowledge of ASD than parents of European American children. The HCPs also suggested that, as practitioners, they faced more difficulty in recognizing the characteristics of ASD in Latino and African American children, as compared to European American children (Zuckerman et al., 2013).

There is a dearth of literature around diagnosis and misdiagnosis of ASD in the African American community (Mandell et al., 2002). Despite the availability of evidence-based, early intervention services for children with ASD, African American children continue to go undiagnosed and misdiagnosed at alarming rates. These findings reflect a need to explore the reasons why late diagnoses and disproportionate access to services are, as indicated throughout the literature, unique to this ethnic minority population. Therefore, the purpose of this study was to explore the perceived notions that facilitate and impede early diagnoses and access to services for children with ASD in grades K-5, by interviewing African American parents about their experiences. This study was guided by the following research questions: (1) What are the reported experiences of African American parents of children with ASD in grades K-5 when obtaining an initial diagnosis? (2) What are the reported experiences of African American parents in gaining access to services? and (3) What recommendations do African American parents have for educators, service providers, and healthcare providers to better serve the needs of African American children with ASD and their families?

Method

Participants

Semi-structured interviews were conducted with 11 African American mothers of children ages 4–11 with ASD living in a midwestern state. The inclusionary criteria were: (a) a parent or caregiver of a child with a primary diagnosis of ASD who qualified for special education and related services in a public school, (b) both parents/guardians and the child were African-American and resided in the state, and (c) the child was between grades K-5 at the time of the study. All caregivers (including fathers) were eligible and invited to participate; mothers, however, were the only respondents.

After receiving Institutional Review Board approval, efforts were made to reach families who resided in all regions of the state, including urban, rural, and remote communities. Participants were recruited through a local autism program, Parent Training and Information Centers, Easter Seals, and various local community agencies using emails, newsletters, and flyer announcements. Thirteen parents expressed their interest in the study after receiving a flyer from the researchers or from participants who had already completed the study (i.e., snowball sampling). Of the 13 parents who expressed interest, 11 met inclusion criteria to participate in the study. Data were collected from 11 African American mothers in urban and rural areas whose children (boys, \( n = 9 \); girls, \( n = 3 \)) were 4–11 years old (mean age = 7.92 years) at the time of the study. The mother’s ages ranged from 31 to 48 years (mean age = 38.9 years). Six mothers were single, three were married, and two were living with their partners. Annual family income ranged from $8,700 to $90,000 (mean Annual Family Income = $48,600). Two participants were mothers of two children with ASD who met inclusion criteria; therefore, child data is representative of 13 children (see Table 1).

Data Collection

To explore the experiences of African American parents of children with ASD, participants completed a family background questionnaire and participated in semi-structured interviews.

Family Information Questionnaire. The Family Information Questionnaire was developed by the authors and was administered to collect demographic information about the parents and the types of services that their children with ASD received. The questionnaire included 15 items and took 5–10 minutes to complete. The questionnaire included demographic questions such as parent’s age, gender, marital status, level of education, employment status, family income, and child information. The questionnaire also included questions about the types
### TABLE 1
Participant Demographic Information

<table>
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<tr>
<th>Mother Name</th>
<th>Mother Age</th>
<th>Marital Status</th>
<th>Education</th>
<th>Employment</th>
<th>Family Income</th>
<th>Total # of Children</th>
<th>Other Children with Disabilities</th>
<th>Child Gender</th>
<th>Child Age</th>
<th>Age of Diagnosis</th>
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<td>Phone Operator</td>
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<tr>
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<td>Single</td>
<td>Bachelor of Arts</td>
<td>Supervisor</td>
<td>$67,500</td>
<td>1</td>
<td>No</td>
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<tr>
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<td>Associate of Arts</td>
<td>House Manager</td>
<td>$90,000</td>
<td>1</td>
<td>No</td>
<td>Male</td>
<td>9</td>
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* Participants 7 and 8 reported experiences based on two children with ASD.
and amount of services their child with ASD received.

**Interviews.** The first author conducted semi-structured interviews with each participant. The interview protocol was piloted with a single mother of a 10-year-old child with ASD. The pilot participant confirmed that the interview questions were clear and expressed that the questions were developed well enough to capture the experiences of African American parents of children with ASD. The final protocol included seven open-ended questions (see Figure 1). The main areas of inquiry that were addressed include: (a) experiences of African American parents of children with ASD obtaining diagnoses, (b) experiences gaining access to services, and (c) recommendations for healthcare providers, service providers, and educators to better meet the needs of African American children with ASD. During each interview, the researcher followed up when necessary, with additional probes based on information that parents provided in the family information questionnaire. The interviews were conducted at a time and place that was most convenient for the participants (e.g., public library, homes). Each interview was audio-recorded, field notes were collected, and interviews were transcribed verbatim. Ten out of 11 interviews lasted between 42 and 73 minutes, and one interview lasted 10 minutes (average = 53 minutes).

**Data Analysis**

Data from the Family Information Questionnaire were analyzed to provide descriptive information about the participants (see Table 1). The questionnaire data were compared to the interview data to provide support for data triangulation (e.g., number and types of services). A constant comparative method (Corbin & Strauss, 2008) was used to analyze the interview data and data analysis was conducted in four phases. First, the researchers each read, independently, one transcript at a time to identify and label significant pieces of text that emerged from the data (i.e., open coding). Next, the researchers met to reach a

<table>
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<th>Semi-Structured Interview Questions</th>
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<tr>
<td>1. Tell me about your family and your child with ASD.</td>
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<td>2. Tell me about his/her abilities and needs.</td>
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<tr>
<td>3. Please tell me about your experiences with obtaining an initial diagnosis of ASD.</td>
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<tr>
<td>a. Length of time</td>
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<td>b. Number of visits</td>
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<tr>
<td>c. Number of different practitioners</td>
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<td>d. References to specialists</td>
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<tr>
<td>e. Perceived knowledge of practitioners</td>
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<td>f. Perceived cultural responsiveness</td>
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<td>4. Please tell me about your experiences with gaining access to services in school?</td>
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<tr>
<td>g. Appropriate?</td>
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<td>h. Culturally responsive?</td>
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<td>i. Receptive to parents?</td>
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<td>j. ABA?</td>
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<tr>
<td>5. Please tell me about your experiences with gaining access to services outside of school?</td>
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<tr>
<td>a. Insurance?</td>
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<tr>
<td>b. Appropriate?</td>
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<tr>
<td>c. Culturally responsive?</td>
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<tr>
<td>d. Receptive to parents?</td>
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<tr>
<td>e. ABA?</td>
</tr>
<tr>
<td>6. What recommendations do you have for educators, service providers, and healthcare providers to better serve the needs of African American children with ASD?</td>
</tr>
<tr>
<td>7. Is there anything else you would like to add?</td>
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Figure 1. Interview Protocol.
consensus on significant text and develop categories based on their line-by-line coding. Third, the researchers compared the categories to their previously identified categories to ensure consistency. Finally, the first author reviewed all of the transcripts to ensure the categories were applied uniformly, and together, the authors developed the final emergent themes.

Credibility and trustworthiness. To select appropriate participants the researchers recruited from a number of community agencies, social networks, and schools across the state. Participants were screened prior to scheduling the interview to verify that they met criteria for the study. Furthermore, the researcher employed a snowball sampling technique such that each participant was given recruitment flyers and was encouraged to share them with other families who met criteria. Each of these measures was taken to ensure that the sample was purposely identified, effectively recruited, adequate in number, and representative (Brantlinger, Jimenez, Pugach, & Richardson, 2005).

To ensure that the data were credible and trustworthy the researchers employed data triangulation (i.e., questionnaire and semi-structured interview) and researcher reflexivity (i.e., the first author was forthright about her position and perspectives within the context of this research by monitoring her possible biases through field notes, memos, and regular debriefings). Additionally, level two member checks were employed to confirm the accuracy and inaccuracy of the transcript summaries, and to gain support for the researchers’ conclusions. Ten out of 11 parents participated in the member checks (i.e., reviewed summaries). Feedback from eight participants confirmed the validity of the researcher’s interpretation of the responses. Feedback from two mothers provided clarifications related to diagnoses. For example, one mother’s clarifying response was, “The school [early education center] diagnosed her with autism at that time; she was 2 1/2. She did not receive a medical diagnosis from a health care provider until she was 6.” Finally, the first author worked collaboratively, with a culturally and ethnically diverse research team with expertise in both content and methodology during data analysis. The team verified transcripts, reviewed and verified summaries, and assisted in coding (Brantlinger et al., 2005).

Findings

After analyzing the data, seven themes emerged as they were related to experiences obtaining diagnoses: (a) navigation, (b) concerns initiated by others, (c) referrals, (d) extended family views, (e) parent knowledge of development and disability, (f) HCP knowledge of ASD, and (g) HCP response to parent concerns. Additionally, seven themes were categorized as experiences related to accessing services: (a) advocacy, (b) partnerships with HCPs, service providers, and educators, (c) sources of support, (d) healthcare coverage and costs, (e) employment, (f) geographical location, and (g) family life events. Finally, three themes were identified in the mother’s recommendations for HCPs, service providers, educators, and other parents. These themes include: training, education, and experience. Figure 2 illustrates themes and sub themes related to diagnoses, access to services, and recommendations for practice.

Research Question 1: Experiences Obtaining Initial Diagnoses

The age at diagnosis for the 13 children whose parents participated in this study ranged from 1.5 years to 6 years. The average age at diagnosis was 3.5 years. Five (38.5%) children were not diagnosed with ASD until they were 4 years or older. In regards to their experiences accessing EI services, three of the four mothers who had access to EI often discussed challenges with receiving EI for their children such as inflexible work schedules. The seven mothers who did not have EI services for their children, acknowledged the benefits, and often expressed a desire to have had the opportunity for those services for their children at a young age. During the interviews, mothers were asked to share their experiences related to obtaining an initial diagnosis of ASD. A number of categories and subcategories emerged in their responses to this question that act as facilitators or barriers to obtaining diagnoses for African American children with ASD (see Figure 2).
Facilitators. During the interviews, a few mothers identified specific factors that helped them obtain diagnoses for their children. These emergent themes referred to as facilitators include: navigation, concerns initiated by others, and referrals.

Navigating the service delivery system. Four participants shared their experiences with navigating the service system when seeking a diagnosis for their child. In instances when they were not able to get immediate attention and services, mothers sought other avenues. For example, Jennifer said:

Because it took so long to get in to see Dr. M [developmental pediatrician], I went through [community organization] and I was able to get in to see one of their therapists and she was the one who diagnosed him.

In two cases, participants discussed how news and media helped them with navigation related to obtaining a diagnosis and services. Meghan explained:

I felt like I was frustrated with the doctor because at that time I knew nothing about
autism. And it just so happened that at that time I think Toni Braxton was coming out and Jenny McCarthy was coming out and I am like oh my gosh, he does that. And, so, I just think that like, if I didn’t watch that or see them on Good Morning America, you know, I wouldn’t have known anything either. So when it came time to go to the doctor and I filled out his general check-up, I am like, well he doesn’t do this. I felt like those are red flags. So, I am like, somebody could have said something. You all could have told me to go here or, you know, but I did it all by myself.

Concerns initiated by others. In two cases, mothers mentioned that someone else (e.g., educators, service providers, friends) brought to their attention that their child’s communication, socialization, and/or behaviors were possibly indicative of a disability. For example, during a weekend retreat, Deborah was sharing her concerns about her son’s development with a group of friends and expressed that she was not familiar with ASD. She said, “The special ed teacher [friend] said, ‘have you ever heard about autism?’ I said, ‘I heard of it, but I didn’t know what it was.’ She said, ‘well look into that. It could be that.’” Similarly, Laura shared, “He was very busy and that was an issue for me. He wouldn’t sit still. And someone [friend] had mentioned to me that he might be delayed.”

Referrals. Deborah explained that it was her friend’s referral that helped her obtain a diagnosis for her son. She said, “There was a lady that worked with me. She works with special needs children. She asked me to bring him with me. She said, let me just observe him. So, when she was doing a little observing just for me, she said, you know what, it does seem like your friend is right. So, she told me to go through what is called Easter Seals.

Similarly, Linda said, “I watch TV, you know; things tell the signs so I took her to the doctor and let her pediatrician know. She referred me to Dr. M [doctor’s name] and he diagnosed her.”

Barriers. During the interviews, mothers also discussed a number of factors that created difficulty when they were seeking to obtain diagnoses for their children. These emergent themes referred to as barriers include: extended family members’ views, parent knowledge of development and disability, HCPs knowledge of ASD, and HCP responses to parent concerns.

Extended family views. Five participants in this study discussed the ways in which their extended family members’ perceptions of their child delayed the process when they were trying to obtain a diagnosis. In some instances, family members noticed characteristics and behaviors that were indicative of a possible disability, but they viewed them as typical behaviors. For example, Meghan shared a story about how her father’s views of her son’s behaviors conflicted with her own instincts. She said, “He [child] would have those tantrums and I was like, oh my gosh, what is going on. My dad is like, ‘he is just a boy.’”

In other instances, participants and family members were more passive in their responses to observed behaviors and characteristics of ASD. That is, they were aware of the problem behaviors, but did not always address them. Laura shared her frustration about her mother’s views of her son’s behaviors: “My mama was a daycare provider and I was like, ‘did you really overlook all of this?’ I felt like she should have been the first one, but that is her grandbaby so there is nothing wrong with my grandbaby.

Similarly, Lynette said:

They [her extended family] just kind of avoided it and it became very clear to me that they really were not going to take it serious when they [her children] were showing different behaviors and things—there was a strict intolerance to it.

Parent knowledge of development and disability. Another primary theme related to obtaining diagnoses was parent’s general knowledge of child development and disability. In two cases, mothers admitted that they knew little about development and disability, and discussed the role it played in their decisions to seek a diagnosis. In other words, some mothers knew something was different about their child, but
they were not exactly confident in their knowledge of the characteristics of disability. Jennifer said, “So that is why I waited a year. It wasn’t because I was being naïve about it. It was more so I wanted the school to tell me that they see a problem. Confirm what I already knew.”

Other mother’s indicated that their knowledge of child development in general, was limited because their child with ASD was also their first child. For example, Deborah shared, “being she is my only child, I was a teacher but I worked with kids five and up. So, if they are walking and talking I could handle that. I wasn’t familiar with babies.”

**HCP knowledge of ASD.** One mother who participated in this study indicated that her child’s primary HCP lacked the knowledge and/or training to provide timely diagnoses and support. On a number of occasions the doctor actually expressed that she was not familiar with ASD. Lynette explained,

> The first pediatrician we had, she was just a general practitioner. She is like, ‘I really don’t know anything about it [autism]’. I would come to her and tell her different things and she was just like, ‘I really don’t know anything about it.’

In other cases, HCPs’ knowledge of ASD was reflected in their responses to parents’ concerns about their children’s development. The fact that HCPs’ ignored characteristics of ASD in addition to parent concerns appeared to be associated with their actual knowledge of ASD. This phenomenon is described in more detail below.

**HCP response to parent concerns.** In this study, a frequently mentioned barrier to obtaining diagnoses was having the knowledge and resources for swift and effective navigation of services. Two of the most frequently mentioned barriers included HCP response to parent concerns and extended family views of disability.

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**Research Question 2: Experiences Accessing Services**

In terms of experiences with services in school and community environments, mothers reported a number of facilitators and barriers for gaining access to services (see Figure 2). Positive experiences with educators, administrators, and service providers were often facilitated by factors such as advocacy and partnership. Perceived barriers associated with services in schools included teacher training and experiences.

**Facilitators for accessing services.** Participants discussed a number of facilitators that positively shaped their experiences with gaining access to services. Parent advocacy was a primary theme that was echoed throughout a number of interviews as a strategy to impact action and attention to their child’s needs. Other themes that were identified as facilitators of service provision include: (a) partnerships with educators, service providers, and HCPs, (b) general satisfaction with services, and (c) sources of support (see Figure 2).

**Advocacy.** One of the most fundamental ways that mothers were able to gain access to
services for their children was through advocacy. During the interviews, nine out of 11 mothers explained how they have often advocated for the rights and services of their children. Tiffany explained:

We were able to advocate to get her [aide] to continue to be with our daughter and we even had to be specific in what we wanted to put in her IEP. They didn’t want to put personal aide. They wanted to put classroom aide and we had to say, ‘I am sorry, we weren’t born yesterday. We know the difference and we want a personal aide who is specifically for our daughter not somebody that you can pool and do whatever you need.’

**Pursuit of knowledge.** Another facilitator that aided in parents’ ability to access timely and appropriate services for their children was the pursuit of knowledge- a subcategory of parent advocacy. Four mothers discussed the efforts they made to increase both their general knowledge about ASD, and their knowledge of the services that were available for their children. For example, Tameka shared, “It’s just me taking advantage and going to the classes and trying to learn stuff.” Similarly, Lynette shared, “I had to go for parental classes. So, they could teach us how to work with the children in therapy. I think it was like four or five sessions of that for myself.”

**Dissemination of knowledge.** A second subcategory of parent advocacy was dissemination of knowledge. During the interviews, three mothers who discussed their efforts to gain knowledge, also shared the knowledge they had acquired, with family members, friends, and other individuals in their communities. Meghan said, “’cause I would educate anybody in a minute. I take them to the side, ‘don’t judge him. He has autism.’” Deborah said, “I put it on my social networks. I try to talk to parents in the school and let them know, hey they are offering this for the kids.”

**Partnerships.** Another facilitator for accessing services was the development of collaborative partnerships between the parents (primarily mothers) and the educators, service providers, and healthcare providers. Moreover, some of these partnerships were with individuals in the community who connected the families to the appropriate administrator or service provider (i.e., external partnership). Of the 11 mothers who participated in this study, six of them discussed the partnerships they developed and the impact that these partnerships had on their experiences. Meghan shared her experiences with a teacher who did not have any previous experience teaching children with ASD. Over time however, she was able to develop a partnership with him that led to more collaboration and positive outcomes. She said:

The teacher went to different seminars about autism. So, he was trying to educate himself. He tried his best . . . He would text me all the time and I would text him. And, when J [child’s name] forgets his homework he takes a picture of it and texts it to me.

**Sources of support.** During the interviews, several mothers expressed how they were able to cope with the challenges, frustrations, and barriers they often faced when seeking access to services for their children. They often relied on their sources of support as avenues of encouragement, strength, and perseverance to continue to advocate for services for their children. The two primary sources of support that the mothers referenced were faith and family.

**Faith.** Five mothers in this study referenced their faith as source of support. Tiffany said, “Our family has done amazing, I would say, by God’s grace.” Similarly, Ebony said, “The first 4 and a half months of her life it was very dire financially. It was really just the grace of God. It [faith] has kept me sane.”

**Family.** During the diagnosis process, mothers often described many of their family members’ perceptions of disability (ASD in particular) as a challenge, or barrier. Once mothers were seeking or obtaining access to services however, they described more positive dynamics of their relationships with their family members. For example, Tameka explained,

Blessedly we had his [child’s father] mom because she was babysitting for us. The early intervention really sucks if you are not the one at home. So she became our stay at home parent. The services were happening in her house and she was very good.
Tiffany acknowledged how pivotal it was to have the support of her husband as she coped with the experiences and challenges of parenting a child with ASD. She said, “I am fortunate to have a husband. How many of these kids, particularly African American children, are in single-family homes, particularly single moms, who don’t have the emotional support as they are going through the stages of grief.”

**Barriers.** When asked about their experiences accessing services, participants also discussed a number of factors that inhibited their access to services, or created challenges with service delivery. The emergent categories of barriers included: healthcare coverage and costs, employment, geographical location, and family life events.

**Healthcare Coverage and Costs.** Five participants discussed the impact that private healthcare coverage in particular, has had on their ability to access services. These mothers explained that they were better able to access services when their children were covered under state plans as opposed to private insurance. Tiffany shared,

> It is unbelievable how much it would cost and not only just meeting deductibles. For example, The Autism Center was $200 per semester; $200 to some people is a lot, and others it’s like okay. But they are actually changing and they are going to be billing insurance in the spring. And because it is the beginning of the New Year, guess what that means? You have to meet your deductible all over again, so you are going to be paying thousands of dollars out of pocket to get services from somebody who doesn’t even have their master’s degree yet. Therefore, my daughter will not be able to continue services there.

Lynette explained a common experience that families who have private insurance often face, “I think where parents run into problems with insurance is when you have private insurance because they won’t cover a lot of things.” Three other mothers echoed experiences where they make too much to qualify for state coverage, and too little to afford the co-pays and out of pocket expenses associated with private coverage.

**Employment.** For a few parents, particularly single, working moms, employment was in some ways, a barrier to service delivery. For example, Tameka said, “If you are a working parent it [EI] doesn’t work as well.” She went on to say:

> I really hate that I have to work. Not to say that it would be so much easier if I wasn’t working; at least I could devote more time and energy to it [accessing services] if I wasn’t working. The only time you can truly focus on it [implementing strategies] is on the weekend because once you get home from work it is just like, feed them, go to bed.

**Geographical location.** The three mothers who live in rural areas expressed a number of challenges related to the accessibility of services due to their geographical location. Tiffany shared how her location has been a barrier for accessing services for her daughter. She explained,

> There are limited resources in southern [state] altogether, and being able to get ABA therapy specifically; we haven’t been able to do that. We tried to get ABA therapy and the closest place is like 45 minutes away and I would have to go up there a couple days a week. Driving 45 minutes to get therapy and having [three] other children is ridiculous.

**Family life events.** Four mothers discussed a number of family life events that sometimes either impacted their ability to access services, interrupted services, or created a need for additional services for their children. Some examples of these family life events include unstable housing (i.e., moving to and from a number of shelters), relocating, divorce, child abuse and trauma, illness of a spouse, and the death of a loved one. Laura explained how it was often difficult for her to focus on getting services for her son because she had to prioritize the immediate needs of her family. She said, “My mom was ill. He was diagnosed while she was ill. It was just so much. There was just so much going on at the time.” When discussing the challenges of finances as a single parent mother, Deborah explained the following,

> Every month I am behind I’m constantly juggling the car note and rent, making do and I shouldn’t have to. I am a supervisor, I
make decent money. I think I make more money than I have ever made in my life. I should not, you know be needing the child support. I wouldn’t have to work overtime. I would have more time to spend with her, to do things, you know, so that is the reality. And, I think the other reality is a lot of people don’t want to hear it. Or they don’t accept, I think it is just assumed well, you are a single parent, you have to do two jobs. Well I don’t want to have to do that.

More than one third of the mothers who participated in this study experienced family life events that impacted their ability to obtain or maintain services for their children with ASD. As such, these experiences were not only stressors, but also external barriers that affected their ability to access services for their children.

**Research Question 3: Mothers’ Recommendations**

At the end of each interview, mothers were asked, *What recommendations do you have for educators, service providers, and healthcare providers to better serve the needs of African American children with ASD?* Their recommendations are discussed below (see Figure 2).

**Educators.** The primary category that emerged for educators was specialized training and experience in autism. Ebony said,

I think teachers should be specialized in what they teach. Her teacher has a special education certification, not a certification in autism, and there is a difference. She has had teachers that are specialized in autism and I could see the difference immediately.

Other recommendations for educators include expansion of after school services and better communication with parents.

**Healthcare providers.** When participants were asked about their recommendations for healthcare providers, the primary category that emerged was knowledge and training for HCPs. For example, Laura said, “they just have to seek experience because doctors are not going to say I don’t know. You know, just ‘cause you have years of experience, don’t mean you have years of good experience.” Similarly, Meghan said:

I feel like maybe because of lack of knowledge and education, they should be more, what is the word? Not focus—but you know. Like I feel like I got turned away so many times. You know, and if I didn’t go on there and Google or read he probably still wouldn’t be diagnosed.

Lynette also discussed the importance of training for HCPs, “I think medical professionals, they definitely need to teach this in the schools because it doesn’t make any sense for a parent to get a diagnosis and go back to their pediatrician and they can’t help them.”

Interestingly, Ebony provided a suggestion that would play on the strengths of HCPs specialties. She said:

If a pediatrician has a patient with autism, I think the appointment should be tag teamed with a developmental pediatrician. Once a year it should be a team appointment; general and developmental pediatricians and then maybe they can take a video or something. They would get a better idea of what was going on developmentally.

In addition to recommendations related to training, education, and areas of specialty, participants recommended that HCPs be more responsive to parents’ concerns. Tiffany said,

I recommend that educators, health professionals, and other service providers really listen to the parents. I think everybody is so busy and time is so limited that, you know, things fall between the cracks. Because in our case, I think our daughter should have been diagnosed a whole lot sooner than she was.

Finally, one parent provided a recommendation for healthcare providers that would help parents navigate the service system. Tameka said,

It would be nice if upon discovery there was more than just some print out that they were handing you—if there was an actual person that they could hand you. Like the social services person—have that person you can call.

**Parents.** Many recommendations provided by participants were actually for other parents.
The primary emergent theme was a need for parent education and support. Tiffany said, “Parents not only need to know the resources that are available and how to access them, but they need training themselves.” Similarly, Michelle shared:

For me, the biggest thing is to help me to understand or help me to help him; not the generic class, but maybe what your particular child might need. More parent education as far as, how to navigate these systems.

Discussion

The purpose of this study was to explore the perceived factors that facilitate and impede early diagnoses for African American children with ASD in grades K-5 by investigating parents’ experiences gaining access to services. Overall, participants in this study indicated that (a) there is a need for more parent education and training around ASD for African American families, (b) HCPs should be more responsive to the concerns of African American parents of children with ASD, and (c) HCPs should be more knowledgeable of ASD diagnostic criteria. The participants also recommended specialized training and experience in ASD for educators. The following section is organized by the research questions that guided this investigation.

Obtaining Diagnoses

Previous research findings have indicated that the early childhood years are critical for children with ASD because the earlier a child is identified, the greater the likelihood that he or she will benefit from interventions and services designed to address his or her needs (Bruder, 2010; Irvin et al., 2011). African American children with ASD whose parents participated in this study were diagnosed on average, at 3.5 years old. At age 3, young children age out of early intervention services; moreover, these families and children have likely not had any exposure to parenting programs, community programs, or support groups, for example.

Overall, findings from this study indicate that mothers’ perceptions of facilitators for obtaining diagnoses for African American children with ASD include navigation, concerns initiated by others, and referrals. Previous studies have not highlighted facilitators for obtaining diagnoses; therefore, this study extends the current literature in this domain. Furthermore, factors described by other researchers as barriers to obtaining diagnoses for African American children with ASD include extended family members’ views (Gourdine et al., 2011), parent knowledge of development and disability, HCP knowledge of ASD (Mandell, Ittenbach, Levy, & Pinto-Martín, 2007; Zuckerman et al., 2013), and HCP responses to parent concerns (Reichard et al., 2004). These findings not only support previous work, but also extend the literature around barriers to access for African American families of children with ASD in two ways. First, the current study includes in-depth interviews with 11 African American mothers of children with ASD; the only other qualitative study to address the experiences of African American parents of children with ASD was a single-family case study (Gourdine et al., 2011). Second, unlike many of the quantitative studies that have been conducted around ASD and African American children, the qualitative data from this study highlight specific experiences of African American families and provide examples of both barriers and facilitators for obtaining diagnoses and gaining access to services.

Gaining Access to Services

Positive experiences with educators, administrators, and service providers in the school were often facilitated by factors such as advocacy and partnership. Perceived barriers associated with services in schools included limited teacher training and experience. Three out of 11 mothers who participated in this study were receiving various types of home and community-based services for their children (e.g., play therapy, ABA therapy, social skills group), on average, for three hours per week. The primary service these families received in the community was social skills groups. In addition, those mothers of children with ASD who live in rural areas of the state expressed more difficulties with accessing community services than those who live in urban areas.
Recommendations

The participants provided various recommendations for educators, healthcare providers, and parents to better address the needs of families of children with ASD. Their primary recommendations suggest that educators and healthcare providers need more training and experiences specific to ASD. Mothers emphasized the point that learning about ASD is not enough and experience is crucial. Moreover, the mothers suggested that parents need more training and support. These recommendations support the previous work of Gourdine and colleagues (2011) that suggests that African American parents need more opportunities to access information on ASD, and HCPs need more training (Zuckerman et al., 2013).

Finally, mothers suggested that all service providers be more receptive to the voices and concerns of African American parents of children with ASD. The recent work of Zuckerman and colleagues (2015) based on their nationally representative sample of children with ASD, indicates that diagnosis is delayed by as much as three years after the first parental conversation with the healthcare provider. The findings from the current study corroborate previous work that suggests that (a) many families of children with ASD and other developmental disabilities from minority and non-minority backgrounds face difficulties finding competent and trustworthy practitioners and want them to show more concern (Reichard, et al. 2004; Zuckerman, Lindly, & Sinche, 2015), and (b) there is a need for more support for HCPs to be better prepared to provide earlier diagnoses that will help young children with ASD and their families gain access to early intervention.

Limitations and Implications

Limitations. The primary limitation in this study was that participants were all mothers, and not representative of the SES and marital status of African American families overall. Future studies should aim to recruit more representative families. Moreover, this study was based solely on mother’s reports, which may have influenced the accuracy of results (e.g., the number of services received in school). A review of IEPs and other school documents might be helpful in addressing this limitation in future studies. Finally, this study focused specifically on the experiences of African American mother’s of children with ASD. The interviews from this study provide rich information about the lived experiences specific to these families. Therefore, comparisons cannot be drawn about the differences in diagnoses and access to services between African American families of children with ASD, and families from other racial backgrounds. It does, however, elucidate the voice of African American parents of children with ASD, little of which has been done in the literature to date.

Implications for research. Given these limitations, future research in this domain should: (a) include a larger sample of African American parents of children with ASD from various locations across the country, (b) include interviews with African American fathers of children with ASD, (c) explore pliant barriers and facilitators (i.e., those barriers in some families, that may be facilitators for others), and (d) include interviews with educators, HCPs, and service providers to gain their perspective on providing services for African American children with ASD and their families. Future research might also employ additional sources of information such as IEP or teacher reports.

Participants in this study identified a number of facilitators for accessing services and coping with challenges (e.g., advocacy, collaborative partnerships with professionals, and identifying and tapping into sources of support). Future intervention research should aim to develop and examine the effectiveness of parent-advocacy trainings that (a) embed empowerment practices as a component of the intervention, (b) emphasize advocacy, partnerships with professionals, and knowledge of ASD (e.g., social communication strategies) as tools for gaining access to services, and (c) rely on a sociocultural theoretical approach whereupon African American families can engage with each other, share knowledge of resources, share experiences, help brainstorm, and troubleshoot challenges related to their experiences as parents of children with ASD through critical reflection and discussion (Baumgartner, 2001).
Implications for practice. First, the findings from this study indicate that there is a need for more positive partnerships between healthcare providers and African American parents. Second, African American parents and extended family members should receive more training and education to increase (a) their knowledge and awareness of ASD, (b) their knowledge of available services for children with ASD, and (c) their knowledge and skillset for effective advocacy. ASD occurs once in every 68 children (CDC, 2016) and, although the prevalence is consistent across racial and ethnic backgrounds, the reported incidence of ASD is not. Participants in this study indicated that they and their family members were sometimes unfamiliar with ASD and didn’t realize the frequency with which it occurs in the African American community. Therefore, news and media sources should aim to be more representative by showing the faces and sharing the voices and experiences of African American families of children with ASD. It is plausible that this exposure will not only increase awareness, but also enable family members to feel more empowered and able to advocate for their children, even when healthcare providers fail to provide timely and accurate diagnoses.

This study extends the research on ASD in African American children by elaborating on the findings from correlational designs and highlighting the lived experiences of these families. In addition, unlike previous research in this domain, this study highlights facilitators, in addition to barriers to obtaining diagnoses and gaining access to services. Having better knowledge of both facilitators and barriers alike could potentially shape future practices.

Conclusion. The findings from this study support previous research that suggests that African American parents face difficulties with healthcare providers who either have limited knowledge of ASD (Zuckerman et al., 2013) or are not responsive to parental concerns related to ASD or disability (Zuckerman et al., 2015). This points to the need for more HCP training not only specific to the characteristics of ASD, but training that also better prepares providers to respond appropriately to parental concerns. The findings from this study also add to existing literature by sharing the voices and untold experiences of 11 African American mothers of children with ASD. Future practice around diagnoses and services for children with ASD should aim to prepare (a) knowledgeable (in regards to ASD) and responsive healthcare providers, (b) experienced and responsive educators and service providers, and (c) strong parent advocates, who together, can address the needs specific to African American children with ASD and their families.

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Response Interruption and Redirection (RIRD) as a Behavioral Intervention for Vocal Stereotypy: A Systematic Review

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Abstract: Response interruption and redirection (RIRD) is an intervention that involves presenting demands or other types of distracters to interrupt an interfering behavior and redirect it to a more appropriate response. It targets the decrease of repetitive, stereotypic, and self-injurious behaviors. Research indicates that stereotypy is commonly maintained by automatic reinforcement (Rapp & Vollmer, 2005). Ahearn, Clark, MacDonald, and Chung (2007) were the first to evaluate the use of RIRD as a behavioral intervention for vocal stereotypy. Due to the success of RIRD as being the one behavioral intervention that not only decreases vocal stereotypy but may increase engagement in appropriate vocalizations the authors chose to examine additional studies that have used RIRD to address vocal stereotypy in children with autism in order to see if the replication and expansion of RIRD has continued to produce support for this intervention. Ten single-subject design studies were identified between 2000 and 2016. With such a limited number of studies, all showing positive results, future research should focus on replicating and expanding RIRD as a behavioral intervention to address vocal stereotypy in children with autism.

Individuals diagnosed with autism spectrum disorder (ASD) often engage in stereotypic behavior which is defined as a repetitious behavior that does not serve a clear function for the individual engaging in it (Boyd, McDonough, & Bodfish, 2012). The current diagnostic criteria for ASD classify stereotypic behaviors exhibited in autism into three categories, including stereotyped or repetitive speech, stereotyped or repetitive motor movements, and stereotyped or repetitive use of objects (American Psychiatric Association, 2013). One of the subcategories that falls under stereotyped or repetitive speech is repetitive vocalizations which includes repetitive guttural sounds, intonation noise-making, and repetitive humming (American Psychiatric Association, 2013). Vocal stereotypy is a repetitive behavior that involves utterances that are considered to be contextually inappropriate (Falcomata, Roane, Hovanetz, & Kettering, 2004), purposeless sounds (Cook, Rapp, Gomes, Frazer, & Lindblad, 2014), persistent vocalizations (Anderson & Le, 2011), unintelligible speech (Rapp, Patel, Ghezzi, O’Flaherty, & Titterington, 2009), and/or words and phrases that are non-conversational (O’Connor, Prieto, Hoffmann, DeQuinzio, & Taylor, 2011).

Stereotypy may interfere with the acquisition of functional or academic skills and can be disruptive to home and school environments (MacDonald et al., 2007; Wunderlich & Vollmer, 2015). MacDonald et al. (2007) and colleagues compared stereotypic behavior in children with autism and typically developing children all between the ages of 2 and 4 years. While typically developing children tend to produce contextually appropriate vocalizations, their peers with autism were apt to emit repetitive and non-contextual vocalizations. Results indicated that children with autism displayed substantially higher levels of stereotypic behavior than their same age peers. Hence, decreasing the levels of vocal stereotypy in individuals with autism was identified as a goal of high priority (MacDonald et al., 2007).
Research has shown that most stereotypic behaviors serve an automatic function (Rapp & Vollmer, 2005). According to Rapp and Vollmer, there are at least five sources of evidence to support the notion that stereotypy is maintained by automatic positive reinforcement including studies that show stereotypy persists in the absence of social consequences, environmental enrichment is correlated with reductions in stereotype, and restricting access to or providing prior access to stereotypy results in subsequent increases or decreases in stereotypy (p. 530). Thus, the automatic consequence of vocal stereotypy warrants thoughtful planning, because it cannot be interrupted through physical blocking (Ahrens, Lerman, Kodak, Worsdell, & Keegan, 2011). Reducing the occurrences of vocal stereotypy, which interferes with instructional time and social opportunities, may lead to significant positive outcomes for children with autism (Taylor, Hoch, & Weissman, 2005).

Over the years, many interventions have been used in an attempt to decrease vocal stereotypy through different approaches such as self-management (Mancina, Tankersley, Kamps, Kravits, & Parrett, 2000), auditory stimulation (Lanovaz, Rapp, & Ferguson, 2013), overcorrection (Anderson & Le, 2011), appropriate alternative verbal behavior (Colon, Ahearn, Clark, & Malsasky, 2012), and verbal reprimands (Cook et al., 2014). Some of these interventions have shown effectiveness in decreasing vocal stereotypy, yet a lot of them still lack the sufficient replication of research to be considered evidence-based treatments (Mulligan, Healy, Lydon, Moran, & Foody, 2014).

In a review conducted by Rapp and Vollmer (2005), they examined behavioral interventions that were used to treat stereotypy into two categories, antecedent manipulations and consequent manipulations. For purposes of their review, the authors "adopted the descriptors of movement invariance and movement repetition to categorize behavior of humans, which generally persists in the absence of social consequences, as stereotyped or stereotypic" (p. 529). Interventions categorized under antecedent manipulations included the use of multi-sensory stimulation, engagement in physical exercise, and matched stimulation. Sensory extinction, displacement of reinforcement, differential reinforcement, punishment and inhibitory stimulus control were all procedures classified under consequent manipulations. A short-term reduction in stereotypic behavior was reported in both categories. Previously, LaGrow and Repp (1984) had reported that antecedent based interventions were less effective for reducing stereotypy than consequent based interventions, but DeLeon and Iwata (1996) suggested that the expanded technology of stimulus preference assessment may have contributed to the effectiveness of antecedent based interventions.

Expanding on the work of Rapp and Vollmer (2005), Lanovaz and Sladeczek (2012) published a review that specifically focused on reducing vocal stereotypy in individuals with ASD using behavioral interventions with an emphasis on the applicability of the procedures in the natural environment. The term vocal stereotypy was defined as "any repetitive sounds or words produced by an individual’s vocal apparatus that are maintained by nonsocial reinforcement" (p. 36). The behavioral interventions were divided into antecedent- and consequence-based strategies. Antecedent-based treatments included non-contingent reinforcement, matched and unmatched stimulation, physical exercise, and visual cues. Consequence-based treatments included differential reinforcement for other behavior (DRO), response interruption/redirection (RIRD), verbal reprimands, contingent demands, and response cost. Findings revealed that many behavioral treatments, such as non-contingent reinforcement and response cost, have been successful at decreasing vocal stereotypy. However, RIRD has been the only behavioral treatment that could decrease the occurrences of vocal stereotypy as well as increase the occurrences of appropriate vocalizations. The study recommended using RIRD when developing an intervention for decreasing vocal stereotypy, but it was noted that the frequent prompting that is required might limit its applicability in some environments (Miguel, Clark, Tereshko, & Ahearn, 2009).

RIRD is an intervention that involves presenting demands or other types of distracters to interrupt an interfering behavior and redirect it to a more appropriate response. It targets the decrease of repetitive, stereotypic,
and self-injurious behaviors. Ahearn, Clark, MacDonald, and Chung (2007) were the first to evaluate the use of RIRD as a behavioral intervention for vocal stereotypy, and their study will be discussed later in the review. RIRD is most effective at reducing behaviors that are maintained by automatic reinforcement (Wong et al., 2014).

Due to the success of RIRD as being the one behavioral intervention that not only decreases vocal stereotypy but increases engagement in appropriate vocalizations (e.g., Ahearn et al., 2007), the authors chose to examine additional studies that have used RIRD to address vocal stereotypy in children with autism in order to see if the replication and expansion of RIRD has continued to produce support for this intervention. To date, two reviews were identified that examined vocal stereotypy and behavioral interventions (Lanovaz & Sladeczek, 2012; Rapp & Vollmer, 2005), but no reviews were identified that examined the literature using RIRD or a combination of interventions including RIRD to address vocal stereotypy.

Method

Literature Search Procedures

The following search procedures were used to retrieve relevant studies for the review. First, a computer-assisted search of three major databases was conducted including Academic Search Complete, PsycINFO, and Education Research Complete from 2000 to 2016. The following descriptors were used: autism, autism spectrum disorder (ASD), Asperger Syndrome, vocal stereotypy, response interruption, and redirection. Second, a hand search of relevant articles was conducted. Third, a hand search of reference lists and tables of content of relevant journals was completed.

Criteria for Inclusion

The five main criteria for inclusion in the literature review included: (a) articles published between 2000 and 2016 in English; (b) studies that focused on using RIRD as treatment for vocal stereotypy; (c) studies that focused on using RIRD as treatment for vocal stereotypy and motor stereotypy (data was disaggregated for vocal stereotypy); (d) individuals included in the study were classified as having autism; and (e) only intervention studies were included (used either a group experimental, a quasi-experimental design, or a single-subject design).

Although additional studies were identified, they were excluded if: (a) the focus was on motor stereotypy (e.g., Lang et al., 2010; Pastrana, Rapp, & Frewing, 2013); (b) the focus was on the influence of measurement and data analysis procedures on RIRD outcomes (e.g., Carroll, & Kodak, 2014; Wunderlich & Vollmer, 2015); or (c) if the treatment for vocal stereotypy did not include RIRD (e.g., Athens, Vollmer, Sloman, & Pipkin, 2008; Taylor et al., 2005).

Coding Instrument

A coding system was developed to identify and summarize the procedures and the effectiveness of RIRD in each study. The coding system included variables in the following areas: (a) introduction (e.g., study ID, author, year, study design); (b) sample characteristics (e.g., demographic information about the participants); (c) intervention characteristics (e.g., setting, intervener, dependent variables, intervention); and (d) study outcomes (e.g., findings reported by the researcher).

Ten studies, including one with two experiments were identified during the period from 2007 to 2015 in the following journals: Behavioral Interventions, Journal of Applied Behavior Analysis, and Behavior Modification. A total of 24 participants with autism were included in these studies with a mean age of 6.9 years and ranging from 3 to 12 years of age). All 11 studies included in the review employed a single-subject design. Table 1 provides a synthesis of the studies.

RIRD as an Intervention

In 2007, Ahearn et al. was the first study identified to examine the effects of RIRD on vocal stereotypy in children with ASD. The participants were a 3-year-old boy, an 11-year-old boy, and 7-year-old twin girls diagnosed with ASD. Results of the functional analysis conducted suggested that the participants’ vocal stereotypy was maintained by automatic rein-
<table>
<thead>
<tr>
<th>Citation</th>
<th>Participants</th>
<th>Design</th>
<th>Intervention</th>
<th>Results</th>
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</thead>
<tbody>
<tr>
<td>Ahearn, Clark, MacDonald, &amp; Chung, B. (2007)</td>
<td>$N=4$ Autism, Ages 3, 7 &amp; 11</td>
<td>ABAB Design</td>
<td>Vocal RIRD</td>
<td>Substantial decrease in VS; increase in AV; effective in the natural environment</td>
</tr>
<tr>
<td>Ahrens, Lerman, Kodak, Worsdell, &amp; Keegan (2011)</td>
<td>$N=2$ Autism, Ages 4 &amp; 6</td>
<td>Combined reversal and multielemental design</td>
<td>Vocal RIRD, motor RIRD</td>
<td>Decrease in VS; increase in AV; termination of demands contingent on responses is not required for treatment effectiveness</td>
</tr>
<tr>
<td>Experiment #1</td>
<td></td>
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<tr>
<td>Ahrens, Lerman, Kodak, Worsdell, &amp; Keegan (2011)</td>
<td>$N=2$ Autism, Ages 4 &amp; 5</td>
<td>Combined reversal and multielemental design</td>
<td>Vocal RIRD, motor RIRD</td>
<td>Decrease in VS; increase in AV; termination of demands contingent on responses is not required for treatment effectiveness; motor RIRD slightly more effective than vocal RIRD at decreasing</td>
</tr>
<tr>
<td>Colon, Ahearn, Clark, &amp; Masalsky (2012)</td>
<td>$N=3$ Autism, Ages 8 &amp; 10</td>
<td>Multielement design</td>
<td>Verbal operant training, vocal RIRD</td>
<td>Verbal operant training alone increased AV, but did not produce significant decrease in VS; RIRD produced socially significant decrease in VS</td>
</tr>
<tr>
<td>Dickman, Bright, Montgomery, &amp; Miguel (2012)</td>
<td>$N=1$ Autism, Age 5</td>
<td>ABABCBC reversal design</td>
<td>Vocal RIRD, Differential Reinforcement for incompatible behavior (DRI)</td>
<td>RIRD alone resulted in slightly lower rate of VS and an increase in AV; RIRD+DRI resulted in a significant decrease in VS and an increase in AV</td>
</tr>
<tr>
<td>Duffy-Cassella, Sineder, Sidener, &amp; Progar (2011)</td>
<td>$N=2$ Autism, Ages 4 &amp; 7</td>
<td>ABAB reversal design</td>
<td>Motor RIRD</td>
<td>Substantial decrease in VS</td>
</tr>
<tr>
<td>Liu-Gitz &amp; Banda (2010)</td>
<td>$N=1$ Autism, Age 10</td>
<td>ABAB reversal design</td>
<td>Vocal RIRD</td>
<td>Decrease in VS</td>
</tr>
<tr>
<td>Love, Miguel, Fernand, &amp; LaBrie (2012)</td>
<td>$N=2$ Autism, Ages 8 &amp; 9</td>
<td>Multitreatment reversal design</td>
<td>Vocal RIRD, Matched Stimulation (MS)</td>
<td>Increase in AV; decrease VS, RIRD+MS produced lower VS for one participant</td>
</tr>
<tr>
<td>Miguel, Clark, Tereshko, &amp; Ahearn (2009)</td>
<td>$N=1$ Autism, communication delay, Age 4</td>
<td>ABABC reversal design</td>
<td>Vocal RIRD, Sertraline</td>
<td>RIRD decreases VS and increases AV; Sertraline does not lower the frequency of VS</td>
</tr>
<tr>
<td>Schumacher &amp; Rapp (2011)</td>
<td>$N=2$ Autism, Ages 5 &amp; 8</td>
<td>Multielement design</td>
<td>Vocal RIRD</td>
<td>Immediate decrease in VS; withdrawal of RIRD did not produce subsequent increase in VS</td>
</tr>
<tr>
<td>Shawler &amp; Miguel (2015)</td>
<td>$N=5$ Autism, Age 5, 6, 7, &amp; 12</td>
<td>Multielement design</td>
<td>Vocal RIRD, motor RIRD</td>
<td>Both methods decrease VS and increase AV</td>
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*Note:* VS = vocal stereotypy; AV = appropriate vocalizations.
forcement. Using an ABAB design, RIRD sessions were conducted in a room with only a table and chairs. During the treatment session, the teacher provided a vocal demand for the child contingent on the occurrence of vocal stereotypy. The demands provided for each child were skills that he/she mastered which included answering a social question (e.g. “What’s your name?”), or performing vocal imitation (e.g. “say ball”). The teacher stopped providing vocal demands after the child performed three consecutive correct responses of appropriate language, which were followed by praise. The teacher delivered reinforcement whenever a participant used appropriate vocalizations in the form of praise or requested item. The results suggested that vocal stereotypy may be able to be decreased through RIRD and that an increase in appropriate vocalizations may be an added benefit of the treatment.

In 2010, Liu-Gitz and Banda replicated the RIRD strategy developed by Ahearn and colleagues (2007) with a 10-year-old student with autism who displayed vocal stereotypic behavior in a special education classroom. A functional analysis revealed that the problem behavior was possibly maintained by automatic reinforcement. Thus, an ABAB reversal design was used to determine the effectiveness of implementing RIRD to decrease vocal stereotypy. The classroom teacher implemented the intervention sessions during the classroom activities. Contingent on the occurrence of vocal stereotypy, the classroom teacher called the student’s name and delivered vocal demands. Responses to demands were immediately followed by praise. The delivery of demands was discontinued after two or three responses. The results showed that the procedure reduced the vocal stereotypy of the student and increased appropriate vocalizations. In addition, the teacher indicated that the student was less resistant to academic tasks.

In order to further evaluate the effects of RIRD, Ahrens et al. (2011) assessed the effectiveness of using motor and vocal demands in RIRD to decrease vocal stereotypy and attempted to determine the behavioral principle responsible for the decreasing effect of RIRD. Two experiments using a combined reversal and multi-element design were conducted. Functional analyses conducted prior to the study suggested that the behavior was maintained by automatic reinforcement. The children participating in the first experiment were a 6-year-old and a 4-year-old boy with ASD. One of the participants' session was conducted in his bedroom while the other sessions were conducted in a treatment room with table, chairs, and preferred items.

For vocal RIRD, the therapist provided a vocal demand whenever the child emitted vocal stereotypy and waited 5 seconds for the child to respond. The therapist continued to present demands until three consecutive demands were delivered without the child engaging in vocal stereotypy. Correct responses were followed by praise; however, responses from the child were not necessary for ending the delivery of demands.

Next, the therapist used RIRD with motor demands. Motor demands were instructions that required motor responses such as “stand up” and “clap hands”. The therapist presented a motor demand and waited 5 seconds for the child to respond. If he did not perform the response within 5 seconds from the delivery of the prompt, the therapist physically guided him to perform it. Correct responses, whether prompted or not, were followed by praise. The delivery of demands stopped after the child performed three consecutive correct responses without emitting vocal stereotypy. During treatment sessions, appropriate vocalizations were followed with the requested item or the therapist’s attention. The treatment sessions were divided equally between vocal RIRD and motor RIRD. Both conditions of RIRD increased appropriate vocalizations and decreased vocal stereotypy. The increase in appropriate vocalizations in both conditions indicated that motor demands could be as effective as vocal demands at achieving this result. Also, the decrease in the level of stereotypy indicated that not responding to RIRD demands did not influence the effectiveness of the treatment. Moreover, the authors concluded that RIRD worked as a punishment procedure for the participants since both conditions demonstrated similar effectiveness at reducing vocal stereotypy.

The participants in the second experiment included two boys, ages 4 and 5 years of age with ASD. Their sessions were conducted in a room at a day-treatment center. In this exper-
iment, vocal and motor stereotypies were targeted using the same procedure implemented in the first experiment. The only difference was that the time between each prompt was two to three seconds instead of five. Results concerning vocal stereotypy revealed that both RIRD conditions were effective in decreasing vocal stereotypy and increasing appropriate vocalizations which further suggests that RIRD functions as a punishment procedure. Motor RIRD produced a slightly lower level of vocal stereotypy than vocal RIRD. The higher effectiveness of motor RIRD may be due to the fact that motor demands are stronger punishers than vocal ones.

In 2011, Duffy-Cassella, Sidener, Sidener, and Progar focused on systematically replicating and extending Ahearn et al.’s 2007 study by examining the effects of using RIRD directions that required motor responses to decrease the vocal stereotypy of two boys with autism, age 4 years 11 months and 7 years 2 months, respectively. Functional assessments used prior to the study suggested an automatic reinforcement function. Using an ABAB reversal design, the sessions were conducted with an experimenter and took place in the participants’ schools. The method involved calling the child’s name, establishing eye contact, and presenting directions for motor responses following the occurrence of vocal stereotypy. If the child did not perform the response within 5 seconds from the delivery of the direction or performed it incorrectly, the experimenter provided a model for the desired response. If the response did not occur within 5 seconds from the delivery of the model, the child was physically guided to perform it. Each correct response was followed by behavior-specific praise. RIRD trials were discontinued after the child performed three consecutive correct responses, whether prompted or not, without engaging in vocal stereotypy. Demanding motor response in RIRD to decrease vocal stereotypy proved to be effective for both participants. However, there was no increase in appropriate vocalizations as found in the Ahearn et al. 2007 study.

After previous research, as reported above, revealed some positive results in decreasing vocal stereotypy using RIRD in students with autism, Schumacher and Rapp (2011) evaluated whether or not there were lasting effects once the RIRD treatment was extinguished. Thus, Schumacher and Rapp examined the effectiveness of RIRD in decreasing vocal stereotypy and whether the level of vocal stereotypy increases after withdrawing the treatment. The participants in the study included a 5-year-old girl and an 8-year-old boy with ASD. Using a multi-element design, their treatment sessions were implemented in a home-based therapy room. During the RIRD treatment, the therapist presented vocal demands, selected randomly from a prearranged set of options whenever the child engaged in vocal stereotypy. The therapist continued to present vocal demands, such as “What is your name?” or “How old are you?”, until the child performed three consecutive correct responses without engagement in vocal stereotypy. During the no-interaction sequence the therapist was present in the room but did not interact with the participant. Results revealed that RIRD was effective at reducing engagement in vocal stereotypy and its withdrawal did not lead to a subsequential increase in its level of occurrence.

In the most recent and final study identified using RIRD as the only behavioral intervention, Shawler and Miguel (2015) used a multiple treatment reversal design to compare the effects of both motor and vocal RIRD procedures on vocal stereotypy as well as their associated effects on appropriate vocalizations. An abbreviated functional analysis was conducted to verify whether stereotypy was present in the absence of social contingencies. Five children with ASD between the ages of 5 and 12 years of age participated in the study. For vocal RIRD, the participants were given access to preferred items. Whenever the child emitted vocal stereotypy, the experimenter removed the item and called the child’s name to gain his/her attention and initiate eye contact. Three consecutive correct responses to vocal demands, without engagement in vocal stereotypy, were required to terminate RIRD trials. Instances of appropriate language were followed by praise. Other than presenting motor demands instead of vocal ones, motor RIRD involved the same procedure as vocal RIRD. These demands included either gross motor imitations or following directions, such as ‘Touch your nose’ and ‘Clap your hands.’ Results showed that both motor and vocal RIRD were effective
at decreasing vocal stereotypy and increasing appropriate vocalizations for all the participants except for one. Results also indicated that motor RIRD could also lead to an increase in appropriate vocalizations.

**RIRD with Combined Treatments**

Because of the number of children with autism on medication and the success of RIRD, it is not surprising that Miguel et al. (2009) were interested in examining the effects of RIRD combined with medication. Specifically, Miguel et al. explored the effects of RIRD with and without sertraline, an antidepressant, on automatically maintained vocal stereotypy of a 4-year-old child with ASD. The functional analysis conducted suggested that the participant’s stereotypy was maintained by automatic reinforcement. Using an ABABC reversal design, the treatment sessions were conducted with an experimenter in a room in the participant’s school where preferred items were present. A was sertraline only, B was RIRD plus sertraline, and C was RIRD only. During the sessions where sertraline was presented with RIRD, the child took 10 mg of sertraline daily. Moreover, whenever the child engaged in vocal stereotypy, the item that the child was engaged in was removed and vocal imitation demands were presented until he performed three correct responses without vocal stereotypy. The experimenter delivered praise after correct vocal imitations, while correct mands were followed by praise and the requested items. Sessions where only RIRD was implemented were similar except that the medication doses were faded out. The results revealed that sertraline was not effective in reducing vocal stereotypy while RIRD was successful at decreasing vocal stereotypy and increasing appropriate language. It also showed that vocal stereotypy did not return to its previous level when sertraline was removed.

There has also been research suggesting that skill acquisition; specifically verbal operant training (Skinner, 1957) may increase appropriate verbal behavior while decreasing inappropriate verbal behavior (Morrow & Foxx, 1986). Thus, Colon et al. (2012) sought out to explore whether verbal operant training could produce the same results without using RIRD. A non-concurrent multiple baseline design across participants was used to analyze the effects of verbal operant training, while a reversal design was used for implementing RIRD. Results of a functional analysis supported the hypothesis that vocal stereotypy was supported by automatic reinforcement. The experiment was conducted with two 10-year-old boys and one eight-year-old girl with ASD in a therapy room. The sessions initially consisted of verbal operant training of teaching tacts and mands to all three participants. Although vocal stereotypy continued to occur throughout the training, two of the students continued to emit high levels of vocal stereotypy, so RIRD was implemented. During the RIRD component, every occurrence of vocal stereotypy was followed by prompts for emitting tacts. The experimenter continued to deliver prompts until the child emitted three consecutive correct tacts without engagement in vocal stereotypy. Instances of appropriate vocalizations were followed by praise.

Results showed that verbal operant training increased the participant’s appropriate vocalizations but was not as effective in producing a socially significant decrease in vocal stereotypy for two of the participants. Following their verbal operant training, the two participants received RIRD procedures, which was effective at producing a socially significant decrease in their vocal stereotypy.

In 2012, Love, Miguel, Fernand, and LaBrie hypothesized that since vocal stereotypy may occur quite frequently, it may be possible to decrease the motivating operation for engaging in stereotypy through the presentation of a MS, and therefore, be more effective than just RIRD alone. Love et al. (2012) used a multi-treatment reversal design to examine the effects of RIRD alone, Matched stimulation (MS) alone, and MS combined with RIRD on vocal stereotypy. Two children diagnosed with ASD participated in the study. The sessions of the 8-year-old participant were conducted in his bedroom while the sessions of the 9-year-old participant were conducted in a treatment room. Throughout the RIRD and MS sessions, the experimenter provided an access to one of two preferred items that produced auditory stimulation. If the child produced vocal stereotypy, the experimenter removed the item, called the child’s name, and presented vocal demands. After responding to
three consecutive demands without producing vocal stereotypy, praise was delivered and the item was returned. RIRD alone sessions were implemented in the same manner, except that the two preferred items used did not produce auditory stimulation. One of the participants’ results showed a similar level of decrease in vocal stereotypy across conditions while the other participant showed a lower level of vocal stereotypy during the RIRD plus MS condition. For both participants, the frequency of appropriate vocalizations increased when RIRD was part of the condition.

Further, a study conducted by Dickman, Bright, Montgomery, and Miguel (2012) tested the relation between vocal stereotypy and appropriate vocalization by implementing RIRD and differential reinforcement of incompatible behavior (DRI). The completion of a functional analysis suggested that the vocal stereotypy was maintained by automatic reinforcement. Using an ABABCBC reversal design, the implementation included A consisting of baseline, B consisting of RIRD, and C consisting of RIRD plus DRI. The sessions were implemented with a 5-year-old child with autism in his bedroom. During the RIRD alone condition, the child was seated at a table and engaging in an activity. Contingent on the occurrence of vocal stereotypy, the experimenter blocked access to the activity, called the child’s name until eye contact was established, and issued demands that required vocal responses. Demands were discontinued after three consecutive responses were obtained without engagement in vocal stereotypy. Praise was delivered following the occurrence of appropriate vocalizations and correct responses to demands.

The RIRD plus DRI condition involved the same procedure implemented in RIRD alone with the addition of using token economy for appropriate vocalizations. Before the beginning of the session, the child was informed that he would receive a star for every time he uses “nice words” and that each star could be exchanged for candy after the session was over. The use of RIRD alone increased appropriate vocalization, but did not result in substantial reduction in vocal stereotypy while RIRD and DRI combined resulted in significant decrease in vocal stereotypy and a higher frequency of appropriate vocalization.

Results and Discussion

The purpose of this literature review was to examine the research that has explored the effectiveness of using RIRD as a treatment for vocal stereotypy in children with autism. Unlike motor stereotypy, physical blocking is not an option for vocal stereotypy. Ahearn and colleagues (2007) first described the RIRD procedures and while six of the studies included in the review focused on using RIRD as the intervention, four of the studies combined the RIRD procedures with other interventions, such as medication (Miguel et al., 2009), verbal operant training (Colon et al., 2012), matched simulation (MS); (Love et al., 2012), and differential reinforcement of incompatible behaviors (DRI); (Dickman et al., 2012).

RIRD – Results of Vocal, Motor, and Combined

Three of the six studies (Ahearn et al., 2007; Lui-Gitz & Banda, 2010; Schumacher & Rapp, 2011) implemented vocal RIRD procedures. In 2007, Ahearn et al. reported a decrease in vocal stereotypy and an increase in appropriate vocalizations. Extending on this research, Lui-Gitz and Banda (2010) reported a decrease in vocal stereotypy while the teacher indicated that the participant’s appropriate vocalizations had improved. Schumacher and Rapp (2011) reported success with decreasing vocal stereotypy, but no increase in appropriate vocalizations. They also noted that withdrawal of the RIRD procedures did not lead to an increase in its level of occurrence.

Additionally, one of the six studies (Duffy-Cassella et al., 2011) implemented motor RIRD procedures while two of the six studies (Ahrens et al., 2011; Shawler & Miguel, 2015) implemented motor and vocal RIRD procedures. Duffy-Cassella et al. (2011) found that demanding a motor response in RIRD to decrease vocal stereotypy was effective, but contrary to the Ahearn et al. (2007) study, there was not an increase in appropriate vocalizations.

Ahrens et al. (2011) conducted two experiments comparing vocal RIRD and motor RIRD. Results showed a decrease in vocal stereotypy and a slight increase in appropriate vocalizations. Thus, the increase in appropriate vocalizations in both conditions indicated
that motor demands could be as effective as vocal demands at achieving this result. Ahrens et al. (2011) noted that the vocal and motor RIRD acted as a punisher. Shawler and Miguel (2015) reported the same results revealing that both vocal and motor RIRD were equally effective in reducing vocal stereotypy and increasing appropriate vocalizations and supported Ahrens et al. (2011) findings that RIRD is a punishment procedure.

In five of the six studies, the teacher/therapist also used social praise when participants produced appropriate vocalizations, while Schumacher and Rapp (2011) did not report that social praise was part of the RIRD procedures.

RIRD and Other Interventions

There were four studies, which implemented RIRD procedures in comparison with other interventions. These included medication (Miguel et al., 2009) verbal operant training Colon et al., 2012), MS (Love et al., 2012), and DRI (Dickman et al., 2012). While the medication was not effective in reducing vocal stereotypy (Miguel et al., 2009), the verbal operant training increased the participant’s appropriate vocalizations but was not as effective in producing a socially significant decrease in vocal stereotypy (Colon et al., 2012). When using MS as an intervention, findings revealed that using RIRD as part of the condition increased the frequency of appropriate vocalizations (Love et al., 2012). When comparing the use of RIRD and DRI, the use of RIRD alone increased appropriate vocalization, but did not result in substantial reduction in vocal stereotypy while RIRD and DRI combined resulted in a significant decrease in vocal stereotypy and a higher frequency of appropriate vocalization (Dickman et al., 2012).

With only ten studies identified between 2000 and 2016, it is clear that the research is very limited. This may seem surprising as the results of all ten studies suggest that RIRD may be successful in decreasing vocal stereotypy while showing an increase for more appropriate vocalizations. As Ahrens et al. (2011) noted that the research on treatments for vocal stereotypy is limited and even more so for the effectiveness of RIRD.

Overall, the findings from these 10 studies revealed RIRD is a promising intervention that can be used to decrease vocal stereotypical behavior for children with autism and increase more appropriate vocalizations. RIRD is considered a relatively nonintrusive intervention that can be easy to implement and may be considered as a possible option when reinforcement-based interventions alone are ineffective in reducing vocal stereotypy. Not only is further research needed, but questions about its effectiveness in educational settings, as well as, the possible lasting effects of RIRD on reducing vocal stereotypy and increasing appropriate vocalizations for children with autism need to be explored.

References

* denotes articles included in the review.


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Social Story Effectiveness on Social Interaction for Students with Autism: A Review of the Literature

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Abstract: Social stories frequently have been used to improve the social interaction of students with autism spectrum disorder (ASD). This literature review examines the effectiveness of social story interventions on the social interactions of students with ASD including with whom, where, and what formats have been implemented, as well as the methodological rigor of the research. Findings indicate preliminary evidence to suggest that social stories are a promising intervention to increase social interactions. Future research with methodological rigor is needed to reveal the most effective strategy for developing and implementing social story interventions.

Autism spectrum disorder (ASD) is characterized by deficits in social communication and/or social interaction across multiple contexts (American Psychiatric Association, 2013). Impairments in social interactions serve as a defining characteristic of individuals with ASD; deficits can range from mild to severe and may manifest as issues with integrated verbal and nonverbal communication, poor eye contact and body language, deficits in understanding and use of gestures, lack of facial expressions, and other nonverbal communication issues (American Psychiatric Association, 2013). The limited repertoires of social skills of students with ASD affect the ability to form and maintain friendships (Locke, Ishijima, Kasari, & London, 2010). For example, students with ASD are reported to have fewer friendships but have the desire to engage in relationships with others (Locke et. al., 2010). The importance of social skill development is critical. Such deficits may impede childrens’ development and increase the risk of social withdrawal and isolation (Matson, Dempsey & LoVullo, 2009). Children who are socially withdrawn may be rejected by peers thus impeding social inclusion (Kagohara et al., 2013). Their isolation likely will affect their overall educational experience (Delano & Snell, 2006).

Lack of appropriate social skills has been identified as a critical component of education programming; the Individuals with Disabilities Education Act (IDEA) has stressed that educational goals for children with ASD should include the development of social skills. Social interaction skills center on increasing the frequency of and competency in social interaction. Skills that may be taught can include initiating or responding to other students (verbally, physically, or gesturally), maintaining conversations, offering to help, asking and answering questions, requesting information from others, and interacting in games (Bellini, Peters, Benner, & Hopf, 2007).

Teachers, professionals, peers, and other adults can be very effective in promoting the social engagement of individuals with ASD by using specific intervention strategies (Barnard-Brak, Ivey-Hatz, Ward, & Wei, 2014). Strategies used have included behavioral interventions, modeling, peer training, pivotal response treatment, and scripting (National Autism Center, 2015). One strategy that is frequently used to modify the social engagement of students with ASD is social stories or story based interventions (National Autism Center, 2015).

Social stories are individualized short stories...
that describe situations, concepts, or social skills designed to increase the quality or quantity of social interactions of individuals having ASD with others. The stories describe and explain the cues in the social contexts as well as provide appropriate responses. The goal of a social story is to share relevant information that includes (but is not limited to) where and when a given situation takes place, who is involved, what is occurring, and why (Gray, 1998). Gray (1995) and other researchers (e.g., Hobson, 1993; Trevarthen, Atken, Pa-pudi, & Roberts, 1996) have proposed that the effectiveness of social story interventions is most consistent with the “theory of mind” (ToM) (Baron-Cohen, 1995) accounts of autism that suggest that individuals with ASD have difficulty understanding perspectives different from their own (Leslie, 1987). Theory of Mind (ToM) is described by Garfield, Peterson, and Perry (2001) as a broad umbrella term used to denote whatever knowledge guides prepositional attitude attribution and the explanation and prediction of behavior by means of inner states and processes. Difficulty in recognizing the thoughts of others may be problematic for individuals with ASD when interpreting social information.

Social stories are an inherently attractive instructional strategy because they are relatively easy to implement and are reported to be applicable to a wide variety of behaviors (Reynhout & Carter, 2006). Social stories were implemented for increasing social and daily-living skills (Agosta, Graetz, Mastropieri, & Scruggs, 2004; Bledsoe, Myles, & Simpson, 2003) and decreasing behaviors (Crozier & Tincani, 2005; Scattone, Wilczynski, Edwards, & Rabian, 2002).

There is a wide variety of ways that social stories have been constructed. Information in the social story can be presented with text and/or visual components (Gray & Garand, 1993). According to Gray’s (2010) social story guidelines, a social story should be individualized and consist of seven types of sentences: descriptive, perspective, affirmative, three types of sentences that coach and partial sentences. According to Gray (2010), the social story formula is complete when the total number of descriptive, perspective and affirmative sentences divided by the number of sentences that coach is equal or larger than two. In the story, descriptive, perspective, and affirmative sentences can be partially written. A partial sentence encourages the person with ASD to complete a given statement in terms of his or her perception of what will happen next or to make a guess regarding the responses of another person (Gray, 2010).

There have been concerns ascertaining the efficacy of social stories (Mayton, Menendez, Wheeler, Carter, & Chitiyo, 2013). Efficacy of an intervention can be represented in a number of ways, one of which is calculation of effect size. Effect size serves as an indication of the magnitude of the effect of the intervention. One calculation of effect size commonly used is the percentage of non-overlapping data (PND). PND provides the overlap between treatment and baseline phases by counting the number of data points in the treatment phase that exceed the highest data point of the baseline phases. Several meta-analyses have been conducted by researchers that report effect size. Two meta-analyses were conducted by Reynhout and Carter (2006, 2011) that provided a descriptive synthesis (16 and 62 studies, respectively) using the percentage of non-overlapping data (PND) and three different metrics (PND, percentage of data exceeding the median (PEM), and improvement rate difference (IRD)) to determine the effectiveness of the interventions.

Both of these studies questioned the effectiveness of social stories (M = 43% and M = 52% respectively). A meta-analysis conducted by Kokina and Kern (2010) that included 18 studies also used PND metric and reported questionable intervention effectiveness (M = 60%). Similarly, in their meta-analysis Test, Richter, Knight, and Spooner (2011) found that the PND scores for social story intervention effectiveness were questionable (M = 50%).

Measures other than PND have been introduced by researchers to examine effect size including percentage of all non-overlapping data (PAND), non-overlap of all pairs (NAP), IRD, and PEM. Of all the established effect size metrics most have problems for applied research such as having esoteric meanings, assuming data properties lacking in datasets, or encouraging oversimplified misinterpretations (Parker, Vannest, & Brown, 2009). Improvement rate difference (IRD) (Parker et
al., 2009) has been suggested to provide a comparison with better sensitivity, allowing for confidence intervals, and providing improvement rates between baseline and treatment phases.

Another component of efficacy is the quality of the research itself. In an effort to assess methodological rigor, the National Autism Center developed a Scientific Merit Rating Scale (SMRS). This scale involves five dimensions including research design, measurement of the dependent variable, measurement of the independent variable, participant ascertainment, and generalization and maintenance effects (NAC, 2015) to evaluate the strength of the intervention efficacy.

The purpose of this review is to examine the literature addressing the efficacy of social stories for improving the social interactions of students with ASD. The review includes analyses related to whom and where social stories have been used, and what format and implementation strategies have been employed. In addition to descriptive analyses, the efficacy of the interventions is reported using IRD metric as well as the SMRS to evaluate methodological rigor.

**Method**

**Search and Selection Procedures**

This review focused on studies published from 1993 to 2015. This time period was used because Gray and Garand developed the initial set of guidelines for creating social stories in 1993; accordingly, reviewing the literature of the past three decades permitted an integrated and comprehensive understanding of the literature.

A comprehensive search to locate articles for this literature review was conducted using a three-phase methodology: a key term search, a title and abstract review, and a check of articles’ reference lists. First, four electronic databases were searched: Lion Search, Education Resources Information Center (ERIC), PsycINFO, and ProQuest Education Journals. In order to maximize the yield of the database, multiple search terms were used. Intervention-related search terms included: social story, and social interaction, or social engagement, or socially appropriate behavior, and population-related search terms included: autism, or autism spectrum disorder, or Asperger syndrome, or Asperger’s disorder. Using these search terms, 325 articles were identified initially. The following criteria were used for inclusion in this review: (a) participants of the study were students with ASD, (b) the titles and/or abstracts contained the terms social interactions, or communication skills, or social engagement, or prosocial behavior, or social communication, or socially appropriate behavior, (c) the study was published in a peer-reviewed journal, and (d) the study was data-based and experimental. The articles were classified into relevant and non-relevant sets based on these inclusion criteria. Seventy-eight articles were identified; articles about storytelling, narrative therapy, social scripts and autism stories were excluded. In addition, studies based on the teachers’ and parents’ perceptions and unpublished dissertations were excluded from the review. Third, the reference lists of the chosen articles were reviewed to identify additional studies about social story interventions that also met the criteria. Consequently, 12 peer-reviewed journal articles (Barry & Burlew, 2004; Crozier & Tincani, 2007; Delano & Snell, 2006; Kagohara et al., 2013; Malmberg, Charlop & Gershfield, 2015; Norris & Dattilo, 1999; Sansotti & Powell-Smith, 2006, 2008; Scattone, 2008; Scattone, Tingstrom, & Wilczynski, 2006; Schneider & Goldstein, 2010; Thiemann & Goldstein, 2001) were identified for the literature review. As an inter observer agreement (IOA) for identified articles regarding if an article met the inclusion criteria, a doctoral student read all articles and confirmed that all studies met the inclusion criteria (100%).

**Effect Size**

The IRD metric was calculated by determining the exceeding data points in treatment phase over all baseline data points divided by the total number of improved data points in that phase while eliminating overlapping data points between phases. For this review, each data point from baseline and treatment phases were extracted from graphs using the data extraction application WebPlotDigitizer (Rohatgi, 2015). The article pages that contain the graphics were saved as JPEG format files and dragged into the application. After
adjusting the x and y axes of the graph, each data point was spotted on the application. Specified data then were imported into the online calculator developed by Vannest, Parker, and Groen (2011). According to Parker et al. (2009), the maximum IRD score is 1.00, while scores greater than .75 indicate very large effect sizes, scores between .70 and .75 indicate large, scores between .51 and .70 indicate moderate, and scores less than .50 indicate small effect sizes.

Methodological Rigor

The SMRS rating scale was used to evaluate the methodological rigor of studies. Per the SMRS guidelines, each study was evaluated on the five dimensions and assigned a score that ranged between 0 and 5, with 0 representing the poorest experimental rigor and 5 the strongest. The combined formula used to determine methodological rigor was as follows: research design (.30) + dependent variable (.25) + participant ascertainment (.20) + procedural integrity (.15) + generalization and maintenance (.10). Scores that were calculated as 3, 4, and 5 indicated sufficient scientific rigor permitting firm conclusions about the intervention effectiveness while scores of 2 indicated initial evidence with more rigorous research needed; scores of 0 and 1 provide insufficient scientific evidence to state whether any beneficial or harmful effects were evidenced (NAC, 2015). Generalization and maintenance are reported in the current review but an in depth discussion related to these variables are reported in Karal and Wolfe (in progress).

Reliability

Reliability calculations were completed by two raters. Two doctoral students served as independent calculators for IRD metrics and raters for SMRS coding. Reliability checks were completed on 100% of both IRD calculations and SMRS ratings. Each rater independently calculated IRD scores and coded each component for SMRS score reliability. The percentage of inter-rater agreement was calculated by dividing the number of agreement by number of agreement plus disagreement and multiplying by 100. Agreement rates were 91% for IRD metrics and 91.76% for SMRS scores.

Results

A summary of the descriptive information including gender, age, settings, study designs, independent and dependent variables is presented in Table 1. Table 2 provides the formats of the social stories, implementation methods, other strategies and investigation results with mean IRD scores. Table 3 includes the components and total SMRS scores.

Participants and Settings

Twelve peer-reviewed, single-subject studies involved 31 participants (27 males and four females). Thirty participants were identified as having ASD, while one participant was identified as language-impaired. The disability criteria for inclusion in the review were students with ASD. Three out of 22 students who were diagnosed with ASD were identified as having severe autism, and five were identified as having mild to moderate autism. Three students were diagnosed with Asperger syndrome (per DSM-IV categories). Only six of the studies (Kagohara et al., 2013; Malmberg et al., 2015; Sansotti & Powell-Smith, 2008; Scattone, 2008; Schneider & Goldstein, 2010; Thiemann & Goldstein, 2001) provided standardized data about the participants. In most instances, participants were given diagnostic labels of only either autism or ASD.

Four out of 12 studies (Delano & Snell, 2006; Norris & Dattilo, 1999; Scattone et al., 2006; Thiemann & Goldstein, 2001) provided information about participants’ reading abilities. The reported reading skills of participants in the studies ranged from those who were able to identify basic sight words (e.g., I, will, James) to those who read independently. Communication skills ranged from individuals who were non-verbal to individuals who were able to verbally communicate. Three participants diagnosed with severe autism were able to repeat any language spoken to them and had receptive language skills. Most of the students who were capable of speech and able to communicate verbally had difficulty with conversation skills and had impaired social communication skills. Eight studies (Crozier
<table>
<thead>
<tr>
<th>Reference</th>
<th>Participants</th>
<th>Gender</th>
<th>Age</th>
<th>Setting</th>
<th>Design</th>
<th>Independent Variables</th>
<th>Dependent Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barry &amp; Burlew (2004)</td>
<td>2 (1M and 1F) with severe Autism</td>
<td>7, 8</td>
<td></td>
<td>Play centers in general education classroom</td>
<td>Multiple baseline across participants</td>
<td>(2) Social Stories</td>
<td>Interacting with the materials and/or peers Choice making</td>
</tr>
<tr>
<td>Crozier &amp; Tincani (2007)</td>
<td>3 M with Autism</td>
<td>3, 3, 5</td>
<td></td>
<td>Kindergarten classroom</td>
<td>Case study with reversal design</td>
<td>(3) Social Stories</td>
<td>Sitting on the edge of the circular carpet, talking with peers, cooperating and sharing materials</td>
</tr>
<tr>
<td>Delano &amp; Snell (2006)</td>
<td>3 M with Autism</td>
<td>6, 6, 9</td>
<td></td>
<td>Play area of a resource classroom, open area between classrooms for</td>
<td>Multiple baseline across participants</td>
<td>(3) Social Stories (Two with pictures)</td>
<td>Saying one or more understandable words, directing gesture or movement toward a peer, responding verbal, gestural or movement response within 5 sec</td>
</tr>
<tr>
<td>Kagohara et al., (2013)</td>
<td>2 (1M and 1F) with Asperger Syndrome</td>
<td>10, 10</td>
<td></td>
<td>General education classroom</td>
<td>Multiple baseline across participants</td>
<td>(1) Social Story + (VM)</td>
<td>Partial and full greeting to staff members, researchers, and teachers</td>
</tr>
<tr>
<td>Malmberg, Charlop, &amp; Gershfeld (2015)</td>
<td>2 M with Autism</td>
<td>6, 8</td>
<td></td>
<td>University based research clinic</td>
<td>Multiple baseline across participants</td>
<td>(2) Social Stories</td>
<td>Offering to help, reciprocal commenting, empathic congratulatory statements, reciprocal questions</td>
</tr>
<tr>
<td>Norris &amp; Dattilo (1999)</td>
<td>1 F with Autism</td>
<td>8</td>
<td></td>
<td>In the work area, outside of her classroom</td>
<td>Case study with reversal design</td>
<td>(3) Social Stories</td>
<td>Initiating or responding to other students verbally, physically, or gesturally</td>
</tr>
<tr>
<td>Sansotti &amp; Powell-Smith (2006)</td>
<td>3 M with Autism</td>
<td>10, 11, 9</td>
<td></td>
<td>Fenced in area side of school</td>
<td>Multiple baseline across participants</td>
<td>(3) Social Stories</td>
<td>Sportsmanship behavior Maintaining conversation Joining in</td>
</tr>
<tr>
<td>Reference</td>
<td>Gender</td>
<td>Age</td>
<td>Setting</td>
<td>Design</td>
<td>Independent Variables</td>
<td>Dependent Variables</td>
<td></td>
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<tr>
<td>Sansotti &amp; Powell-Smith (2008)</td>
<td>3 M with Autism</td>
<td>6, 8, 9</td>
<td>Fenced in area side of school</td>
<td>Multiple baseline across participants</td>
<td>(3) Social Stories (Computer-Presented + VM)</td>
<td>Maintaining conversation Joining in</td>
<td></td>
</tr>
<tr>
<td>Scattone (2008)</td>
<td>1 M with Asperger Syndrome</td>
<td>9</td>
<td>Medical center</td>
<td>Multiple baseline across behaviors</td>
<td>(3) Social Stories (VM)</td>
<td>Looking at the interaction partner for 3 sec or more, grinning or laughing Any unprompted question or comment to the interaction partner</td>
<td></td>
</tr>
<tr>
<td>Scattone, Tingstrom &amp; Wilczynski (2006)</td>
<td>3 M with Autism</td>
<td>8, 8, 13</td>
<td>Classroom, School cafeteria, Area out of classroom</td>
<td>Multiple baseline across participants</td>
<td>(3) Social Stories</td>
<td>Initiating or responding to other students verbally, physically, or gesturally</td>
<td></td>
</tr>
<tr>
<td>Schneider &amp; Goldstein (2009)</td>
<td>3 M with Autism</td>
<td>10, 6, 5</td>
<td>Corner of computer room, hallway outside their classroom</td>
<td>Multiple baseline across participants</td>
<td>(3) Social Stories + pictures</td>
<td>Moving away from computer room and walking toward the line at the door, raising his hand and waiting to be called, following directions</td>
<td></td>
</tr>
<tr>
<td>Thiemann &amp; Goldstein (2001)</td>
<td>5 M (4 with Autism, 1 LI)</td>
<td>11, 7, 8, 6, 12</td>
<td>Media room in school library</td>
<td>Multiple baseline across behaviors</td>
<td>Social Stories + Written text cues</td>
<td>Securing attention, initiating comments, initiating requests, responding peers</td>
<td></td>
</tr>
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</table>

*Note.* VM = Video Modeling
<table>
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<tr>
<th>Reference</th>
<th>Format</th>
<th>Implementation</th>
<th>Other Strategies</th>
<th>Results</th>
<th>Mean</th>
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</thead>
<tbody>
<tr>
<td>Barry &amp; Burlew (2004)</td>
<td>Written + photos of participants, peers and their classroom NSS</td>
<td>Read by teacher</td>
<td>Verbal/gestural/physical prompting, corrective feedback, verbal praise</td>
<td>Need of prompts for choice making decreased and play minutes increased significantly</td>
<td>1.00</td>
</tr>
<tr>
<td>Crozier &amp; Tincani (2007)</td>
<td>Written + pictures SS</td>
<td>Read by teacher</td>
<td>Verbal prompting, Comprehension questions, Mayer-Johnson picture symbols</td>
<td>Prosocial behavior of two students increased</td>
<td>0.54</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Increase reported for other after changing the study design and adding prompting</td>
<td></td>
</tr>
<tr>
<td>Delano &amp; Snell (2006)</td>
<td>1 written 2 written + pictures NSS</td>
<td>Read by experimenter</td>
<td>Comprehension questions, peer training</td>
<td>Increase reported for two and gradual increase for one participant in frequency of target skills</td>
<td>0.68</td>
</tr>
<tr>
<td>Kagohara et al., (2013)</td>
<td>Computer-presented ESS</td>
<td>Viewed and read by student</td>
<td>Verbal prompting</td>
<td>Increases for both participants in frequency of greeting adults</td>
<td>0.50</td>
</tr>
<tr>
<td>Malmberg, Charlop, &amp; Gershfeld (2015)</td>
<td>Written + pictures NSS</td>
<td>Read by experimenter</td>
<td>Comprehension questions, Verbal prompting, Clipart pictures</td>
<td>Learning criterion was only achieved in the prompting conditions for both participants</td>
<td>0.22</td>
</tr>
<tr>
<td>Norris &amp; Dattilo (1999)</td>
<td>Written + pictures Randomized use of three different stories NSS</td>
<td>Read by student 4–5 times</td>
<td>–</td>
<td>No increase reported in social interaction, overall decrease in making noises (e.g., television sound effects, gagging, yelling)</td>
<td>0.35</td>
</tr>
<tr>
<td>Sansotti &amp; Powell-Smith (2006)</td>
<td>Written + pictures SS</td>
<td>Read by student</td>
<td>Verbal prompting, Mayer-Johnson pictures</td>
<td>Increases reported in social engagement for two of the three participants</td>
<td>0.62</td>
</tr>
<tr>
<td>Sansotti &amp; Powell-Smith (2008)</td>
<td>Computer-presented NSS</td>
<td>Viewed and read by student</td>
<td>Mayer-Johnson pictures, corrective feedback from participants and parents</td>
<td>All students indicated an significant increase in maintaining conversation and joining - in</td>
<td>0.71</td>
</tr>
<tr>
<td>Scattone (2008)</td>
<td>Written + videotaped Social story SS</td>
<td>Read and viewed by student</td>
<td>Comprehension questions</td>
<td>A significant increase reported for two of the social skills (eye contact, initiations, and smiling)</td>
<td>0.80</td>
</tr>
</tbody>
</table>
TABLE 1

<table>
<thead>
<tr>
<th>Reference</th>
<th>Implementation</th>
<th>Other Strategies</th>
<th>Results</th>
</tr>
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<tr>
<td>Scattone, Tingstrom &amp; Wilczynski (2006)</td>
<td>Written SS</td>
<td>Read by teacher to two students</td>
<td>Read by student</td>
</tr>
<tr>
<td>Schneider &amp; Goldstein (2009)</td>
<td>Written + visual symbols ESS</td>
<td>Read by teacher</td>
<td>Comprehension questions, Mayer-Johnson picture symbols</td>
</tr>
<tr>
<td>Scattone &amp; Dattilo, 1999; Sansotti &amp; Powell-Smith, 2006, 2008; Scattone, 2008; Scattone et al., 2006; Thiemann &amp; Goldstein, 2001</td>
<td>Written + visual symbols ESS</td>
<td>Read by teacher</td>
<td>Verbal prompting, Comprehension questions, Self-evaluation using video feedback</td>
</tr>
</tbody>
</table>

Note: SS = Social Story provided; ESS = Example of Social Story provided; NSS = No Social Story provided.
dents from two different studies (Scattone et al., 2006; Schneider & Goldstein, 2010) participated in different places than did the other participants in their studies due to their specific target behaviors. One treatment setting was in a quiet corner of the school’s computer room, and the other was in a school cafeteria after lunch.

Social Story Format and Implementation

Twelve peer-reviewed studies involved 34 social stories for 31 participants in total. There were variations in providing the story and the number of social stories used in the studies. Five out of twelve studies did not provide the stories in the studies (Barry & Burlew, 2004; Delano & Snell, 2006; Malmberg et al., 2015; Norris & Dattilo, 1999; Sansotti & Powell-Smith, 2008). Social stories were provided in their entirety in the appendices of four studies (Crozier & Tincani, 2007; Sansotti & Powell-Smith, 2006; Scattone, 2008; Scattone et al., 2006). Three studies that were conducted by Kagohara and her colleagues (2013) Schneider and Goldstein (2009) and Thiemann and Goldstein (2001) also provided examples of social stories. The study conducted by Norris and Dattilo (1999) used one social story per participant. Norris and Dattilo (1999) used three different randomly-selected social stories for the participant in order to maintain interest, targeting social interaction only. Scattone (2008) used three stories for three different target social skills for the participant.

In three studies (Kagohara et al., 2013; Scattone, 2008; Sansotti & Powell-Smith, 2008) the social story was presented on a computer. Sansotti and Powell-Smith constructed social stories with a PowerPoint which included similarly-aged peers as video models for the participants. In addition, two stories were presented in written formats, and five stories had pictures or photos to enhance the written information. Only one study (Delano & Snell, 2006) had forms of written stories without pictures and written stories with pictures for different participants in the study. In the study conducted by Barry and Burlew (2004), photographs of participants, peers, and their classrooms were

<table>
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<th>Reference</th>
<th>Total SMRS</th>
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<th>DV Measures</th>
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<th>Participant Ascertainment</th>
<th>Generalization and Maintenance</th>
</tr>
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<tbody>
<tr>
<td>Barry &amp; Burlew (2004)</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>0</td>
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Note. 3, 4, 5 = Sufficient scientific rigor; 2 = initial evidence with more research needed; 0, 1 = Insufficient scientific rigor.
included alongside the written text. An examination of the sentences revealed that descriptive, sentences that coach, and perspective sentences were present in all of the provided stories, while control, cooperative, and affirmative sentences appeared less frequently.

The social story was read to students or read/viewed by students in all of the studies. In the study conducted by Norris and Dattilo (1999), each participant read the same story two days in a row; the student also read the first and third stories four times and the second story five times. Scattone and her colleagues’ study (2006) had two of three participants reading stories twice because the other participant was not able to read fluently; however, he had his story read to him by his teacher. In the studies that had the social stories read to students, four featured teachers as readers (Barry & Burlew, 2004; Crozier & Tincani, 2007; Delano & Snell, 2006; Schneider & Goldstein, 2010).

The social stories were presented immediately prior to the target activity (e.g., talking with peers) for all studies. In the study conducted by Barry and Burlew (2004), the researchers created opportunities for students to participate in play centers after teachers had read social stories to them. The other variation involved comprehension questions to ask about the story. In three studies (Malmberg et. al., 2015; Scattone et al., 2006; Schneider & Goldstein, 2010), teachers asked students questions right after the social story reading. If a student answered incorrectly, the teacher reread the story so the student could respond correctly. In three studies (Barry & Burlew, 2004; Norris & Dattilo, 1999; Thiemann & Goldstein, 2001), the social story remained accessible to the student if he or she wanted to read it again.

**Effect Size**

The mean effect size was moderate \((ES = .61)\) for social story efficacy on social interaction in 12 of the studies. Table 3 provides the information on mean effect sizes for each study. The authors of four studies (Barry & Burlew, 2004; Sansotti & Powell-Smith, 2008; Scattone, 2008; Thiemann & Goldstein, 2001) reported significant increases in students’ social skills and play-per-minutes from baseline to intervention. Mean effect sizes of those studies that reported significant increases are 1.00, .71, .80, and .87, respectively. Four peer-reviewed studies revealed moderate effect sizes, while the other four studies (Malmberg et al., 2015; Norris & Dattilo, 1999; Sansotti & Powell-Smith, 2006; Scattone et al., 2006) showed no change for some participants. The mean effect sizes for those studies were .22, .35, .62, .54, respectively.

**Methodological Rigor**

For 12 studies, total SMRS scores ranged from 2 to 4 \((M = 3.41)\). Per components of the scale, the highest quality indicators were related to procedural integrity \((M = 4.41)\), participant ascertainment \((M = 3.75)\), and dependent variable measures \((M = 3.41)\). Lower quality scores occurred for research design \((M = 2.83)\), and generalization and maintenance \((M = 2.41)\). Fewer than five data points in a phase or less than three participants for some studies affected scores related to research design. Four studies that did not include any after treatment data affected scores related to generalization and maintenance.

Two studies (Barry & Burlew, 2004; Norris & Dattilo, 1999) had a total SMRS score of 2; the study conducted by Barry and Burlew (2004) reported positive treatment effects. No study attained the highest SMRS score of 5; however, all nine studies (Crozier & Tincani, 2007; Delano & Snell, 2006; Kagohara et al., 2013; Sansotti & Powell-Smith, 2006, 2008; Scattone, 2008; Scattone et al., 2006; Schneider & Goldstein, 2010; Thiemann & Goldstein, 2001) attained a total SMRS score of 3 or 4; all nine of the studies showed a positive change in the behavior of the participants.

**Discussion**

**Descriptive Analysis**

The National Standards Project (NAC) provides essential information about interventions that have been shown to be effective and emphasizes the necessity for evidence-based guidelines for intervention for individuals with ASD (NAC, 2015). It is significantly important for not only educators and individuals with ASD but also parents and service provid-
ers to make a decision about the most beneficial intervention selection. In this review, overall effect sizes indicate that social stories are moderately effective, but specific intervention characteristics are associated with stronger outcomes. According to the NAC, although there are some studies with strong scientific outcomes for an intervention designed for individuals with ASD, additional high quality studies must be conducted to show the effectiveness of the intervention consistently (2015). The NAC standards designate story based interventions, which includes social stories, to be an emerging treatment. As an emerging intervention, social stories related to social interaction need additional and consistent research support to be rated as an established intervention.

Ten out of 12 studies surveyed in this literature review indicated that they drew upon Gray’s criteria (developed between 1993 and 2010) to create the social stories. Three studies (Barry & Burlew, 2004; Kagohara et al., 2013; Norris & Dattilo, 1999) did not specifically mention the criteria used but included some references to Gray and Garand (1993). Four studies (Sansotti & Powell-Smith, 2008; Scattone, 2008; Scattone et al., 2006; Thiemann & Goldstein, 2001) showed effective or very effective intervention results, with the exception of one participant in the study conducted by Scattone and her colleagues (2006). All of the other studies used Gray’s criteria in developing their social story interventions. On the other hand, five studies (Crozier & Tincani, 2007; Delano & Snell, 2006; Malmberg et al., 2015; Sansotti & Powell-Smith, 2006; Schneider & Goldstein, 2010) that also used Gray’s guidelines reported varied results. Moreover, the last two studies’ authors reported significant increases (Barry & Burlew, 2004) or slightly positive results (Norris & Dattilo, 1999), but they did not mention using Gray’s criteria. Gray’s criteria may affect the implementation of social stories, but the adherence to these criteria alone might not result in effective interventions. In the meta-analysis conducted by Reynhout and Carter (2006), social stories that deviated from Gray’s suggested ratio (i.e., included more sentences that coach rather than descriptive sentences) seemed to produce better intervention outcomes than did those that followed Gray’s criteria (Kokina & Kern, 2010).

There are several points to be made regarding format and implementation as they relate to intervention effectiveness. The four studies (Barry & Burlew, 2004; Sansotti & Powell-Smith, 2008; Scattone, 2008; Thiemann & Goldstein, 2001) that reported significant increases in social interactions all included visual components that differed from the other studies that used visual symbols as printed pictures with the text. These visual components (photographs of participants, peers, and the environment; computer-presented social stories; and video feedback) appeared to be a more effective means of increasing social skills than written text alone or written text with printed pictures. That is to say, these studies’ outcomes may have been influenced by their introduction of familiar illustrations or computer usage. Children with ASD appear to remember familiar faces (Volkmar, Sparrow, Rende, & Cohen, 1989). Likewise, computers tend to act as controlled environments with minimal distractions, making the use of computers attractive for the education of children with ASD (Boucenna et al., 2014).

When considering implementation, it should be noted that the number of stories and the readers for the stories varied across studies. The use of one social story for one social situation as opposed to several stories for several situations may affect intervention effectiveness. In relation to readers and reading time, teachers, experimenters, or parents read the stories to students in four studies immediately prior to the target activity. Social stories were slightly more effective when used with students who were able to read, but there was no difference between groups of students with limited and poor reading skills concerning the effectiveness of social stories. These findings imply that, given modifications to their implementation, social stories may be appropriate for students with varying reading skill levels.

There was a wide range of combined strategies in the intervention of social stories. Comprehension questions were assigned in seven studies. Early guidelines identified comprehension as a mandatory component of the intervention to prevent inaccurate interpretation of the situation due to the use of visual
representations (Gray & Garand, 1993), but later guidelines did not mention a mandatory comprehension component. Both assessing comprehension with discussion and questioning are needed because it is important to make certain that individuals with ASD understand the main points of the story (NAC, 2015). The mean effect size for studies that included comprehension questions was moderate ($ES = .59$). Prompting strategies were assigned in four studies for either triggering target behaviors or decreasing challenging behaviors during intervention. The mean effect size of four studies in which prompting strategies were used in conjunction with the intervention was large ($ES = .74$). The other two studies included verbal prompting by creating a verbal prompting only condition. Combining visual cues and verbal cues in a social story may help individuals with ASD understand described skills and behaviors (Dettmer, Simpson, Myles, & Ganz, 2000).

**Efficacy**

The IRD metric was used in this review to measure the efficacy of the social story interventions. Despite the fact that an effect size only cannot summarize whether the treatment caused the improvement, effect sizes are necessary supplements to visual analysis to establish functional relationship between treatment and outcome (Parker et al., 2009). The IRD metric, in comparison to other established effect size metrics, has already been established in medical research, does not require unwarranted data assumptions, and has obtained confidence intervals (Parker et al., 2009).

Although this review included a small number of interventions, the total average IRD score was slightly higher than that of previous analyses related to social story effectiveness. Social story interventions appeared to be moderately effective per the IRD ($ES = .61$) for improving social interactions for some participants but not all, indicating the possibility that a specific participant or a specific intervention feature influenced the strategy’s effectiveness. Of the four studies in which the authors reported that the interventions were significantly effective, three appeared to have a very large effect sizes ($ES = 1.00$, $ES = .80$, $ES = .87$) and one appeared to have a large effect size ($ES = .71$). There was considerable variation between the other eight studies’ effect sizes notwithstanding the reported intervention efficacy. This may indicate that the intervention could be more or less efficacious under different conditions and that PND scores may be underestimating the effectiveness of the interventions.

The SMRS was developed to evaluate the rigor of intervention methodologies. The scientific rigor of published studies varies significantly and poorly-controlled studies are sometimes published due to interesting results that will encourage researchers to undertake better-controlled research (NAC, 2015). It is important that future research include objective and standardized quality indicators as a means to evaluate interventions. Although there are two studies in the current review that indicated initial evidence, the mean of the total SMRS scores for all studies indicated scientific rigor ($M = 3.41$). Studies showed moderate effectiveness according to the IRD metric scores, and methodological rigor was satisfactory for most of the studies. Although total SMRS scores of 3, 4, or 5 indicate the sufficient scientific rigor, there is a large gap between the scores of 3 and 5. Consequently, social story interventions related to social interaction still need additional and consistent research to support outcomes. The SMRS may be an effective way to structure and report results of the interventions.

**Limitations**

There are at least two limitations to this analysis that are important to consider in combination with these results. First, the application of rigorous selection criteria resulted in a small sample size of articles reviewed. Furthermore, analysis of some of the variables was based on an even smaller subsample of studies. Second, given that the results of this review were based on specific studies’ results and from calculated IRD metric scores, the results of the review should be viewed with caution. The use of IRDs to measure treatment outcomes for single-subject studies is somewhat controversial because of the lack of statistical justification. Distributional properties of nonparametric methods are unknown,
so standard errors may not be justified (What Works Clearinghouse, 2010).

Directions for Future Research

A review of the current literature suggests that social stories are interventions that operate in multiple ways and produce varying results. There is no conclusive evidence to support a specific format or method of implementation for providing effective social stories either alone or with other components. The confounding of social story interventions with additional strategies is a problem in many existing studies (Kuoch & Mirenda, 2003). Although there are a number of issues that need to be addressed in future research, several emerge of particular importance. First, inadequate descriptions of participants make it difficult to determine whether participant-related variables moderate the effects of the interventions. Adequate participant descriptions, including information pertaining to the participants’ cognitive abilities, severity in ASD, and language abilities, should be a component of future research for social story interventions.

Likewise, future researchers should employ NAC guidelines as quality indicators of their research to provide stronger intervention evaluation. Further, examining social validity is important; stakeholder concerns have not been fully explored in either the studies reviewed or previous research on social stories. Social validity refers to the social significance of the goals, the social appropriateness of the procedures, and the social importance of the effects (Wolf, 1978). One of the most objective forms of social validity is conducting comparisons with typical peers via direct observation (Ennis, Jolivet, Fredrick, & Alberto, 2013). Peer comparison could be used for all single-subject study designs since examining a typical peer’s behavior can provide insight into the social acceptability of treatment (Ennis et al., 2013).

Conclusion

This review provides evidence that social story interventions can have a positive impact on the social interaction of students with ASD. Given the great variability in research environ-
ments in terms of story format, implementation methods, and additional strategies, it is difficult to ascertain whether the social story or another component of the intervention is the critical reason for the decrease or increase in target behavior. Additional studies are still needed to examine the efficacy of social story interventions on social interactions for students with ASD.

References

Articles included in this review are marked with an asterisk.


*Delano, M., & Snell, M. E. (2006). The effects of Social Stories on the social engagement of chil-


*Schneider, N., & Goldstein, H.* (2010). Using So-


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Effects of Response Cards on Students with Autism Spectrum Disorder or Intellectual Disability

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Abstract: Research has shown that response cards (RC) enhance academic performance of low achieving students with mild to moderate disabilities. Learners with autism spectrum disorder (ASD) and intellectual disability (ID) often have difficulties with communication, which limit their participation in group lessons and limit their access to the general education curriculum. RC are potentially advantageous for students with ASD and ID as they enable students with communication difficulties and low levels of active responding to more fully participate during group lessons. Yet, there is limited research on the effects of RC with these children. This study evaluated effects of teacher-implemented, preprinted RC on participation and correct responding of two students with ASD and one student with ID during group instruction. RC produced large increases in students’ participation and large increases in students’ correct responding compared to traditional hand raising. These findings extend previous research supporting the benefits of RC to students with ASD and ID in accessing the general education curriculum.

Over the last decade and a half there has been a remarkable spike in children with autism spectrum disorder (ASD). The Centers for Disease Control and Prevention estimates that there are 1 in 68 children in the United States with an ASD, nearly double the rate in 2000 (Baio, 2014). Federal laws such as the Individual with Disabilities Education Improvement Act (IDEIA) mandate that educators aim to move learners, including those with ASD, from self-contained classrooms into less restrictive placements (Bouck, 2009; Luke & Schwartz, 2007; Segall & Campbell, 2014); these laws also require that all students receive a curriculum that is as similar to the general education curriculum as possible (Hebbeler, Spiker, & Kahn, 2012). Skills needed for students to be successful within inclusive settings include, but are not limited to, the ability to actively participate during group activities, to wait longer periods of time for teacher attention, and to receive smaller amounts of positive reinforcement (Idol, 2006; Sansosti & Sansosti, 2012). Therefore, it is imperative for learners with disabilities to receive empirically-supported interventions that are likely to equip them to succeed in general educational education environments in which group activities are the norm (Idol, 2006; Segall & Campbell, 2014).

Students with ASD and intellectual disability (ID) who participate in self-contained classrooms benefit from higher teacher-to-student ratios and, in theory, more intensive instruction (Snyder & Dillow, 2013). However, students in self-contained classrooms are less likely to be involved in group lessons than typically developing students in general education (Godfrey, Grisham-Brown, Schuster, & Hemmeter, 2003). Group lessons provide opportunities for students to learn from their peers and to model adaptive responding to peers who may be struggling with an activity (Horn, Schuster, & Collins, 2006). Small group lessons can be an effective means for teaching skills to students with ASD and ID, but careful attention must be given to instructional strategies that promote high rates of student engagement during group lessons (Snell & Brown, 2011). Recent research reviews have identified evidence-based practices for children and youth.
with ASD; however, most of the research has focused on interventions implemented in dyadic (i.e., one-to-one) formats with comparatively little emphasis on supporting children’s engagement within group instruction (National Autism Center, 2015; Wong et al., 2015).

One measure of student engagement, active student responding (ASR), is defined as “an observable student response made to an instructional antecedent” (Heward, 1994, p. 286). Heward contends that ASR is the best measure of student engagement because it focuses on directly observable student behavior, in comparison to less direct measures of engagement, such allocated instructional time and opportunity to respond. Research supports a functional relationship between high levels of ASR and acquisition of academic information, as well as a decrease in problem behavior (Armendariz & Umbreit 1999; Gardner, Heward, & Grossi, 1994; George, 2010; Godfrey et al., 2003; Heward et al., 1996; Narayan, Heward, Gardner, Courson, & Ommess, 1990; Randolph, 2007). This research highlights the value of specific instructional strategies for promoting high levels of ASR as a means for increasing student engagement and lessening opportunity for challenging behavior.

Recently, a variety of digitally-based tools have been used to enhance ASR of students with ASD and ID, such as the iPad™ and other tablet-based speech generating devices that enable functional communication for non-verbal individuals (Lorah, Parnell, Whitby, & Hantula, 2015). However, as with much of the research on interventions for children and youth with ASD, the majority of studies have focused on individual interventions to promote communication, rather than group-level interventions to promote academic responding (National Autism Center, 2015; Wong et al., 2015).

Alternatively, the use of response cards (RC) is one empirically-supported intervention that promotes ASR during group lessons, maintains student engagement, and provides learners with immediate feedback on their performance while simultaneously providing practitioners with insight into their students’ comprehension of the information presented (Berrong, Schuster, Morse, & Collins, 2007; Heward et al., 1996; Horn, 2010; Lambert, Cartledge, Heward, & Lo, 2006; Randolph, 2007; Skibo, Mims, & Spooner, 2011). RC are defined as “… any item that can be held up simultaneously by every student in the class as a means of responding to a question presented by the teacher” (Narayan et al., 1990, pp. 484). Within the basic RC protocol, the teacher asks a question and presents a response cue to a group who then simultaneously answer the question using a card. Variations include pre-printed cards, write-on cards, interactive white boards, or other technology (Randolph, 2007). After students have provided their response, the teacher reviews each response and provides appropriate individual and group feedback.

Preprinted RC are typically more appropriate for younger learners, allowing students to discriminate cards with images and/or text instead of requiring students to write the answer, whereas write-on RC may be more appropriate for older students including those with mild disabilities for whom writing is their primary modality of academic communication (Tincani & Twyman, 2016). Given the noted strengths of individuals with ASD and ID in responding to visually-based cues and teaching strategies (Pierce, Spriggs, Gast, & Luscre, 2013; Shane et al., 2012; Snell & Dillow, 2013), pre-printed RC are potentially advantageous in teaching skills to these populations within group instructional settings.

An accumulation of research suggests multiple benefits for using RC, such as increasing on-task behavior (Berrong et al., 2007; Gardner et al., 1994; Godfrey et al., 2003; Narayan et al., 1990), decreasing disruptive behavior (Armendariz & Umbreit, 1999; Lambert et al., 2006), and increasing student participation (George, 2010; Narayan et al., 1990). There are advantages for the instructor, as well. For example, the teacher can easily identify who is participating, who is answering correctly, and who is struggling to keep up with the group (Godfrey et al., 2003). Moreover, research suggests that students across different grades and populations prefer using RC methods over typical hand-raising during a lecture or review (Christle & Schuster, 2003; Gardner et al., 1994; Marmolejo, Wilder, & Bradley, 2004; Shabani & Carr, 2004).

Research supports the use of RC with typically developing students and students with ASD; however, most of the research has focused on interventions implemented in dyadic (i.e., one-to-one) formats with comparatively little emphasis on supporting children’s engagement within group instruction (National Autism Center, 2015; Wong et al., 2015).
mild to moderate disabilities, yet few studies have examined effects of RC on learners with ID and none have examined effects of RC on students with ASD (Randolph, 2007; Schnorr, Freeman-Green, & Test, 2015). Berrong et al. (2007) evaluated use of RC during a group calendar activity for eight elementary-aged students with moderate to severe disabilities. They found that RC increased students’ active responding and on-task behavior, and decreased their inappropriate behavior in comparison to hand-raising. Skibo et al. (2011) compared effects of RC and single-student responding on number identification of three elementary-aged students with severe disabilities, reporting that RC increased students’ frequency of independent responses.

Given the increasing prevalence of ASD, the need to establish evidence-based strategies to teach students with ASD and ID during group instruction to facilitate access to the general education curriculum, and the promising nature of RC as an evidence-based strategy for these populations, the purpose of this investigation was to evaluate the efficacy of RC on (a) participation and (b) correct responding to teacher-posed questions of three elementary-aged students with ASD or ID during small group instruction. To evaluate social validity of the intervention, we also explored teacher perceptions’ regarding the goals, procedures, and outcomes of using RC in the classroom.

Method

Participants and Setting

Participants were 3 first and second grade children attending a self-contained classroom for students with ID in a suburban elementary school in the mid-Atlantic region of the U.S. Initially, the classroom was attended by 5 first and second students with ID, but one student transferred to a different school over the course of the study, so by the end of the study there were only four students present in the classroom. The classroom was staffed by one teacher and two instructional assistants and instruction was comprised of group and individual lessons focusing on academic and adaptive skills. The classroom teacher led group lessons while the instructional assistants provided support to individual students, as necessary.

The school district’s behavior specialist who provided consultation to the classroom teacher recommended students for participation in the study on the basis of (a) presence of small group instructional activities in the classroom and (b) reported low rates of student participation during these activities. Each participant could follow basic one-step receptive directions, could non-verbally imitate a one-step action, and could communica-tively vocally, although prompts were often required to elicit student vocal responses. Neil, a 7-year-old white male, was diagnosed with ASD. His IQ score, as assessed with the Stanford-Binet Intelligence Scales, was 71, ranking in the third percentile, characterized as a borderline intellectual delay. John, a 7-year-old Asian American male, had a primary diagnosis of Down syndrome, while his official educational classification was Other Health Impairment (OHI). John received a composite standard score of 66 on the Vineland Adaptive Behavior Scale, placing him in the 1st percentile, characterized as low functioning. Alex, the third participant, was a 7-year-old black male with a primary diagnosis of ASD and a secondary diagnosis of attention deficit hyperactivity disorder (ADHD). Alex received a composite standard score of 64 Vineland Adaptive Behavior Scale, also placing him in the 1st percentile. He received a regular dose of 30 milligrams of Vyvanse® for ADHD and two milligrams of Celexa® for anxiety; his mother reported that the second medicine was intended to treat his “repetitive behaviors”. Informed consent was obtained for each participant per the university’s institutional review board.

Each session during baseline and intervention was led by the classroom teacher who stood or sat near the entrance of the classroom in front of the students as they were seated at individual desks facing a projection screen. She was a first-year teacher with almost one year of experience. She received her bachelor’s degree in education and liberal studies with an emphasis in special education. She had previous experience working as a substitute teacher for over 10 years within the same school district and completed a number of long-term assignments in both general...
education and special education classrooms. Two instructional aides in the classroom provided partial physical prompts during the RC intervention.

**Materials**

The first author, a master’s student in applied behavior analysis, created identical RC binders for each participant in the study. During the RC intervention each student was provided with one binder that matched the teacher’s questions. Each binder had 40 RC, 10 pages with four cards on each page. Each page was colored differently and corresponded to a specific lesson topic (e.g., months of the year). Each card was 5 cm high × 6 cm wide and had text and line drawings from the Pics for PECS™ CD (2013) created by Pyramid Educational Consultants. Velcro® was used to attach the cards to each binder page. Figure 1 contains a sample binder page for a lesson on months of the year. Other materials for the study included manipulatives (i.e., coins) for money lessons, a poster-sized calendar for calendar lessons, and an interactive smart board on which the teacher wrote problems for math lessons.

**Measurement and Operational Definitions of Target Behaviors**

The first author was the primary data collector for the study. For each teacher-posed question, she recorded whether the student responded correctly, incorrectly, or not at all. The dependent variables recorded in this study were the percentage of responses to teacher-posed questions (i.e., participation) and the percentage of correct responding to teacher-posed questions.

**Participation.** In the baseline condition, participation was defined as the student raising his hand high enough for the teacher to see (i.e., at least six inches in the air; with hand near head) and then speaking to answer a question within 5 s of being called on by the teacher to answer a question. In the intervention condition, participation was defined as the student removing a RC from the RC binder and holding it up high enough for the teacher to see within 5 s of the cue from the teacher, “Cards up.” Frequency of participa-

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![Figure 1. Sample RC page from a student binder for teacher question, “What month is it?”](image-url)
tion per session was recorded and then di-
vided by number of teacher-posed questions
to yield a percentage of participation per ses-
sion.

Correct responding. In the baseline condi-
tion, correct responding was defined as the
student independently raising his hand and
saying the correct answer to the question
within 5 s of being called on by the teacher. A
correct response was not recorded if the stu-
dent called out the correct answer, but did not
raise his hand first, or if the student raised his
hand, but said an incorrect answer to the
question. In the intervention condition, a cor-
rect response was defined as the student re-
moving and holding up the correct card with-
out prompting within 5 s of the cue, “Cards
up.” A correct response was not recorded if
the student held up the wrong card in re-
response to the teacher’s question, if the stu-
dent put his hand on the correct card, but did
not remove and hold it up in response to the
question, or if the student required prompt-
ing to remove and hold up the correct card.
Frequency of correct responding was divided
by number of teacher-posed questions to yield
a percentage of correct responding per ses-
sion.

Experimental Design
An ABAB reversal design (Gast & Ledford,
2014) was used to assess the effectiveness of
RC on participation and correct responding
to teacher-posed questions. The first seven ses-
sions comprised the baseline condition, which
was single student responding via hand-raising
(HR). The RC intervention was implemented
in sessions 8 through 20. A return to baseline
(HR) was conducted during sessions 21 through
26. Finally, the RC intervention was reintro-
duced on the 27th session, and the study was
completed on session 32.

Procedure
The students arrived in their classroom at 9:20
am and were given 10 minutes to unpack,
remove their homework and complete a writ-
ten calendar activity. Next, a group lesson,
which was part of the classroom’s normal
morning routine, occurred from 9:30 am to
10:00 am. It was during this 30 min. group
lesson that baseline and intervention sessions
took place, at least three days a week, during
the course of the study. The questions for the
group lesson were review questions adapted
from a unit on of the calendar (e.g., “What is
the date?”, “What day of the week is tomor-
row?”, “What month comes next?”), a unit on
numbers, coins and money sense (e.g., “How
many coins are in the piggy bank?”, “How
much is a dime worth?”), and a unit on place
value (e.g., “How many straws are in the 10’s
column?”). The questions and sequence in
which questions were asked was changed on a
daily basis to create variability in the lessons
and to prevent students from responding on
the basis of rote memorization. The first au-
thor and teacher agreed upon a goal of the
teacher asking 10 questions during each ses-
sion. The teacher asked an average of 9.8
questions (range, 5–14) during each session
across baseline and intervention conditions of
the study.

Baseline. The teacher began each baseline
session by providing an overview of the lesson
(e.g., “Today we will be raising our hands to
answer questions. If you know the answer, you
can raise your hand high in the air.”). Then,
the teacher asked a series of questions to the
group. Following each question, the teacher
provided a wait-time interval of 5 s and then, if
one or more students raised their hand, she
picked on one student to answer (e.g., “Go
ahead, Alex.”). If no students raised their
hand, she selected one of the students and
prompted him to provide an answer. No
prompts for hand raising were provided. To
approximate as closely as possible typical class-
room teaching conditions and to minimize
participants’ potential frustration levels given
their low participation during group lessons
observed prior to the study, correct responses
were followed by praise while incorrect re-
sponses were followed by an error correction
sequence in which the teacher stated the cor-
rect response, and then prompted the student
to say the correct response after her, followed
by praise.

Intervention. Each intervention session was
identical to each baseline session except for
the use of pre-printed RC. Teacher training
and student pre-training sessions were con-
ducted by the first author prior to interven-
tion.
Teacher training. Using RC was a novel teaching method for the classroom teacher who implemented the intervention. Therefore, the first author, who was not known to the teacher prior to the study, conducted two 30 min. training sessions with the teacher during two morning group lessons. The training sessions were comprised of the first author modeling practice lessons to show the teacher how to use the RC with the students, followed by teacher practice and feedback from the first author. The first author created a six-step task-analysis for the teacher to follow during intervention; the task analysis was also used for the collection of procedural fidelity data.

Student pre-training. RC were a new method of responding for the students, as well. Therefore, the first author worked one-on-one with each participant during a pre-training session prior to intervention to (a) assess their ability to use the RC and (b) determine which prompting method would be most effective in teaching them to use the RC. During the pre-training session, each participant was asked a series of 10 simplified practice questions (e.g., “Show me Tuesday.”) that provided them with an opportunity to practice the use of the RC. Importantly, these simplified questions did not allow participants the opportunity to practice and learn the academic knowledge evaluated during baseline and intervention conditions, but simply allowed students the opportunity to practice and learn the basic motor responses necessary for using RC. During the first two practice questions, each student received a partial physical prompt (light push at elbow towards the RC binder) from one of the two classroom instructional assistants who sat behind the student to select and hold up the appropriate RC; this confirmed that a partial physical prompt was an effective prompt for teaching the students to use the RC. All students were able to independently respond to simplified questions using the RC for at least five out of the 10 questions (50%) during the pre-training session.

RC intervention. As in baseline, the teacher began each intervention session by providing an overview of the lesson (e.g., “Today we will be using our special binders to answer questions. After I ask you a question, I will say “Cards up!” then you can hold up your answer.”). Each binder containing RC that corresponded to all lessons were placed on the students’ desks. The teacher stated the day’s lesson topic and, if necessary, verbally prompted the students to turn to the corresponding page in their RC books (e.g., “Today we are learning about coins, so turn to the blue page in your book.”). Then, the teacher asked a series of questions to the group. Following each question, the teacher provided the cue, “Cards up!” followed by a 5 s interval to permit students the opportunity to respond. Correct responses were followed by praise while incorrect responses were followed by an error correction sequence in which the teacher modeled the correct response by holding up the correct RC along with a verbal statement of the correct response (e.g., “Today is Wednesday”), followed by a partial physical prompt provided by one of the two classroom instructional assistants to perform the correct response and praise (e.g., “That’s right, today is Wednesday”). Partial physical prompts were faded by lessening the amount of physical support as needed to evoke the desired response, as per a most-to-least prompting hierarchy (Cooper, Heron, & Heward, 2007). After every intervention session the investigator rotated all of the Velcro® RC clockwise to prevent students from responding on the basis of the card’s position on the page.

Although peer modelling of academic responses is considered to be an acceptable component of RC (Heward, 1994), during the initial intervention sessions, the teacher expressed a concern that the participants were responding correctly because they were looking at each other’s response cards. Therefore, beginning on session 18 and continuing throughout the study (see middle panel of Figures 2 and 3), a divider was used during the RC condition to prevent participants from looking at each other’s responses, and the position of RC on each page was varied between participants. All other procedures remained the same.

Interobserver Agreement

A secondary observer independently recorded the target behaviors to obtain interobserver agreement (IOA) data during 28% of baseline and intervention sessions. Two secondary observers were used to gather IOA data. The first was the district’s behavior specialist who had over 10 years’ experience as a Board Certified Behavior Analyst. The second was as a consul-
tant for the school district, a certified Speech-Language Pathologist with an emphasis in communication with over 35 years of experience working with students with disabilities. The first author reviewed the operational definitions with the observers and practiced for three sessions, at which point the primary observer and both secondary observers obtained IOA of at least 90%. Agreements were determined by the point-by-point agreement method and IOA was calculated by dividing the number of agreements by the number of agreements and disagreements and multiplying by 100. IOA was 83.6% (range, 66.6–100%).

Procedural Fidelity
The first author, along with the secondary observers, collected procedural fidelity data to determine if the procedures were implemented as described during 28% of baseline and intervention sessions. Data were collected using two 6-item checklists that corresponded to the baseline and intervention procedures. IOA on the procedural fidelity data was 88.7% (range, 82–100%). On average, the teacher performed 81.5% (range, 60–100%) of the steps correctly. The most commonly missed step was correctly utilizing the error correction procedure. Excluding this step, on average, the teacher performed 88% (range, 60–100%) of steps correctly.

Social Validity
The teacher completed a survey to determine her agreement with the goals, procedures, and outcomes of the intervention. The teacher was asked to rate on a Likert scale of 1 to 5 (1 = strongly disagree; 5 = strongly agree) her agreement with the following statements: (a) The intervention fit into my regular schedule; (b) The intervention taught new skills; (c) The intervention was appropriate given the needs of the students; (d) The intervention was easy to implement and maintain; (e) The students enjoyed using the RC; (f) I will use the intervention again; (g) I would recommend the intervention to others. In addition, the teacher was asked two open ended questions, “What did you like about the intervention?” and “What would you change about the intervention?”

Analytic Approach
To analyze results, data were graphed and visually inspected for level, trend, variability, immediacy of effect, overlap, and consistency of data patterns across phases to determine whether a functional (i.e., causal) relation was evident (Horner et al., 2005; Kratochwill et al., 2013). Means and ranges of responding during each phase were generated to augment visual analysis. Following visual inspection and confirmation of functional relations, effect size estimates were generated with Tau – U, a non-parametric statistical technique based on non-overlapping data points that yields effect size estimates with confidence intervals (Parker, Vannest, Davis, & Sauber, 2011). Tau – U controls for baseline trend and is appropriate for data sets in which data points within phases are autocorrelated, serially dependent, and otherwise fail to meet assumptions of normality. Tau – U cut points were 93–100 for large effect, 66–92 for medium effect, and 0–65 for small effect (Roth, Gillis, & DiGennaro Reed, 2014). To conduct the analyses, the three participants’ data series for baseline and intervention sessions were entered into an online calculator for generating Tau – U estimates (singlecaseresearch.org) (Vannest, Parker, & Gonen, 2011). Phase contrasts were generated for each A and B data series, which were then combined into weighted effect size estimates for each dependent variable.

Results
Figures 2 and 3 display the percentage of participation and correct responding for Neil, Alex, and John during hand raising (HR) and response card (RC) conditions.

Participation and Correct Responding

**Neil.** As displayed in the top panel of Figures 2 and 3, during baseline (HR), Neil had an average of 26.4% (range, 10–40%) participation and had an average of 4.3% (range, 0–20%) correct responding. When RC were implemented, Neil’s participation immediately increased to 92.6% (range, 75–100%) and his correct responding also increased to 66.2% (range, 42–88%). In the return to baseline (HR), Neil’s participation...
immediately reduced to 25.3% (range, 13–44%) and his correct responding also reduced to 2.3% (range, 0–13%). During the return to intervention (RC), Neil’s participation increased to 88% (range, 78–100%) and his correct responding increased to 63% (range, 40–82%). Visual analysis of Neil’s data suggest a strong functional relation between RC and increases in participation and correct responding, although the magnitude of change for participation (Figure 2) was somewhat higher than the magnitude of change for correct responding (Figure 3).

Figure 2. Percentage of participation for Neil, John, and Alex across experimental phases. HR = Hand raising, RC = Response cards.
John. As displayed in the middle panel of Figures 2 and 3, during baseline (HR), John had an average of 53.3% (range, 10–70%) participation and an average of 15% (range, 0–40%) correct responding, although there is a slight improving trend in his baseline percentage of correct responding. When the RC were introduced, John’s participation increased to 98.3% (range, 90–100%) and his correct responding also increased to 49.2% (range, 25–67%). In the return to baseline (HR), John had only 62.7% (range, 50–75%) participation and 12.7% (range, 0–25%) correct responding. In the return to intervention (RC), John’s partici-

Figure 3. Percentage of correct responding for participants across experimental phases. HR = Hand raising. RC = Response cards.
pation increased to 94% (range 80–100%) and his correct responding increased to 65% (25–100%). Visual analysis of John’s data suggest a strong functional relation between the RC intervention and increased participation (Figure 2) and correct responding (Figure 3). However, his correct responding was more variable across all phases of the study and visual inspection of Figure 3 suggests that his gains in correct responding with RC were more modest than his gains for participation.

Alex. As seen in bottom panel of Figures 2 and 3, during baseline (HR), Alex had an average of 18% (range, 10–20%) participation and 0% correct responding. When RC were introduced his participation immediately increased to 81.9% (range, 36–100%) and his correct responding also increased to 42.6% (range, 10–60%). In the return to baseline (HR), his participation decreased to 11.8% (range, 0–33%), while his correct responding was 0%. In the final RC phase, Alex had an average of 72% (range 60–80%) participation and 40.5% (range, 27–56%) correct responding. Visual analysis of Alex’s data suggest a strong functional relation between RC and increases in participation and correct responding, although a decreasing trend in his percentage of correct responding during the first RC condition is evident in sessions 18–20. As with Neil and John, inspection of Figures 2 and 3 also suggests that the intervention had more robust effect on participation than it had on correct responding.

Effect Size Estimates
Omnibus effect size estimates were calculated for both dependent variables using Tau-U, a non-parametric, non-overlap statistic that meets analytic assumptions for SCRD data and accounts for baseline trend (Parker et al., 2011). RC produced large increases in participation (Tau – U = 1.00, 95% CI [.72, 1.28], p < .001) and large, though somewhat smaller, increases in correct responding (Tau – U = .97, 95% CI [.69, 1.25], p < .001) for the three participants in comparison to traditional HR.

Social Validity
The teacher’s responses to the social validity survey are shown in Table 1. Her opinions about the goals, procedures, and outcomes of the RC intervention were mixed. She somewhat disagreed that the intervention taught new skills and was appropriate given the needs of students, and that she would use the intervention again. She was neutral/unsure that the intervention was easy to implement and improved student performance. She somewhat agreed that the intervention fit into her regular schedule and that the students enjoyed using the response cards.

Discussion
The purpose of this investigation was to evaluate the efficacy of RC on (a) participation and (b) correct responding to teacher-posed questions of three elementary-aged students with ASD or ID during small group instruction. We also explored teacher perceptions’ regarding the goals, procedures, and outcomes of using RC in the classroom as a measure of social validity.

Results showed that RC produced large increases in student participation and large increases in correct responding during small group instruction compared to traditional hand-raising. Visual inspection of Figures 2

Table 1

Teacher Responses to the Social Validity Survey

<table>
<thead>
<tr>
<th>Item</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The intervention fit into my regular schedule.</td>
<td>4</td>
</tr>
<tr>
<td>2. The intervention taught new skills.</td>
<td>2</td>
</tr>
<tr>
<td>3. The intervention was appropriate given the needs of the students.</td>
<td>2</td>
</tr>
<tr>
<td>4. The intervention was easy to implement and maintain.</td>
<td>3</td>
</tr>
<tr>
<td>5. The students enjoyed using the response cards.</td>
<td>4</td>
</tr>
<tr>
<td>6. Using response cards improved student performance during the group activity.</td>
<td>3</td>
</tr>
<tr>
<td>7. I will use the intervention again.</td>
<td>2</td>
</tr>
<tr>
<td>8. I would recommend the intervention to others.</td>
<td>3</td>
</tr>
</tbody>
</table>

Note: 1 = strongly disagree; 2 = somewhat disagree; 3 = neutral/unsure; 4 = somewhat agree; 5 = strongly agree.
and 3, combined with the Tau – U effect size estimates, suggests that the magnitude of change was greater for participation than it was for correct responding. These results support previous studies demonstrating that RC are beneficial in enhancing students’ academic performance during group lessons (Randolph, 2007; Schnorr et al., 2015). As no previous studies have examined RC with students with ASD and only one study examined RC with students with ID (Berrong et al., 2007), the results are an important extension of the use of RC with these populations. In particular, they suggest that RC provide a means of enhanced participation for students with ASD and ID during group instruction.

RC produced large increases in participation and large, though somewhat smaller, increases in correct responding across the three participants. Visual inspection of the middle panel of Figure 3 shows that John, in particular, experienced smaller increases in correct responding during RC compared to Neil and Alex. While the data do not provide any specific insight as to why John’s levels of correct responding were lower than Neil’s and Alex’s, he was absent during several intervention sessions and thus diminished exposure to the intervention may have mitigated its positive effects. These results are consistent with previous RC research, which shows that students’ accuracy of responding does not necessarily increase to the degree that their rates of participation and rates of correct responding increase with RC (e.g., Lambert et al., 2006).

Although the data strongly suggest that RC was an effective intervention, teacher responses to the social validity survey in Table 1 indicate that she did not subjectively view the intervention to be particularly effective given her students’ needs. Her mixed assessment of RC occurred in spite of the first authors’ attempts to actively incorporate the teachers’ input into the development of the intervention, including modifying the intervention according to her perceived need to increase students’ independent responding. This finding is consistent with previous research, which suggests that teachers’ ratings of treatment acceptability are influenced by myriad factors beyond apparent efficacy, including time required to implement (Miltenberger, 1990), pre-existing knowledge of behavioral principles (Elliott, 1998), and consistency with personal beliefs (Sidani et al., 2009). The school district’s behavior specialist identified the participants as benefiting from an intervention to increase their levels of group participation. However, the teachers’ responses to the open ended survey questions suggested that she did not perceive students’ very low levels of participation and correct responding in baseline to be a critical problem given the nature of their disabilities, nor did she perceive that the amount of time required to implement the intervention was commensurate with the observed outcomes. One implication of this finding is that training in specific, empirically supported interventions such as RC may not result in teacher adoption unless careful attention is paid to teacher values as part of the decision making process in selecting interventions (Slocum et al., 2014). This finding also highlights the importance of teacher training in behavioral principles and empirically-supported interventions as part of pre-service teacher education to facilitate adoption of evidence-based interventions.

Limitations and Future Research

The following limitations of the study should be considered in relation to the results and areas for future research. First, previous studies of RC have included dependent measures of challenging behavior as part of the evaluation (e.g., Wood, Mabry, Kretlow, Lo, & Galloway, 2009). Challenging behavior was not measured in the current study because pre-baseline observations by the first author indicated that challenging behavior was occurring at low levels and was not interfering with instruction. As challenging behavior can be a significant problem for individuals with ASD (American Psychiatric Association, 2013), future studies should seek to evaluate effects of RC on challenging behavior in addition to instructional responding. Second, the current study used pre-printed RC in the intervention, which necessarily limited students’ number of response choices in comparison to vocal responding and write-on RC. Given the nature of the students’ disabilities and cognitive impairments and their low levels of independent vocal responding, the teacher and first author collaboratively determined that pre-printed
RC would be the best way to facilitate their participation and correct responding. However, future studies should examine use of write-on RC, or typed RC delivered via digital technology, for students with ASD and ID who can write or type their responses. Furthermore, the time and materials necessary for teachers to implement RC lessons could serve as a barrier to implementation and adoption. Finally, while the purpose of the study was to enhance students’ participation and correct responding as a means to increase their access to the general educational curriculum, the study took place in a self-contained classroom in the absence of typically developing peers. While educational placement outside of the regular education classroom is the norm for students with ASD and ID (U.S. Department of Education, 2015), and the intervention setting constituted the students’ current educational environment, future research could examine implementation of RC within regular education classroom environments and peers without disabilities. Future research should also incorporate, where possible, measures to evaluate student preferences of RC implementation techniques.

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Effects of a Self-Monitoring Checklist as a Component of the Self-Directed IEP

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Abstract: Post-school outcomes for students with intellectual disability continue to lag behind other students with disabilities. One way to improve outcomes for these students is to include them in decisions about their future by teaching students how to participate in their IEP meetings. Self-monitoring provides immediate feedback, motivation, and teaches students to self-regulate what they are learning. In this study, two middle school and two high school students learned the steps of leading their IEP meeting. This study used a multiple baseline across participants design to examine the effects of a self-monitoring checklist as an essential component of the Self-Directed IEP for students with intellectual and multiple disabilities. Results showed three of four students only met criteria once the self-monitoring checklist was introduced. In addition, three students were able to generalize to post-intervention mock IEPs using the self-monitoring checklist.

Young adults with intellectual disability are much less likely to attend postsecondary education programs or to be competitively employed as same aged peers without disabilities (Bouck & Joshi, 2012). One reason may be that these students are not always taught about opportunities for after high school or have been left out of the decision-making process for their future. As postsecondary education programs grow, employment opportunities increase, and awareness of possibilities for students with disabilities heighten; post-school outcomes have begun to improve for students across most disability categories. Students with intellectual disability however, continue to lag behind other students with disabilities in these areas (Bouck, 2012; Bouck & Joshi, 2012; Newman et al., 2011).

One way to improve outcomes for students with disabilities is to include them in decisions that determine their future (Warger & Burnette, 2000). According to Kohler and Field (2003), student-focused planning provides an avenue for students to develop self-determination skills and self-awareness. Test, Mazzotti, et al. (2009) identified self-advocacy/self-determination skills as a predictor of successful post-school outcomes. Research has found students with disabilities who scored higher on self-determination scales showed an increased ability to create goals and make decisions (Wehmeyer, Palmer, Soukup, Garner, & Lawrence, 2007). Likewise, students with higher self-determination scores also had higher post-school outcomes one year (Wehmeyer & Schwartz, 1997) and three years after high school (Wehmeyer & Palmer, 2003).

The IEP process provides a potential opportunity for students to practice and learn self-determination skills. Students practice their self-determination skills as they consider their (a) interests, (b) skills and limits, and (c) goals in preparing for their IEP meeting (Martin, Marshall, Maxson, & Jerman, 1996). However, according to the NLTS2 data, only 12% of students with disabilities actively led their transition planning process (Cameto, Levine, & Wagner, 2004). Similarly, Shogren, Kennedy, Dowsett, Villarreal, & Little (2014), found students with intellectual disability showed significantly lower levels of certain self-determination constructs (i.e., psychological empowerment) compared to students with high-incidence disabilities on the NLTS2. For this reason, it is important for educators to teach students with
intellectual disability about self-determination skills needed to participate in their IEP meetings.

One transition curriculum shown to increase student IEP participation is the Self-Directed IEP (Martin et al., 1996), which is designed to teach self-determination skills and build students’ understanding and active participation in their IEP meetings. The Self-Directed IEP curriculum incorporates (a) a DVD or VHS with vignettes of a high school student named Zeke talking to a friend about preparing for his IEP meeting and video segments of Zeke leading his IEP meeting, (b) vocabulary lessons, (c) teacher-directed instruction, (d) student workbook activities, and (e) a checklist for students to use as they role-play the IEP meeting in the last lesson. The Self-Directed IEP has been identified as an evidence-based practice (Test, Fowler, et al., 2009) and shown to be effective in several studies for increasing student IEP participation and leading their IEP meeting (Allen, Smith, Test, Flowers, & Wood, 2001; Arndt, Konrad, & Test, 2006; Kelley, Bartholomew, & Test, 2013; Snyder, 2002; Snyder & Shapiro, 1997; Uphold, 2008).

As educators are implementing more transition planning curricula including the Self-Directed IEP, identifying the individual components becomes critical for providing appropriate strategies for individual student success. Test et al. (2004) suggested future research investigate the effects of individual strategies within packaged transition curricula using component analysis (Baer, Wolf, & Risley, 1968). Component analysis can be used to determine the “necessary parts of an intervention” and to “determine how that particular component affects behavior” (Kennedy, 2005, p. 72). Once identified, these components can be emphasized when disseminating research to inform educators how to implement with fidelity, increasing the social validity of the intervention package at the classroom level (Ward-Horner & Sturmey, 2010).

One component of the Self-Directed IEP to consider is the Role-Play Checklist included in Chapter 11 of the Teacher Handbook. Several of the earlier studies examining the Self-Directed IEP (Martin et al., 2006; Snyder, 2002; Snyder & Shapiro, 1997) used the Role-Play Checklist as a self-evaluative tool at the conclusion of the last lesson to help the students identify what they had learned. Other studies (Allen et al., 2001; Uphold, 2008), used a checklist throughout the lessons as a self-monitoring tool to scaffold the learning process for students with mild/moderate intellectual disability. In these studies, students used the self-monitoring checklist to self-evaluate as they learned each step of their IEP. Self-monitoring is beneficial for some students as they observe their own behavior and keep track of how they performed using a graph or some other visual recording system (Agran et al., 2005; Reid, Trout, & Schwartz, 2005), providing reinforcement for what was learned and motivation for taking the next step (Agran et al., 2005).

Students with intellectual disability often have difficulty with learning and remembering new information (Heward, 2009). When learning with the Self-Directed IEP, students with intellectual disability may benefit from using a self-monitoring checklist to acquire new information about the steps of the IEP and recall that learning at a later time such as during an actual IEP meeting. A self-monitoring check sheet may also provide incentive for staying motivated to the task by checking off the boxes and visualizing their progress. Therefore, the purpose of this study was to examine the effectiveness of a self-monitoring checklist as a component of the Self-Directed IEP for students with intellectual on knowledge of the steps for leading their IEP.

Method

Participants

Four students participated in this study from one middle school and one high school within the same school district. Inclusion criteria included (a) 14–21 years old, (b) diagnosis of intellectual and multiple disabilities, (c) ability to express needs and wants with verbal speech (e.g., I like to cook), and (d) good attendance record defined as missing no more than three days per semester. Students were excluded from the study if they (a) already learned the Self-Directed IEP (Martin et al., 1996) strategy or any IEP participation strategy, or (b) led their IEP meeting in the past. Pseudonyms which were used throughout the
study. Although officially invited to their IEP meetings, none of the participants had ever attended his/her IEP meeting in the past, nor were they aware of the school and transition goals written in their IEP document, according to student interviews.

Alexander was a 14-year-old Caucasian male with mild intellectual disability. He attended eighth grade and participated in the regular education setting for 39% of his school day. According to his school cumulative folder, Alexander scored in the extremely low range (i.e., 41) compared to his same-aged peers, on the Wechsler Intelligence Scale for Children-II (WISC-IV, Wechsler, 2003), and in the well below average range on the Woodcock Johnson Tests of Achievement-III (WJ-III; Woodcock, McGrew, & Mather, 2007), with scores for Broad Reading = 46, Broad Math = 20, and Written Expression = 41. On the Adaptive Behavior Assessment System-III (ABAS-II; Harrison & Oakland, 2003), Alexander scored in the extremely low range as recorded by his parent = 70, regular education teacher = 62, and his special education teacher = 55, and his score on the STAR Reading assessment (Renaissance Learning, 2014) was equivalent to 1.8 grade level.

T’Lik was a 14-year-old Caucasian male with multiple disabilities. He attended eighth grade and participated in the regular education setting for 39% of his school day. According to his school cumulative folder, T’Lik scored in the low normal learning rate/potential range (i.e., 86) on the Wechsler Non-verbal Scale of Ability (WNV; Wechsler & Naglieri, 2006) and on the WJ-III his scores were Broad Reading = 62, Reading Comprehension = 67, Math Calculation = 56, and Written Expression = 69. On the Test of Auditory Processing Skills (TAPS, Martin & Brownell, 2005), his scores were, Standard Score = 61, Phonological = 66, Auditory Memory = 55, and Cohesion = 65, and his score on the STAR Reading assessment (Renaissance Learning, 2014) was equivalent to 1.3 grade level.

Mary was an 18-year-old Caucasian female with mild intellectual disability. She attended tenth grade and participated in the regular classroom for 80% of her school day. According to her school cumulative folder, Mary scored 60 on the full scale WISC-IV (Wechsler, 2003) and on the WJ-III (Woodcock et al., 2007) her scores were Basic Reading = 71, Reading Comprehension = 64, Math Calculations = 57, and Written Expression = 68. On the ABAS-II (Harrison & Oakland, 2003) General Adaptive Composite, she was scored by her parent = 74 and special education teacher = 54. Mary scored 80 which was below average compared to her same aged peers on the Beery-Buktenica Developmental Test of Visual-Motor Integration (VMI, Beery & Beery, 2004) and on the Clinical Evaluation of Language Fundamentals -Fourth Edition (CELF-4, Semel, Wiig, & Secord, 2003) her scores were Core Language = 70, Receptive Language = 66, and Expressive Language = 69.

Ray was a 15-year-old Caucasian male with mild intellectual disability and other health impairment. Ray was also diagnosed with Attention Deficit Hyperactivity Disorder, for which he took medication twice daily. He attended 10th grade and participated in the regular education setting for 80% of his school day. According to his school cumulative folder, Ray scored in the very low range of ability compared to his same age peers (i.e., 51) on the WISC-IV (Wechsler, 2003), and in the very low range (i.e., 57) on the Differential Ability Scales-II (DAS, Elliott, 2007). On the ABAS-II (Harrison & Oakland, 2003), he scored in the extremely low range as recorded by his mother and special education teacher. Ray exhibited an extreme processing deficit when assessed on the VMI (Beery & Beery, 2004). Additionally, on the Oral and Written Language Scales, Second edition (OWLS-II, Carrow-Woolfolk, 1996), he scored in the extremely low range of ability (i.e., 52) on both Listening Comprehension and Oral Expression.

**Setting and Materials**

The study was conducted at a middle school and high school in a large rural school district in the southeastern United States, which served approximately 32,176 students from preschool through 12 grades. All phases of the study were conducted in an empty classroom in each school to eliminate distractions from other students and to provide privacy. The experimenter and student sat at a table or arranged desks to resemble a conference table, typical of an IEP meeting. Materials to be used in this study were (a) the Self-Directed IEP
curriculum (Martin et al., 1996), (b) experimenter-made self-monitoring checklist with picture prompts, and (c) laptop computer with DVD player, (d) Sony Cyber-Shot digital video-recorder, and (e) experimenter-made flashcard with picture prompts for vocabulary words.

Self-Directed IEP. The Self-Directed IEP (Martin et al., 1996) is a curriculum designed to teach self-determination skills and build students’ understanding and active participation in their IEP meetings. The Self-Directed IEP program incorporates a DVD with video segments of Zeke leading his IEP meeting, vocabulary lessons, teacher-directed instruction, and student workbook activities in 11 steps. For this study, the workbook was presented orally and vocabulary was presented with picture prompts in a model-lead-test method.

For purposes of this study, a modified version of the Self-Directed IEP was used, which includes nine of the original 11 steps combined into seven lessons. The lessons were (a) Begin meeting by stating a purpose; (b) Introduce everyone; (c) Review past goals and performance and Ask for others’ feedback; (d) State your school and transition goals; (e) Ask questions if you don’t understand; (f) State the support you’ll need; and (g) Summarize your goals and Close meeting by thanking everyone. The steps not included from the Self-Directed IEP curriculum were (a) Deal with differences in opinion; and (b) Work on IEP goals all year.

Student IEP checklist. Students were provided with a self-monitoring checklist with picture prompts during the lesson, Phase two enhanced intervention sessions, and mock IEP meetings. The checklist had lines for students to write their responses as they learned the content during each of the seven lessons of the modified Self-Directed IEP.

Experimenter

The experimenter and interventionist for this study was a doctoral student who had over five years of experience working with youth and adults with intellectual disability and autism spectrum disorders in public schools and habilitative workshop settings. A second doctoral candidate in school counseling, who was familiar with single-case research and special education, was trained in all aspects of the Self-Directed IEP data collection procedures and observed the video recordings of intervention sessions to measure procedural fidelity, as well as all probe sessions and mock IEPs to measure interobserver reliability.

Experimental Design

A multiple probe across participants design (Horner & Baer, 1978) was used to investigate the effects of the Self-Directed IEP with self-monitoring checksheet with picture prompts as a component of a modified Self-Directed IEP on students’ knowledge of the steps of the IEP and time talking. Multiple probe design establishes the current status of the desired behavior before introduction of the intervention is staggered across individual participants.

Dependent Variable

Knowledge of IEP steps. The dependent variable was the number of steps of the IEP meeting the student implemented correctly as described in the Self-Directed IEP Teacher’s Manual (Martin et al., 1996). For this study, each step had been broken down into multiple responses to correspond with students’ answers to each probe question. For example, probe question number one asked students to state the purpose of the IEP meeting. The appropriate response had three components (i.e., review goals, state progress, set new goals) resulting in three possible answers. The total possible correct answers for the primary dependent variable was 30. Mastery was set at 24 of 30 correct independent responses. Percentage of correct IEP steps was calculated by the number of correct responses divided by the number of possible responses (i.e., 30) multiplied by 100. Probe sessions were conducted at the beginning of each intervention session, before any instruction was initiated.

Interobserver Reliability

The second observer was trained to collect interobserver reliability for the both dependent variables. The second observer watched 30% of probe sessions videos across each phase and independently scored participants’ responses as correct or incorrect on the data.
collection sheet. Item by item agreement for interobserver reliability was calculated, dividing the number of agreements by the total number of trials times 100 (Cooper, Heron, & Heward, 2007) and resulted in a mean of 86% (range 73%–100%).

Social Validity

Social validity data were collected from direct and indirect consumers. First, as direct consumers, participants completed a five item questionnaire on intervention procedures asking for their perceptions about using Student IEP Checklist with picture prompts. Participants indicated their agreement by circling the word with corresponding picture prompt for “yes”, “maybe”, or “no” about their perceptions of the intervention. Teachers read the survey to students, if needed.

Next, as indirect consumers, teachers and the job coach were asked to complete a five item questionnaire about the effectiveness and usefulness of the intervention to establish social validity on the procedures and outcomes. Teachers indicated their perception of students’ leadership during the IEP meetings and teachers’ perceptions of using the Self-Directed IEP in their classroom, by circling “agree”, “not sure”, or “disagree”.

Procedure

Baseline. Parent consents and student assents were obtained from all participants, according to the university institutional review board procedures prior to beginning baseline data collection. For each probe session, the experimenter greeted student and asked probe questions. The Student IEP Checklist was not presented to participants during baseline probes. If participants responded correctly to probe questions, the experimenter marked correct the data collection sheet and probed with the next question. If participant responded with an incorrect answer or did not answer within 10s, incorrect was marked on the data collection sheet and the next probe was presented. No feedback was given during baseline sessions other than thanks for participating. Each student participated in a minimum of three probe sessions during baseline or until a stable or decreasing trend was determined.

Phase one procedures. First, before each intervention lesson, probe data were collected using the same probe questions and procedure as in baseline, without the Student IEP Checklist. Second, the experimenter previewed the lesson for the day and reviewed previous lessons, using the picture prompts on the Student IEP Checklist. New vocabulary for each lesson were presented on index cards with the word and picture prompt. Third, the participant watched a video segment about Zeke leading his IEP meeting and discussed the contents of the video with the experimenter. The participant and experimenter orally reviewed the workbook material, wrote answers for that step on the Student IEP Checklist, and practiced the step using the Student IEP Checklist. Finally, the experimenter and participant role-played an IEP meeting. If the participant had difficulty stating a step, he/she was directed to the Student IEP Checklist for guidance. Upon completion of the lesson, the experimenter thanked the participant for cooperating in the session.

Phase two procedures. Students who did not meet mastery criteria on probe questions after completing the seven lessons in Phase One moved into Phase Two. This phase consisted of at least three probe sessions, without instruction. The Student IEP Checklist was provided during Phase Two probes to examine the effects of the self-monitoring checklist with picture prompts on student responses to probe questions.

Phase three procedures. If mastery was not met in Phase Two, students were given individualized booster sessions based on the IEP steps they responded to incorrectly during previous probes. The Student IEP Checklist with picture prompts was available to participants during Phase Three probes. Figure 1 displays the decision-making process for implementing Phase Two and Three procedures.

Maintenance. Maintenance data were collected, seven to 32 days after mastery criteria was met. Participants were asked questions from the probe script as in baseline and intervention probes. For participants who met criteria in Phase Two or Phase Three, the Student IEP Checklist with picture prompts was available during maintenance probes.
**Generalization.** To determine if generalization occurred, two mock IEP meetings were conducted for each of the participant. The first mock IEP meeting occurred before baseline and the second occurred during maintenance. Members of the participants’ IEP team were invited to participate in both mock IEPs. At the high school, the job coach attended mock IEP-1 meetings for both students and mock IEP-2 for Ray’s meeting, while a regular education teacher attended Mary’s mock IEP-2. Only the special education teacher attended the Mock IEPs for middle school students. The experimenter stood-in for the local education agency representative for all mock IEPs and name cards were placed on the table to represent any missing IEP team members. To make the mock IEP meetings as authentic as possible, the special education teacher conducted the mock IEP meetings and asked probe questions to the participants. The Student IEP Checklist with picture prompts was available for students to use during mock IEPs. If participants responded incorrectly or did not respond within 10s, the special education teacher stated the correct answer and moved onto the next probe question.

**Procedural fidelity.** Procedural reliability data were collected by the second observer for 30% of intervention sessions for each participant. The second observer watched the video recordings and marked on the Procedural Reliability Checklist if the step was observed or heard. To determine procedural reliability, the total number of observed steps were divided by the total number of available steps and multiplied by 100 (Cooper et al., 2007). Procedural reliability data indicated a mean of 88% with a range of 70%–100%.

**Results**

The purpose of this study was to examine the effects of the self-monitoring checklist as a component of the *Self-Directed IEP*. Figure 2 presents the number of correct responses for steps of the IEP for all four participants. Results indicated a functional relation between the Self-Monitoring Checklist with picture prompts and the number of correct responses on the steps of the IEP.
Figure 2. Graph of modified Self-Directed IEP with self-monitoring checklist.
Alexander’s data for correct responses on the steps of his IEP were baseline ($M = 0.5$, range 0–1), Phase One ($M = 0.3$, range 0–2), Phase Two ($M = 7.3$, range 1–16), and Phase Three ($M = 27.3$, range 26–30). Alexander scored zero on his maintenance probe and increased his generalization score from Mock IEP-1 (score = 4) to Mock IEP-2 (score = 29).

T’Lik’s data for correct responses on the steps of his IEP were baseline ($M = 5.3$, range 4–6), Phase One ($M = 6.5$, range 4–9), and Phase Two ($M = 26.7$, range 25–29). T’Lik scored 18 on his maintenance probe and increased his generalization score from Mock IEP-1 (score = 4) to Mock IEP-2 (score = 25).

Mary’s data for correct responses on the steps of her IEP were baseline ($M = 7.6$, range 7–9), and Phase One ($M = 29.3$, range 29–30). Mary met mastery criteria in Phase One. Mary scored 30 on her maintenance probe and increased her generalization score from Mock IEP-1 (score = 9) to Mock IEP-2 (score = 30).

Ray’s data for correct responses on the steps of his IEP were baseline ($M = 7.1$, range 4–13), Phase One ($M = 9$, range 4–15), and Phase Two ($M = 25.7$, range 24–27). Ray scored 24 on his maintenance probe and increased his generalization score from Mock IEP-1 (score = 6) to Mock IEP-2 (score = 24).

Social Validity

After all phases of the intervention were completed, special education teachers and students were asked to complete questionnaires on the procedures and outcomes of the intervention. All four students responded that the intervention helped them feel ready to lead their IEP meeting and they liked learning what to do at their IEP meetings. Three students responded that they knew what to do at their IEP meetings and that the Student IEP Checklist helped them know what to do.

Special education teachers and the job coach agreed with all five questions on the social validity measure (a) students led the mock IEP meeting, (b) students knew what to do at their mock IEP meeting, (c) the Student IEP Checklist with picture prompts helped students learn to lead their IEP meetings, and (d) the Self-Directed IEP with Student IEP Checklist appeared easy to use. Both special education teachers responded that they would use the Self-Directed IEP with Student IEP Checklist in their classroom.

Discussion

The purpose of this study was to examine the effects of a self-monitoring checklist as a component of the Self-Directed IEP curriculum for students with intellectual disability. Three of four participants (i.e., Alexander, T’Lik, Ray) did not reach mastery of 24 out of 30 correct responses to probes on the steps of the IEP until presented with the Student IEP Checklist with picture prompts in Phase Two. Mary reached mastery criteria before the Student IEP Checklist was introduced in Phase One. For Alexander, T’Lik, and Ray, the addition of a self-monitoring checklist provided a system for observing and recording their responses to the probes (Browder & Shapiro, 1985; Cooper et al., 2007) and evaluating their progress (Agran et al., 2005). The results of this study build on the empirical research supporting the Self-Directed IEP curriculum as an evidence-based practice (Martin et al., 2006; Test, Fowler et al., 2009) in a number of ways.

First, this study was the first to conduct a component analysis of a self-monitoring checklist as a component of the Self-Directed IEP curriculum for students with intellectual and multiple disabilities. Test et al. (2004) recommended the need for component analyses of commonly used techniques within IEP participation training to determine their efficacy. The importance of conducting an analysis of the components of evidence-based interventions is to identify which elements in an intervention are integral to changing behavior for certain students (Kennedy, 2005). Cook, Tankersley, and Harjusola-Webb (2008) noted that not all
Evidence-based practices work seamlessly for all students and the necessity to consider the particular students’ strengths and needs before implementing an evidence-based practice. By evaluating an intervention with and without specific components (Ward-Horner & Sturmey, 2010), researchers can adapt the practice and demonstrate for educators how to differentiate the intervention across the classroom reaching more students and implementing strategies with fidelity.

Second, this study adds evidence to the field that students with disabilities can learn the steps to lead their IEP meetings when taught with an established curriculum. While this study focused on students with mild intellectual and multiple disabilities, previous research has demonstrated this effect with students with learning disabilities and intellectual disability (Kelley et al., 2011), emotional behavioral disorder (Snyder & Shapiro, 1997), emotional behavioral disorder and intellectual disability (Snyder, 2002), and moderate intellectual disability (Allen et al., 2001; Uphold, 2008). In addition, Arndt et al. (2006) and Martin et al. (2006) found similar effects with students with various disabilities including other health impaired, autism, and orthopedic impairment.

Third, this study extended the literature by demonstrating the effectiveness of the Self-Directed IEP for middle school-age students. Although Martin et al. (2006) included middle school-aged students in their group study, this is the first single-case study to include middle school students. Since Martin et al.’s results were not disaggregated by age, by using a single-case design, this study was able to demonstrate the positive effects of the Self-Directed IEP for two middle school students and showed both students were able to identify postsecondary goals for employment, education/training, and independent living.

Limitations and Suggestions for Future Research

There are several limitations to the findings of this study. First, all four participants were provided special education services in self-contained or pull-out settings which reduced their opportunities to share ideas and options for postsecondary employment, education, and independent living with peers without disabilities. A suggestion for future research is to examine the use of a modified version of the Self-Directed IEP (Martin et al., 1996) and other transition planning curricula in inclusive classrooms for students with and without disabilities.

Second, this component analysis was limited as it only focused on students with mild intellectual disability and multiple disabilities. Future research investigating other components and individual strategies within packaged curricula (Test et al., 2004), such as the Self-Directed IEP, could help teachers implement interventions in their classrooms with fidelity for specific disability groups.

Implications for Practice

An implication for practitioners is to be aware of students’ varying strengths and needs across the classroom so evidence-based transition planning programs such as the Self-Directed IEP can be adapted for individual students. For example, although three participants (i.e., Alexander, Mary, Ray) were identified with mild intellectual disability, each student’s strengths, needs, and abilities were very different. While some students will learn the skills as presented in the program (i.e., Mary), other students (i.e., Alexander, T’Lik, Ray), may need extra scaffolding such as using a self-monitoring checklist. Preplanning how to differentiate instruction to maximize student learning is common in the academic world and is equally as important for transition planning.

Educators should provide opportunities for students to explore their educational and vocational dreams at an early age, especially once they are in middle school, so they can have a voice in their IEP and transition planning. Two of the participants (i.e., Alexander, T’Lik) had very little comprehension of what transition goals were or what they wanted to do after high school. For most of the baseline probes, Alexander responded by shaking his head and mouthing the words, “I don’t know.” After being taught about interests, skills, and limitations with the Self-Directed IEP, both middle school students chose long-range goals for education (i.e., “learn more about computers,” “read more books”) and employment (i.e., “work with animals,” “build houses with my dad”).

A third implication for practice is to create opportunities to extend transition planning...
activities to students with and without disabilities in the inclusive classroom (Shogren et al., 2015; Thomas & Dyckes, 2011; Wehmeyer, 2016). Many of the skills taught in these programs are valuable to all students, regardless of disability, including self-determination and choosing goals for their future.

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Use of Visual Supports to Increase Task Independence in Students with Severe Disabilities in Inclusive Educational Settings

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Abstract: The present study sought to determine if systematically teaching the use of visual supports to three students identified as having moderate to severe disabilities resulted in improved task completion and independence in general education settings. For each participant, a visual support system delineated a multi-step task, which prior to the implementation of the intervention, required extensive prompting. A non-concurrent multiple baseline design across participants demonstrated that the use of visual supports paired with systematically teaching use of the visual support increased independent task completion for each student. Results, analyzed through visual analysis and calculating effect size through Tau-U, showed intervention of visual supports paired with systematic teaching of the supports was highly effective for the participants. Social validity data gathered after the completion of the study revealed that teachers and support staff viewed the visual support intervention as an effective strategy in aiding the participants’ independent task completion.

Visual supports serve as communication and teaching aids that provide students with information allowing them to process a message, task, or expectation (Rao & Gagie, 2006) as well as provide them with stimuli to help with focus and completing tasks with decreased assistance from staff or peers (Bryan & Gast, 2000; Conroy, Asmus, Sellers, & Ludwig, 2005; MacDuff, Krantz, & McClannahan, 1993). Additionally, visual supports can be used to enhance social skill development and to address behavior that impedes students’ learning and the learning of others (Ganz, Kaylor, Bourgeois, & Hadden, 2008; Harrower & Dunlap, 2001).

Johnson, McDonnell, Holzwarth, and Hunter (2004) demonstrated that the use of picture cues in the form of icons and printed words embedded into the general classroom teacher’s instruction were beneficial in increasing the acquisition and maintenance of academic and developmental skills by students with severe disabilities. Observations during the implementation of the intervention using the picture and written cues also showed an overall increase in class participation and social interaction with peers without disabilities (Johnson et al., 2004). Although the study focused on the benefits of embedded instruction, the use of visual support strategies to engage the students, increase their attention, participation, and overall communication was a positive outcome of the study.

An expanded study on the effects of embedded instruction compared two environments, the special education classroom and the general education classroom, and found that when picture cues were appropriate and combined with embedded instruction, student participation in the general education setting increased (Jameson, McDonnell, Johnson, Riesen, & Polychronis, 2007). The effectiveness of embedded instruction in the general education classroom proved to be a valuable instructional strategy for students with developmental disabilities. Combining visual supports and embedded instruction lends itself to further increasing student success in the general education setting, and allows the students to become integrated members of the general education classroom, with the general educa-
tion teacher leading the instruction for all students.

Students with developmental disabilities can experience difficulty with learning activities presented in general education classrooms for numerous reasons. Many students with severe disabilities have difficulty in processing verbal instruction and thus have difficulties in accessing general classroom instruction. Additionally, students with severe disabilities may have difficulty paying attention to the teacher during instruction or following whole-class or small-group discussions. These students may be easily distracted by extraneous environmental details and find it difficult to keep their attention focused on the instructional activities.

In deciding upon the level of representation that will be used with the support system through the symbol assessment process (Beukelman & Miranda, 2013), the level of visual representation (object, photo, line drawing, word) should be determined by that which is best understood by the student accessing the visual support (Carson, Gast, & Ayres, 2008). The visual depiction of the activity must be clear to the student (Carson et al., 2008; Hodgdon, 2011; Jaime & Knowlton, 2007). Often it is necessary to consider behavior exhibited by the student throughout various activities, or various parts of an activity, and use a combination of symbol representations within a visual support to meet the varying comprehension levels. In Jaime and Knowlton’s study (2007) of a third grade student with cognitive disabilities, problem behaviors, and limited functional language, the implementation of a combination of visual strategies that included the use of Social Stories™ and visual schedules proved to be very effective in reducing the student’s frustration and increasing participation in the general education classroom.

Visual aids such as schedules, calendars, choice boards, and menus serve the primary functions of giving information in a structured, orderly format (Carson et al., 2008; Hodgdon, 2011). Aids for providing effective directions can include any classroom management tool that allows the teacher to communicate more effectively with the students and can include visual supports that give directions, depict rules, and provide students with task organization (Hodgdon, 2011). Visual supports in the form of objects, pictures, line drawings, or words can be used to build schedules and organize tasks, bringing structure to a child’s day.

Visual schedules can be used to organize specific activities and tasks by portraying the activities that will occur as well as detailing the small steps involved in a single activity such as the steps necessary to complete a specific activity within the larger daily routine. Research suggests that picture schedules that offer support both between and within an activity can benefit students with severe disabilities (Clarke, Dunlap, & Vaughn, 1999; Dettmer, Simpson, Myles, & Ganz, 2000). Picture schedules, used as a strategy for increasing predictability of classroom routines, can be an alternative to verbal and written instruction (Harrower & Dunlap, 2001).

Bryan and Gast (2000) used graduated guidance combined with a picture activity schedule to increase independent on-task and on-schedule behaviors of students with autism. Their activity schedules used line-drawings of academic activities and replaced verbal prompts while maintaining student attention and engagement in academic tasks. The picture activity schedules were reported as a useful management tool, feasible to implement in the general education classroom, and beneficial to all children in the class setting (Bryan & Gast, 2000).

Photographs can be combined to create schedule activity books that depict individual activities in a sequence in which they are to occur (Carson et al., 2008). Although this study was conducted outside of the general education classroom, it demonstrated the benefit of activity schedules on increasing students’ independence in work environments thereby decreasing their prompt dependency and the need for teacher support. The success of the activity schedules is suggestive of their ability as a non-invasive support strategy that can increase student independence across multiple environments, including the classroom (Carson et al., 2008).

Activity schedules were demonstrated to be very effective in teaching participants with autism and other developmental disabilities to complete a variety of recreational and home-living tasks. The activity schedules comprised of photographs and line drawings were suc-
successful in decreasing the participants’ dependency on verbal prompts to remain engaged in appropriate activities. The photographic activity schedules, taught with graduated guidance, promoted sustained engagement and lead the participant to respond to new activity sequences and novel leisure activities with a greater level of independence (MacDuff et al., 1993).

Despite research on the use of visual supports, only a small number of studies address the needs of students with severe disabilities in inclusive school settings. Further research in this area can add to the evidence that visual supports can be a useful tool in supporting students with multiple disabilities in inclusive school settings. The use of visual supports to increase student independence, task initiation, and task completion continues to warrant research as a successful intervention and support tool for students with severe disabilities in inclusive environments.

The purpose of the present study was to investigate use of visual supports across participants and activities in inclusive settings to increase independent task performance. Specifically, the research questions were (1) to what extent does presentation of a visual support without systematic teaching of its use increase independent task completion by students with severe disabilities in activities in the general education setting? and (2) to what extent does presentation of a visual support paired with systematic teaching of its use increase independent task completion by students with severe disabilities in activities in the general education setting?

Method

Participants

To be included participants were required to receive services and funding as students with moderate/severe disabilities under one of the following categories: intellectual disability, multiple disabilities, autism, deaf-blindness, or serious emotional disturbance. The second criterion was a minimum of 10% of the school day in general education classrooms or school environments designated on the IEP. None of the participants had visual supports in place for the selected tasks prior to the start of the study.

Will. Will, a 10-year-old Caucasian male in the third grade, was identified as having Down syndrome. His assessment results indicated that his cognitive functioning fell within the range of intellectually impaired with his adaptive skills within the low range (see Table 1). His targeted task was writing, using the computer software Write:Outloud with Co-Writer, a talking word processor and writing software program and a word-prediction program de-

### TABLE 1

<table>
<thead>
<tr>
<th>Participant</th>
<th>Ethnicity</th>
<th>Age (in years)</th>
<th>Grade</th>
<th>Disability</th>
<th>% Included in General Education</th>
<th>Present Levels of Performance</th>
<th>Measure</th>
<th>Purpose</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Will</td>
<td>Caucasian</td>
<td>10</td>
<td>3</td>
<td>Intellectual Disability</td>
<td>20</td>
<td>KABC b Assessment of intellectual functioning</td>
<td>68</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SIB-R c Assessment of adaptive skill functioning</td>
<td>43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seth</td>
<td>Caucasian</td>
<td>8</td>
<td>2</td>
<td>Multiple Disabilities</td>
<td>45</td>
<td>DAS d Assessment of intellectual functioning</td>
<td>70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jose</td>
<td>Hispanic</td>
<td>11</td>
<td>5</td>
<td>Intellectual Disability</td>
<td>10</td>
<td>KABC Assessment of intellectual functioning</td>
<td>40</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SIB-R Assessment of adaptive skill functioning</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

aPresent levels of performance- standard scores are reported; bKABC-Kauffman Assessment Battery for Children. Scores are General Intellectual Ability; cSIB-R-Scales of Independent Behavior-Revised. Scores are reported as Broad Independence; dDAS-Differential Abilities Scale.
signed to expand vocabulary and improve written expression. This task was chosen due to his lack of functional computer use as well as the importance of classroom-based writing for academic gains. Activities using the computer required one-on-one support with consistent verbal prompting.

Seth. Seth, an 8-year-old Caucasian male, had an educational diagnosis of multiple disabilities. He exhibited overall low adaptive skills and borderline cognitive abilities resulting from an unknown etiology (see Table 1). He was in second grade and received the majority of his educational services in a self-contained class for students with moderate to severe disabilities. The multi-disciplinary team determined Seth’s overall social and communication abilities were significantly depressed due to Seth’s difficulty with reading and understanding written materials, printing and writing personal information, and following parts of multi-step verbal directions. Seth’s functional communication was in the low range.

Seth’s targeted activity was silent reading after discussing Seth’s reading abilities with both the special education and second grade teachers. Silent reading, occurring daily in the second grade class, was a 20 to 30 minute session where students interacted with books independently while the classroom teacher worked one-on-one with students. Because Seth’s reading skill level was kindergarten level, excessive prompting or one-on-one assistance was needed for Seth to complete this activity successfully.

Jose. Jose, an 11-year-old Hispanic boy with Kabuki syndrome, qualified for special education as a student with an intellectual disability (see Table 1). Jose was in the general education setting for lunch, recess, and music with support from special education staff. Jose, whose overall communication was indicated to be at the 2-year, 6-month level in Spanish, was observed in the classroom to use sporadically a visual support, comprised of colored photos of actual objects used and line drawing symbols, in a “first/then” format (i.e., the support showed a photo representing the first “job,” then a line drawing representing the reinforcer). The lunch time routine was selected for Jose because it required extensive prompting for the duration of the activity with one-on-one or one-on-two support from either a teacher or a paraprofessional.

Setting

The study was conducted in a rural elementary school located in a western state. The school is a traditional kindergarten through fifth grade school that serves all local community children. Before the start of the study, the researcher met with the special education teacher and conducted preliminary videoing to identify school environments and routines in which students did not already have interventions in place or where tasks were being completed one-on-one with a great deal of prompting. The routines; sentence writing on a computer for Will, silent reading for Seth, and lunch routine for Jose; determined the setting for each participant.

The second grade classroom, Seth’s setting for his reading activity, was set up traditionally with all students having individual desks, which were grouped into learning “pods” of five desks each. In addition to the individual desks there were large group tables. The classroom had designated areas for a library, group/circle times, and a teacher work area. During academic instruction, students sat at their desks or in a group on the floor in the front of the classroom. During non-instruction times, the students self-selected locations in the classroom to complete work, engage in silent reading or partner reading activities, or complete free time activities. The self-selected seating was contingent on the students’ remaining on-task.

The resource classroom, where computer instruction occurred for Will, was set up to provide instruction to several small groups of students receiving reading, writing, or math instruction or English Language Development. The resource classroom served between eight and 12 students, receiving instruction for 45 to 60 minutes. The resource classroom was comprised of three large group tables and contained several computers available for working on reading, writing, and math skills that were not otherwise available in the general education classrooms.

The school cafeteria, Jose’s setting, was set up to provide lunch for all 660 students attending the school. Lunch times were set up
in 10-minute intervals by grade-level, with students given 20 to 30 minutes to eat lunch prior to being sent to recess. Upon entering the cafeteria, students walked along a perimeter line to the director of the cafeteria who checked students by name on a computer. Each student was required to wait on the “white line,” give his or her name, and then walk through the door to the buffet-style serving corridor where each walked through picking milk, selecting hot or cold lunch, and exiting to another buffet-style cart containing spork packages (a spoon/fork, napkin, straw combination), fruits and vegetables, and condiments (e.g., ketchup). Students then self-selected a seat at one of 16 cafeteria tables. When finished eating, students raised their hands to be excused by a cafeteria supervisor.

Research Design

A non-concurrent, multiple baseline design across participants (Carr, 2004; Harvey, May, & Kennedy, 2004; Stokes, Cameron, Dorsey, & Flemming, 2004; Watson & Workman, 1981) was used to study the effectiveness of visual supports on increasing independence and reducing staff prompting for task engagement and completion. “Non-concurrent multiple baseline designs stagger the baseline-to-intervention timing across various entities, but the baselines and interventions are not contemporaneous across each of the tiers” (Harvey et al., 2004, p. 270). The non-concurrent design is similar to the concurrent design in that behaviors are evaluated and compared across multiple baselines. Harvey et al. (2004) states that as long as unequal baselines occur and the intervention is planned, then the requirements of the experimental design are met.

Materials

The visual supports were individualized and comprised of digital photos and line drawing symbols dependent upon student need. The number of symbols in each visual support was standardized across participants and based upon the 10-step task analysis that was completed for each participant’s activity (Table 2). During the initial task-analysis process, each step of the activity was recorded and assigned

<table>
<thead>
<tr>
<th>Will</th>
<th>Seth</th>
<th>Jose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Turn on computer by pressing the power button on monitor</td>
<td>1. Get from shelf his book box containing an assortment of books on CD</td>
<td>1. Stand in line and wait for turn to greet cafeteria director</td>
</tr>
<tr>
<td>2. Open Write:Outloud; use the mouse to click on the “SOLO” icon on monitor</td>
<td>2. Sit</td>
<td>2. Greet by saying “Hi” or “Hi XXX”</td>
</tr>
<tr>
<td>4. Type password</td>
<td>4. Open the CD player</td>
<td>4. Get lunch</td>
</tr>
<tr>
<td>5. Click on the Write:Outloud pencil icon located on the top toolbar</td>
<td>5. Put CD from chosen book in CD player</td>
<td>5. Get a spork package</td>
</tr>
<tr>
<td>6. Click on wake-up Co:Writer icon located on top toolbar</td>
<td>6. Put on headphones attached to CD player</td>
<td>6. Sit at a table</td>
</tr>
<tr>
<td>7. Type sentences</td>
<td>7. Push play on CD player</td>
<td>7. Open spork package</td>
</tr>
<tr>
<td>8. Click on Save icon on top toolbar</td>
<td>8. Read</td>
<td>8. Open milk</td>
</tr>
<tr>
<td>10. Click on red close box on top toolbar to close program</td>
<td>10. Put book box back on shelf in its designated location</td>
<td>10. Clean-up, gathering all trash from food wrappers and milk carton; walk to central trashcan</td>
</tr>
</tbody>
</table>
vocabulary, which was then assigned a symbol referent based upon the communication level of each student as determined individually conducted symbol assessments. Each visual support contained 10 symbol referents, one per step of the task analysis, aimed at directing each student to complete his targeted activity.

**Will.** Will’s visual support (Figure 1) contained symbols that combined photos, icons matching the computer, and words/numbers. Each referent corresponded with the prompts of the software (i.e., Co:Writer with Write:Outloud). The visual support was comprised of 10 symbols (1.27 cm by 2.54 cm), organized vertically and attached to the left edge of the computer monitor. The vertical organization of the visual support allowed Will to read it like a list. Will typed three to five sentences per session, with the sentences aligned to his reading program. Each sentence contained controlled vocabulary and a picture to cue Will to type one of his spelling list words, which was intended to promote the use of word prediction in Co:Writer with Write:Outloud.

**Seth.** Seth’s visual support (Figure 2) was organized using a combination of photos and Picture Communication Symbols. The visual support, comprised of 10 symbols measuring 2.54 cm by 2.54 cm, was organized to allow Seth to read his visual support from left to right, similar to reading a book or page of text. Additional materials for Seth were a portable CD player to play audio books, headphones, and a task box to hold the book choices. The researcher varied the selection of books every 2 weeks to provide choice and opportunities to engage in reading books that were potentially of high interest. There were always four to six books from which to choose.

**Jose.** Jose’s visual support, organized from left-to-right (Figure 3), was made solely of photographs that included all of the meaningful steps involved in participating actively in the lunch routine. Students were required to give their name and teacher so the cafeteria director can mark them as receiving lunch. The modification for Jose was an alternative to giving his name and teacher’s name; a skill not in his repertoire; rather he was required to say “hi” to the cafeteria worker, a skill that was in his repertoire. The first five steps of the lunch activity were backed in red and the last five steps in blue in an attempt to decrease visual confusion.

![Figure 1. Will's visual support.](image-url)
clutter and to provide Jose with the task broken down into two distinct parts; the process of moving through the lunch line and then the process of sitting and eating. Photo sizes were 5.08 cm by 5.08 cm, with the exception of the “open spork” photo which was 3.81 cm by 7.62 cm to keep the integrity of the photo.

**Variables**

The independent variable was presentation of the visual support with and without systematic prompting. The dependent variable was percentage of task or activity steps completed independently. A student was considered independent on a task step when he: (a) began the task step without teacher or peer prompting, (b) engaged in task step, and (c) finished the step.

**Data Collection**

Most sessions were videoed (92%) with data collected from the videos. Data collection used task analysis sheets in which independent performance for each step of the task was recorded by session for each student. Data were summarized by tallying steps completed independently within each task and dividing by 10 (i.e., the total number of steps).

**Pre-Baseline: Symbol Assessment**

When developing a visual support, it is important to determine the student’s symbol skills (Mesibov, Browder, & Kirkland, 2002). A symbol assessment (Beukelman & Mirenda, 2013) was conducted to determine the symbol understanding of each student. Following
teacher identification of 10–15 functional, known items, each student was assessed using a receptive labeling or visual-matching format (Beukelman & Mirenda, 2013) with symbols assessed in the following order: objects, photographs, and line drawings.

**Phase 1: Baseline**

Throughout baseline, prompts were delivered using increasing assistance, or least-to-most intrusive prompting, allowing the students to be as independent as possible (Demchak, 1990). The instructional prompting sequence began with an opportunity for the student to respond independently, followed by a gesture (e.g., pointing to the correct picture/activity), then a verbal directive, and finally physical assistance. The wait time between prompts was up to 10 seconds. The prompt hierarchy occurred as follows:

1. Orient the student to the activity “Time for [type sentences, silent reading, lunch]”
2. I = Independent (Wait for response indicating independent initiation of task and first step completion); upon no response
3. G = Gesture (Gesture to step);
4. Wait for response; upon no response
5. V = Verbal (Provide verbal cue paired with gesture to step)
6. Wait for response; upon no response
7. P = Physical (Provide Physical guidance paired with verbal cue to step)
8. Wait for response for initiation of subsequent step indicating independent step completion. If no response or an incorrect response, the prompt hierarchy above was followed for each successive step through all steps of the task analysis.

During baseline, students were observed in their task settings and data were collected on individual task step completion. Each student was prompted through the steps of their task systematically until data indicated stability or a decreasing trend. Baseline continued with intervention introduced in a staggered sequence consistent with a non-concurrent multiple baseline design. Three to five sessions were conducted each week.

**Phase 2: Visual Supports Introduced**

In a staggered sequence consistent with the experimental design, each participant was in-
introduced to their visual support without any teaching of the use of the support. In this phase, the objective was to determine if the mere presence of the visual support would increase task independence. During this phase, the task continued to be prompted as described in baseline without specifically referencing the visual support.

**Phase 3: Specifically Teaching the Use of the Visual Supports**

Phase 3 focused on systematically teaching the students to use the visual supports introduced during Phase 2. Using a specific prompt hierarchy of least-to-most prompts, each student was taught to use their visual support to complete their task. The prompt hierarchy used to teach the visual support followed the same 10 steps of the task analysis and was standardized through a least-to-most prompt hierarchy as follows:

1. Gain attention of the child
2. I = Initiates work/step after presentation of visual support
3. Wait up to 10 seconds for child to respond
4. Gesture (G) = Initiates work/step after gesture to visual support
5. Wait up to 10 seconds for child to respond
6. Gesture paired with verbal prompt (G, VP) = Initiates work/step after gesture and verbal prompt “Look at your schedule”
7. Wait up to 10 seconds for child to respond
8. Gesture paired with indirect verbal prompt (G, IVP) = Initiates work/step after gesture and indirect verbal prompt “what is it telling you?”
9. Wait up to 10 seconds for child to respond
10. Gesture paired with direct verbal prompt (G, DVP) = Initiates work/step after gesture and direct verbal prompt “it is telling you to ______”
11. Wait up to 10 seconds for child to respond
12. Gesture paired with partial physical prompt and direct verbal prompt (G, PP, DVP) = Initiates work/step after gesture, combined with partial physical prompt, and direct verbal prompt “it is telling you to ______”
13. Wait up to 10 seconds for child to respond
14. Gesture paired with full physical prompt and direct verbal prompt G, FP, DVP = Initiates work/step with gesture, combined with full physical prompt, and direct verbal prompt “it is telling you to ______”

**Inter-observer Reliability**

After the initial development of the prompt-hierarchy and task analysis sheets, the primary researcher and secondary observer practiced observing videos of sessions with a young child not in the study. The primary researcher scored the prompts delivered and then trained the secondary observer until a minimum of 80% agreement was reached. At any point during the study if agreement dropped below 80%, training re-occurred.

Inter-observer agreement was assessed for a minimum of 50% of all sessions within each phase of the study. Inter-observer agreement was calculated using a point-by-point method to compare each prompt level recorded by the researcher and secondary observer. The number of agreements was divided by the total number of agreements and disagreements with the result multiplied by 100 to yield a percentage of agreement (Table 3).

**Procedural Reliability**

Procedural reliability refers to the degree of accuracy with which the conditions are implemented as specified. The researcher developed a checklist that highlighted the procedures to be implemented in each phase. The primary researcher and the secondary observer met weekly to review sessions and used this checklist in a minimum of 33% of the sessions across conditions for all participants. A percentage of procedural reliability was calculated by determining the percentage of procedures implemented correctly as specified within the checklist (Table 4).
Social Validity

In order to assess social validity, the general education teacher, the cafeteria director, and the special education teacher were asked to complete a questionnaire rating the perceived success of the visual supports on the students’ task completion and skill acquisition. This measure was included to determine if changes in task completion and independent behavior were apparent to those who worked with the students on a daily basis. Each respondent answered open-ended questions on their perceptions of the students’ behavior both prior to and after the study. This questionnaire provided a measure of perceived value of the outcome of the visual support on the learning and task completion in comparison to perceptions of pre-intervention behavior. Each respondent was also asked to rate how easy they thought the support system was to use, how helpful it was to the student, and their likely use of this type of support in the future.

Results

Figure 4 shows data for all participants across conditions: (1) Baseline, (2) initial Intervention phase (i.e., presentation of the visual support), and (3) second Intervention phase (i.e., participants taught systematically to use their visual supports). In addition to conducting visual analysis of the graph, Tau-U (Parker, Vannest, Davis, & Sauber, 2011) was calculated using the online calculator (http://www.singlecaseresearch.org/calculators/tau-u) to determine the effect size of each intervention phase.

Participant 1: Will

During baseline, Will began his activity upon the verbal cue “It’s time to type sentences.” Will initially needed prompting for all 10 steps required to complete the task. He averaged 24.3% (range 0 to 40%) independence across the seven baseline sessions (see Figure 4). Phase 2, introduction of the visual support without focused teaching on the use of the support, began on session 9. Although Will initially looked at his visual support, he discontinued referencing it and prompting the task was still required throughout his typing activity. Will averaged 64% (range 40 to 80%) independent task completion with the introduction of the visual support. Although there was a 39.7% improvement from Base-

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line to Phase 2 with the introduction of the visual support, visual analysis of the data indicates an initial increase in task independence followed by a decline and an overall decreasing trend.

Will began Phase 3, systematic teaching use of the visual support, on session 14. Will’s independence in task completion made a marked increase on the second session of teaching the use of the support. With gestures to the visual support Will immediately began to show behaviors indicating he was using the support to give him the information on the next steps to be completed. Will looked at and pointed to the visual support, completed a step, and again referenced the visual support to provide him with the next step. Figure 4 shows the level of independence Will achieved and maintained after being taught to use the visual support. Will averaged 92% independence in Phase 3 (range 60 to 100%); which was a 67.7% improvement over baseline and 28% improvement over Phase 2 (visual support with no teaching of its use).

Participant 2: Seth

Seth’s baseline phase was 11 sessions. Seth needed prompting throughout baseline, averaging 38% (range 20 to 50%) independence throughout his silent reading activity. Seth’s visual support was introduced in session 12. During silent reading, Seth was required to get a basket containing books on CD, a CD player and headphones; Seth’s visual support was placed in this basket. Seth immediately asked “What’s that?” He looked at the visual support, but did not use it to guide the activity. Seth averaged 45% (range 20 to 70%) independence in Phase 2, which was 6.8% improvement over baseline. Seth continued to need prompting to complete the silent reading activity. There was a decreasing trend noted in Seth’s performance during Phase 2. Seth began Phase 3 in session 18. Seth made an observable increase in his task independence when teaching use of the visual support was introduced (Figure 4). Seth averaged 87.3% (range 70 to 100%) independence in task completion, a 42.3% improvement over the use of the visual support without systematic teaching and a 49.1% improvement over baseline.

Participant 3: Jose

Jose was in baseline for 12 sessions. Jose averaged 39.2% (range 10 to 60%) independence in his lunch routine during baseline. Phase 2 began in session 13 with the introduction of
his visual support. He carried his visual support with him through the lunch line and then placed it on the table when he sat down. Jose initially showed interest in the visual support, particularly the digital photograph of the cafeteria director. However, he did not use the support to assist in the completion of the lunch routine. Jose averaged 24.3% (range 10 to 40%) independence in Phase 2; a decrease of 14.9% in task independence as compared to baseline.

Jose began Phase 3 in session 20. As with the other participants, Jose’s data indicated a greater level of task independence was achieved after systematic instruction to use the visual support began. Jose, more than any other participant, talked about his visual support and was observed labeling the pictures and saying the steps as he walked to the cafeteria. He would repetitively say “Hi Dani” and point to her picture. Jose exhibited limited functional verbal skills, usually communicating in single words, or through gestures, in the school setting and his behavior indicated he very much enjoyed looking at and talking about the pictures. Data for this third phase, ending during the last week of school, indicated that Jose achieved an average of 74.6% (range 40 to 90%) independence in task completion when taught to use the use of the visual support to complete his task. Jose’s performance in this phase represented 35.4% improvement over baseline and 50.3% improvement over Phase 2 (the visual support without teaching its use). Three of the last four sessions showed Jose at 90% task independence.

**Effect Size**

Tau was calculated for both intervention phases. As expected, the effect size across the three participants for the first intervention phase was only 0.1759, which indicates that simply presenting visual supports to students is an ineffective intervention. In contrast, the effect size across the three participants for the second intervention phase was 0.953, indicating that systematically teaching the use of the visual support is a highly effective intervention.

**Social Validity Results**

Social validity is the estimation of the importance, effectiveness, appropriateness, and satisfaction various people experience in relation to the intervention (Kennedy, 2005). The special education and second grade teachers and cafeteria director completed a social validity questionnaire regarding their perceptions of the students’ use of visual supports. All respondents reported that the visual support was an appropriate instructional strategy with the use of prompts decreasing and task independence increasing. It was also reported that use of visual supports created more opportunities for participation in general education classroom activities. Two of the respondents commented that it was not difficult to implement the visual supports with one teacher stating “it is very easy to use at all times.” The third respondent indicated that use of visual supports in a general education setting will “depend on individual staff skill levels and willingness.” Two of the respondents reported that they thought some level of training would be needed prior to implementation. The third respondent did not think any training was necessary, but did comment that systematic application is needed saying that “this structure/expectation is a must.” Each reported that they thought they could implement visual supports with other students as needed. The special education teacher stated that “visual supports decreased disruptions within the general education routine” and that “the student developed a means to request assistance without disrupting the class.” The second grade teacher commented that “the visual support helped meet the expected behaviors for the 20 minute time period of reading because it was systematic and had expectations for the student to follow.”

**Discussion**

The purpose of this study was to examine the effectiveness of using visual supports within inclusive educational settings. Additionally, this study sought to expand prior research that used visual supports to demonstrate a variety of increased positive behaviors (Bryan & Gast, 2000; Dettmer et al., 2000; Jaime & Knowlten, 2007). The major findings of the
present investigation indicate that a) visual supports are an essential component in increasing task independence in students with severe disabilities, b) visual supports presented without systematic teaching of their use are not effective intervention strategies for skill acquisition, and c) students with severe disabilities acquired skills necessary to be more independent across inclusive settings with systematically teaching use of a visual support.

Presentation of Visual Support without Systematic Teaching

With the introduction of the visual support, two students, Will and Seth demonstrated a brief increase in their independent completion in the steps of their targeted tasks. Although increases were demonstrated for Will and Seth, this increase in task independence was not maintained and independent responses decreased across participants with student behavior ultimately requiring an increase in prompts. When assessing use of the visual supports, each student was monitored for behaviors indicating they were referencing individual steps of the visual support. Behaviors including visual tracking, pointing, or labeling were observed. However, both Will and Seth stopped looking at the support; and independent task completion returned to baseline levels, demonstrating that simply introducing the visual support was not sufficient for increasing task independence.

Unlike Will and Seth, Jose did not demonstrate an increase in his task independence when the visual support was presented. Although Jose demonstrated curiosity and seemed interested in the symbols, he did not use the support for actual completion of task steps. Instead, Jose would match or label the photographs with objects and people that he saw. During the completion of his lunchtime routine, Jose looked at his support while he was walking to the lunch room, labeling pictures or asking “como se llama?” (i.e., “what is the name?”). Although Jose demonstrated an interest in the visual support, there was no observable behavior that indicated he understood the visual support was a tool for assisting him in completing the task.

Introduction of the visual support without systematic teaching did not influence behavior in a dramatic way. It was not until the visual support was combined with systematically teaching use of the support that a marked improvement in participant performance was noted.

Visual Supports Combined with Systematic Teaching Use of the Supports

Will, Seth, and Jose demonstrated immediate increases in task independence when systematic teaching focused on the visual support. After only a few prompts to the visual support, Will and Seth demonstrated task independence at 90 to 100% over several sessions and Jose demonstrated task independence at 80 to 90%. After Jose began to use the visual support for task completion he achieved 90% independence, but did not achieve 100% independence; however this can be attributed to motor skill difficulties with opening his milk. As in Phase 2 when assessing use of the visual supports, each student was monitored for demonstration of behaviors indicating they were referencing their visual support (e.g., visual tracking, pointing, or labeling). All participants were observed to display such behaviors. Even though Jose did not reach 100% independence, it was very clear he knew what steps to engage in to complete his task as demonstrated by repeatedly pointing to the “open milk” photo and saying “open”. Jose indicated repeatedly during Phase 3 that he used the visual support for obtaining information to complete each step of the activity by pointing and making verbal approximations indicating the expected action based on the picture cue.

These results indicated there was dramatic improvement in task completion without the support of a teacher, paraprofessional, or peer. Analysis of the data and review of effect size supported presentation of visual supports paired with systematic teaching use of the supports as a highly effective intervention. Simply providing the support is insufficient to change behavior; instruction on how to use the support is also needed.

Social validity results added to the understanding of the larger context of this study by providing subjective information on the perceptions of others who were working with stu-
dents in a variety of settings. The respondents to the social validity questionnaire indicated that the goal of increasing task independence was met through the use of the visual supports, the procedures were acceptable and aided in an increased level of understanding of the task expectations for both the participants and others that worked with them, and the outcomes were favorable, leading to an overall successful intervention strategy that not only assisted in teaching of new skills, but increasing overall participation in the settings in which the students were included. The ease of use and acceptance by teachers and support staff is encouraging for future use of visual supports in a variety of general education settings.

Practitioner Implications

Results of this study have implications for efficiently and effectively incorporating recommended best practices into the teaching of students with severe disabilities educated in general education settings. The participants demonstrated they could not only use the visual support to complete tasks with 80% independence or better, but enjoyed its use as a communication tool. The researcher chose activities that the students were already participating in and developed those opportunities to provide the students a greater level of independence. The visual supports were incorporated into routines already in place and could be easily implemented without disruption to the natural scope and sequence of the activity. The ease of the implementation suggests that general education teachers, special education teachers, paraprofessionals, and other support personnel could find additional opportunities across the day and throughout various environments to increase the opportunities to use visual supports. However, it is important to note that practitioners should first complete a symbol assessment prior to developing visual supports to ensure that appropriate symbols are used. It is essential to ensure that students understand the symbols used within their visual supports.

The visual supports in this study were easy both to make and to transport across environments. Visual supports of this nature could be beneficial in expanding the educational opportunities of all students who have difficulties with information presented only through spoken word with the expectation that they will understand what they hear. The students in the present study exhibited growth across their activities and demonstrated enthusiasm over their successes. The visual supports were easy to implement across environments and encouraged socially appropriate, on-task behavior giving students a greater level of access and interaction with their same-age peers in the school setting.

Another noteworthy aspect of the use of visual supports is the relatively short amount of time during which behavioral changes were observed; the study lasted one semester. For teachers looking at ways to increase student skills across a variety of domain areas and behaviors, and increase opportunities for participation, and successful completion of activities, visual supports are an effective intervention strategy. The supports are viewed as socially appropriate, and have a research base as an effective strategy for students with disabilities. This intervention is both effective and efficient, allowing teachers to spend a relatively short time for a potential marked gain in student skill development.

Limitations and Future Research

Follow-up to the present study could be completed to determine if the activities in which students demonstrated a high level of independence maintained and generalized to other settings or to the next grade level where the classroom is different but the activity is the same. It is a limitation to the current study that no generalization or maintenance probes were conducted. Parents could also be included to determine if activity schedules were successful within home routines.

There is some caution in the interpretation of the effectiveness of the intervention of the visual support combined with systematic teaching. Each participant had the opportunity to view and experience his visual support prior to the systematic teaching (Phase 3). Although there was no notable effect for the participants from simple exposure, this exposure could potentially have influenced participants’ subsequent performance.
Conclusion

An objective of all teachers is to provide students with skills that are essential to their growth academically, socially and communicatively across a variety of settings. This is particularly true for teachers of students with disabilities. Students must be given the tools necessary to function more independently in all of their environments. Results of this study indicate that visual supports in the form of activity schedules aided the participants in becoming more independent within their inclusive educational settings.

Results of this study have implications for how to teach children with severe disabilities across a variety of activities and settings. The participants demonstrated that they increased their independent task performance with the use of specifically designed visual supports. The teachers and support staff working with the students found the visual supports easy to implement and effective in decreasing the amount of adult support necessary for students to complete activities.

References


Comparison of Prompting Procedures to Teach Work Tasks to Transition-Aged Students with Disabilities

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Abstract: A single subject alternating treatment design was used to compare most-to-least and least-to-most prompts to teach work tasks in community businesses. Four students with moderate to severe disabilities, two paraprofessionals, and one transition teacher participated in the study. Results of the study suggest that both prompting strategies were effective in promoting the acquisition and maintenance of employment skills taught in community employment training settings. The special education teacher and paraprofessionals implemented the prompting strategies with fidelity and minimal training. Results are discussed in terms of future research and implications for expanding the scope of community-based employment skills training.

Despite efforts to improve competitive integrated employment for transition-aged students with disabilities, outcome data suggests that employment of young adults with disabilities is significantly lower compared to youth without disabilities (Newman et al., 2011). Employment rates for working-aged individuals (18-65 years-old) also remain consistently poor. For example, the National Organization on Disability reports that only 21% of individuals with disabilities were employed full or part-time in 2010 (N.O.D, 2010). These data are consistent with employment status information compiled by the American Community Survey (ACS). The ACS reports that only 33.7% of adults age 16–64 with disabilities are employed (Erickson, Lee, & von Schrader, 2015). Perhaps more troubling is that over the past decade, there has been a decline in integrated employment for people with intellectual and developmental disabilities receiving day supports from state agencies; only 18.6% of this population is currently working in integrated employment (Butterworth et al., 2015).

Legislation has responded to poor employment data and requires schools and rehabilitation agencies to provide quality employment experiences for transition-aged youth with significant disabilities. First, IDEA (2004) requires schools develop a transition plan that consists of coordinated activities that facilitate movement to post-school activities including employment. Second, the Rehabilitation Act, most recently amended under the Workforce Innovation and Opportunity Act (2014) places considerable emphasis on individuals with significant disabilities and transition-aged youth. State rehabilitation agency are now required to set aside 15% of their funds for pre-employment transition services which include work-based learning experiences. For students with significant disabilities to be included in these work experiences, professionals will need to understand how to use appropriate instructional strategies in applied work environments.

Researchers and policy makers have long recognized the importance early employment experiences for transition-aged students with disabilities (Benz, Lindstrom, & Yovanoff, 2000; Benz, Yovanoff, & Doren, 1997; Luecking & Fabian, 2000; Test, et al. 2009; White & Weiner, 2004). For example, Test et al. (2009) conducted a review of research studies and identified 16 evidence-based predictor categories correlated with successful post-high school outcomes such as employment for young adults with disabilities. Predictor categories included career awareness, community experiences, and paid employment/work experiences, among
others. White and Weiner (2004) found that youth with severe disabilities who participated in community training experiences while in high school were more likely to be employed after exiting school compared to those without such experiences. Because paid employment and meaningful community-based work experiences are indeed predictors of post-school success, students, especially those with moderate to severe disabilities, must be provided with applied experiences during the transition years.

To facilitate applied job training and paid work experiences for transition-aged students, transition professionals need to understand and implement reliable methods to rapidly train students to perform a complex array of multi-step work tasks and routines. Students with more significant disabilities will need individualized instruction and support to complete these tasks and often rely on paraprofessionals or job coaches for instruction (Donnell & Hardman, 2010). The available evidence suggests that the use of paraprofessionals in inclusive and community-based programs has grown dramatically (Giangreco, Hurley, & Sutter, 2009; Suter & Giangreco, 2009). As such, paraprofessionals need to be provided with training and education on the most effective strategies to teach the acquisition of new employment skills to students. Some of the challenges facing teachers in using paraprofessionals in inclusive community-based settings are deciding when such supports are necessary and how these supports and instructional procedures should be structured to maximize student success (Giangreco, 2010).

Special education teachers working with students with moderate to severe disabilities often use response prompts to teach students to acquire and maintain new skills. Response prompts are teacher behaviors or verbal cues that when presented to the student, increase the likelihood of the student responding correctly. The ultimate goal of response prompting is to transfer stimulus control from the teacher to the naturally occurring target stimulus (Wolery, Jones-Ault, & Doly, 1992). Two commonly used prompting strategies are least-to-most (LTM), and most-to-least prompting (MTL). The LTM prompting procedure is designed to allow an individual to independently respond before a prompt is delivered. The procedures of LTM include (a) using a hierarchy of prompts that are sequenced from least intrusive to the most intrusive amount of assistance, (b) presenting target stimulus at each level of the prompt hierarchy, (c) using a consistent response interval before delivering each prompt, and (d) reinforcing all correct responses (Wolery et al. 1992). Least-to-most prompting has been used to teach students with disabilities variety of transition related skills including food preparation and cooking skills (Mechling, Gast, & Fields, 2008), meal planning skills (Arnold-Reid, Schloss, & Alper, 1997), and table cleaning skills (Smith, Collins, Schuster, & Kleinert, 1999).

The MTL procedure is designed to systematically fade assistance from the prompt level needed to elicit a correct response. MTL has several procedural components that include (a) selecting the target stimulus and prompts that are sequenced from most intrusive to most intrusive, (b) identifying criterion for moving to the next least intrusive prompt in the hierarchy, and (c) ongoing assessment of individual performance levels (Wolery, et al. 1992). MTL has been used to teach students banking skills (Donnell & Ferguson, 1989), purchasing skills (Donnell & Lauglin, 1989), and exercise skills (O’Conner & Cuvo, 1989).

Researchers also compared different prompting strategies to use with students with disabilities. For example, Miller and Test (1989) compared constant time delay and least-to-most prompting in teaching laundry skills to students; they found that both strategies were effective but constant time delay was more efficient in terms of instructional time and number of errors. Aykut (2012) compared constant time delay and MTL prompting in teaching daily living skills. The results suggested that both procedures were effective, however MTL was more efficient in terms of instructional time and number of errors. Finally, Libby, Weise, Bancroft, and Ahearn (2008) compared MTL and LTM in teaching plays skills to children in a residential living setting. The authors found that both procedures were effective, however, the LTM procedure promoted faster skill acquisition. While there is research comparing the efficacy of response prompting procedures, to date no research has examined LTM and MTL prompting procedures in community-based employment settings. The purpose of this study, therefore, was to (a) compare MTL and LTM in teaching transition-aged students the acquisition of new
work tasks in employment settings, (b) examine the impact of paraprofessional and teacher training on the reliability and fidelity of implementing LTM and MTL response prompting procedures, and (c) report social validity data related to the instructional procedures.

Method

Participants

Four students with moderate to severe disabilities, two paraprofessionals, and one teacher who supported the students in community-based employment training participated in the study. Students were identified based on several criteria. First, students needed to be identified as a student with moderate to severe disability (intellectual and developmental disability, autism, multiple disability). Second, the students needed to have specific employment related individualized education program (IEP) goals and objectives. Finally, the student needed to participate in a community employment-training program under the supervision of a special educator. Students who met each these criterion and their parent/guardian were provided a letter introducing the purpose of the study and asking if they would like to participate in this study. Students and parents/guardians who expressed interest were provided with consent forms to review and return. Four students from this group were selected to participate in the study.

Students. David was a 20-year-old student classified with an intellectual disability. He had an intelligence quotient (IQ) of 56 as measured by the WAIS-IV (Wechsler Adult Intelligence Scale-4th edition), a standard score of 45 on the CASL (Comprehensive Assessment of Spoken Language), and a standard score of 47 on the EVT2 (Expressive Vocabulary Test). Kevin had good receptive language skills but had some expressive language delays. Kevin spent 100% of his transition services time in the community and independently used public transportation to get various community activities. He spent approximately 3 hours a week at an unpaid employment-training site.

Paraprofessionals. Two paraprofessionals implemented the LTM and MTL instructional programs. The first paraprofessional had 12 years experience working as a paraprofessional with 3 of those years working in transition programs. The second paraprofessional had 12 years experience with 9 years in a transition program. Neither paraprofessional had received training on implementing response-prompting procedures in community based employment settings.

Certified special education teacher. A certified special education teacher also implemented the LTM and MTL instructional programs. The first paraprofessional had 12 years experience working as a paraprofessional with 3 of those years working in transition programs. The second paraprofessional had 12 years experience with 9 years in a transition program. Neither paraprofessional had received training on implementing response-prompting procedures in community based employment settings.
Instruction was conducted in community employment-training settings. David trained at a large chain, box store where he learned to fold shirts and “zone” clothes (i.e. arranging clothes according to size on racks). Kevin trained in the kitchen of a take-out pizza chain restaurant where he learned to make a large standard oval pepperoni pizza and a square deep-dish pepperoni pizza. Arnold trained at a school district office where he learned to fill the copy machines with paper and disinfect doorknobs and light switches. Finally, Steve trained at a large chain grocery store where he learned to bag groceries and return carts to the cart corral.

Prior to the implementation of instruction, observations were conducted at each job-site to identify new or novel work tasks that could be taught to each student. To ensure task equivalency, we identified tasks in each job training sites that were roughly equivalent in terms of the number of discrete steps and were similar in terms of the discriminations for each step. Task analyses were subsequently developed by either observing other employees complete the task or by one of the authors completing the task and documenting the steps. Table 1 provides information about each task, the number of steps in each task, and the prompting strategy used to teach the task.

The dependent measures used to compare the MTL and LTM prompting procedures were the percentage of unprompted correct responses on the task analysis during probe sessions and the number of instruction sessions to criterion. The dependent measure used to assess the reliability and fidelity of the response prompting instructional procedures was determined by calculating the percentage of agreement between observers on the fidelity of the response prompting delivery as well as the agreement on the reliability of the data collection during the community based instruction. Percentages were calculated by taking the total number of agreements, dividing that number by the number of possible agreements and multiplying by 100.

Percent of unprompted correct response during probe sessions. Probes were conducted to determine the percentage of unprompted correct responses on each task. The paraprofessionals and special education teacher conducted probe session at the student’s employment training site. During the probe session, each student was provided the stimulus that cued him to respond (e.g. “time to make a deep dish pizza.”). After which, the student performed the steps outlined in the task analysis with no instructional feedback other than general social praise for “working hard.” If the student did not respond within the pre-determined response interval, the instructor provided a least intrusive prompt until the student completed the step specified in the task analysis. Each independent response and the type of prompt needed to complete each step during each instructional and probe sessions was recorded.

Instructional trials to criteria. A performance criterion of 100% accuracy on three consecutive probes was established prior to the implementation of the study. The rate of skill acquisition under both prompting conditions was

### Table 1

<table>
<thead>
<tr>
<th>Student</th>
<th>MTL Task</th>
<th>Number of Steps</th>
<th>LTM Task</th>
<th>Number of Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>David</td>
<td>Folding Shirts</td>
<td>11</td>
<td>Zoning</td>
<td>7</td>
</tr>
<tr>
<td>Kevin</td>
<td>Pepperoni Pizza</td>
<td>11</td>
<td>Deep Dish Pizza</td>
<td>10</td>
</tr>
<tr>
<td>Arnold</td>
<td>Filling Copy Machine</td>
<td>7</td>
<td>Disinfect Doors/Switches</td>
<td>6</td>
</tr>
<tr>
<td>Steve</td>
<td>Cart Return</td>
<td>10</td>
<td>Bagging Groceries</td>
<td>9</td>
</tr>
</tbody>
</table>

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assessed by calculating the number of instructional trials to criteria for each work task.

**Social validity.** The paraprofessionals and teachers completed a social validity survey. The survey consisted of a 5-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neither agree/disagree, 4 = agree, 5 = strongly agree) to determine the functional utility of both prompting procedures. The survey asked questions about the ease of use of each strategy, data collection procedures, and effectiveness of each prompting strategy in promoting student learning in community employment settings.

**Experimental Design**

We used an alternating treatment design (O’Neill, McDonnell, Billingsley, & Jensen, 2011) to measure the effectiveness of MLT prompting and LTM prompting on teaching work tasks to students with disabilities. We choose the alternating treatment design because of the unique and complex nature of community employment training. That is, the design does not require baseline, it allows for immediate intervention to teach the work tasks, and it made it more feasible and socially valid for quantifying community-based instruction. Moreover, an immediate intervention is important in employment settings because individuals are expected to perform essential functions of the job from the onset of employment or employment training and failure to perform essential job functions cannot be considered socially valid. The experimental conditions included MLT and LTM prompting strategies implemented by paraprofessionals and teachers in community based employment settings. We established task equivalency for each work task by ensuring that each work task in the MLT and LTM condition contained roughly the same amount of discrete steps with comparable response topography. Each condition was counterbalanced across students. That is, one instructional session on MLT and LTM prompting was implemented each day the student attended his community-based employment training and the introduction of each prompting strategy was alternated across participants. Training on each task ended when each student successfully performed each step in the TA without prompts over three consecutive probe sessions.

**Training Procedures**

**Procedural fidelity.** The paraprofessionals and special education teachers were provided with two 1-hour training sessions prior to the implementation of each intervention. The training sessions included a review of instructional and data collection procedures. In addition, each instructor was provided with an instructional script outlining the procedural parameters for each strategy. The script outlined specific steps for implementing both MLT and LTM prompting procedures. Fidelity observations were conducted until each instructor implemented the instructional procedures with 100% accuracy over two trials. During these observations, the authors observed and independently recorded information on a fidelity checklist. The checklist included information about (a) delivering task direction, (b) using an appropriate response interval before delivering a prompt, (c) delivering a prompt according to the prompt sequence, (d) delivering appropriate reinforcement for correct response, and (e) implementing appropriate error correction procedures. During these fidelity observations, the congruence of instructor’s behavior with outlined procedures was recorded with a “+” for correct implementation and “−” for incorrect implementation. Fidelity data was collected during 30% of instructional sessions. Instruction was implemented with 98% accuracy across paraprofessionals and the special education teacher during fidelity observation sessions.

**Most-to-Least.** In the MTL prompting condition, each paraprofessionals and special education teacher was provided with an instructional script that outlined the instructional procedures of the MTL prompting strategy and was provided with relevant data collection sheets that allowed data collection on each step of the TA. Prior to initiating instruction, we identified the controlling prompt that elicited the appropriate response for each step in the MTL task analysis by conducting an initial probe with each student. During the probe, the instructor cued the student to start the task “it is time to . . .” and waited an appropriate interval for a response. For each student,
the MTL hierarchy included four prompting levels: model, direct verbal, indirect verbal, and independent. This information was recorded on an instructional data sheet that listed the sequence of steps and the specific prompt for each step. The criterion for moving to the next least intrusive level in the hierarchy was two consecutive correct responses at the designated prompt level for each step. If the student performed a step at a least intrusive prompt level during the weekly probe session, we adjusted the instructional prompt and sequence to reflect the prompt level at which the student performed.

The instructor used total task instruction to teach the steps in chain to each student. That is, all the steps on the task analysis were taught simultaneously. Correct responses on each step were followed by social reinforcement (e.g. good job). If the student made an error on a step in the task sequence, the paraprofessionals or special education teacher prompted the student using the next most intrusive prompt in the hierarchy. Instruction continued until the student achieved 100% unprompted correct responses for three consecutive trials.

Least-to-most. Paraprofessionals and special education teacher were also provided with an instructional script and training on the procedural parameters of the LTM prompting strategy and were provided with corresponding data collection sheets. Similar to the MTL least condition, we conducted an in initial probe to ensure stimulus control and establish a controlling prompt for each step in the chain. Four prompting levels for each student were identified and were sequenced from least assistance to most assistance: independent, indirect verbal, direct verbal, and model. During instruction, the paraprofessionals or special education teacher cued the student to begin the task and waited an appropriate response interval. If the student did not respond within the interval period or responded incorrectly, the paraprofessionals or special education teacher prompted the student using the least intrusive prompt identified in the hierarchy. If the student responded correctly, the paraprofessionals or special education teacher provided social reinforcement and moved to the next step in the chain. If the student did not respond or responded incorrectly, the next most intrusive prompt in the hierarchy was delivered. This continued until the student demonstrated the correct response for the step.

Maintenance

Maintenance probes were conducted 3 weeks after each student successfully meet criteria for independent performance on targeted skills. During these probes, the paraprofessionals or special education teacher cued the student to begin the task and documented the percent of unprompted correct responses for each step.

Inter-observer Reliability

Inter-observer reliability on student performance was gathered on 86.8% of all probes. During the probes, one of the authors observed the paraprofessionals or special education teacher implementing the probe procedures. Agreement was calculated for the percentage of steps correctly completed. An agreement was recorded if both the paraprofessionals or special education teacher and the observer independently recorded the student’s response as correct or incorrect on each task analysis step. Inter-observer agreement was calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100. Inter-observer agreement for paraprofessional and certified teacher data recording of the task analysis steps during instructional and maintenance probes across students was 100%.

Results

Figures 1–4 shows the percentage of unprompted correct responses for each student across instructional procedures. As can be seen from student performance, both MTL and LTM were effective in teaching students their respective work tasks. David, Kevin, and Steve met criteria on both prompting procedures. David, Kevin, and Arnold met criteria on LTM prompting and reached two consecutive probes at 100% on MTL. However, due to end of school year time constraints, three probes were not conducted for Arnold. Maintenance probes were conducted 3 weeks after each student met proficiency criteria. David, Kevin, and Arnold
had 100% accurate performance on both prompting strategies. Steven had 100% accuracy on the LTM strategy and 90% accurate performance on the MTL strategy.

We also collected instructional session data to determine the number of instructional session trials to criteria (Table 2). David learned to fold shirts using the MTL prompting strategy in 11 instructional trials and to zone clothes in LTM condition in 12 instructional trials. Kevin required five instructional trials to learn to make a pepperoni pizza under the MTL condition and three instructional trials under the LTM condition. Steve required 10 instructional trials to learn cart returns in the MTL condition and 10 instructional trials to learn how to bag groceries under the LTM condition. Finally, Arnold required nine instructional trials to learn to fill a copy machine and 10 instructional trials to disinfect doors and lights (only two consecutive trials).

Table 3 provides a summary of social validity data. The mean rating for all questions across paraprofessionals and the teacher were higher for LTM strategy. Specifically, LTM mean scores were considerably higher for ease
of use, data collection format, and use with other students in community-based settings.

Discussion
The purpose of this study was to compare MTL and LTM in teaching transition-age student with moderate to severe disabilities work tasks in community businesses. A number of conclusions can be surmised from the results of this study. First, paraprofessionals and teachers can easily be trained to use both response prompting strategies and once trained they can use both strategies with high levels of procedural fidelity. Second, there was no difference between the response prompting strategies as both strategies led to acquisition of each of the target work tasks in a similar number of instructional trials and sessions. Third, while there were consistently high ratings of the social validity of the intervention, the paraprofessional and teacher indicated that LTM easier to implement.

Our findings are consistent with comparison studies on LTM and MTL procedures (Libby et al., 2008) in that both procedures

![Figure 3. Percentage of unprompted correct responses for Steve.](image)

![Figure 4. Percentage of unprompted correct responses for Arnold.](image)
lead to the acquisition of the targeted skills. Unlike the Libby study, however, we did not detect any significant differences regarding the speed in which students acquired the skill. Since both procedures lead to both acquisition and maintenance of the target skills, transition teachers should make decision about which procedure to use in community-based employment settings based on several factors. First, the learning styles and preferences of the student and the difficulty of the work task should be considered when selecting a prompting procedure. For example, the MTL procedure should be selected if the student traditionally makes a high number of errors when acquiring new skills (Wolery et al. 1992). Moreover, MTL allows an instructor to immediately provide assistance on steps in the task analysis before the student responds. This is an important consideration when implementing instruction in a community-based employment training setting where errors can interfere with the flow of a task. Conversely, the LTM procedure should be used when a student will not make a high number of errors during acquisition (Wolery et al. 1992).

Second, because paraprofessional most commonly implement community-based employment training for students with disabilities, teachers should consider staff training and knowledge of each prompting procedures. Ascertaining this knowledge is important because each procedure requires an instructor to (a) utilize and sequence various prompts based on the type of strategy used, (b) determine the appropriate response intervals, (c) track different prompts and determine criteria for changing prompts, and (d) use different data collection formats for each strategy. Training on each procedure should be con-

### Table 2

**Instructional Trials to Criterion for Participants**

<table>
<thead>
<tr>
<th>Participant</th>
<th>MTL</th>
<th>LTM</th>
</tr>
</thead>
<tbody>
<tr>
<td>David</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>Kevin</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Arnold</td>
<td>9</td>
<td>10*</td>
</tr>
<tr>
<td>Steve</td>
<td>10</td>
<td>10*</td>
</tr>
</tbody>
</table>

* Only two consecutive trials

### Table 3

**Social Validity**

<table>
<thead>
<tr>
<th>LTM</th>
<th>MTL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean</strong></td>
<td><strong>Mean</strong></td>
</tr>
<tr>
<td>The LTM strategy was easy to use.</td>
<td>The MTL strategy was easy to use.</td>
</tr>
<tr>
<td>The LTM was effective at promoting</td>
<td>The MTL was effective at promoting</td>
</tr>
<tr>
<td>student learning.</td>
<td>student learning.</td>
</tr>
<tr>
<td></td>
<td>4.33</td>
</tr>
<tr>
<td>The LTM allowed students with</td>
<td>The MTL allowed students with</td>
</tr>
<tr>
<td>disabilities to participate more fully</td>
<td>disabilities to participate more fully</td>
</tr>
<tr>
<td>in community-based employment</td>
<td>in community-based employment</td>
</tr>
<tr>
<td>environments.</td>
<td>environments.</td>
</tr>
<tr>
<td></td>
<td>3.33</td>
</tr>
<tr>
<td>The LTM strategy did not disrupt</td>
<td>The MTL strategy did not disrupt</td>
</tr>
<tr>
<td>employment training routines and</td>
<td>employment training routines and</td>
</tr>
<tr>
<td>activities.</td>
<td>activities.</td>
</tr>
<tr>
<td></td>
<td>3.33</td>
</tr>
<tr>
<td>The LTM data collection format was easy</td>
<td>The MTL data collection format was easy</td>
</tr>
<tr>
<td>to use.</td>
<td>to use.</td>
</tr>
<tr>
<td></td>
<td>4.33</td>
</tr>
<tr>
<td>I would use LTM strategy with other</td>
<td>I would use MTL strategy with other</td>
</tr>
<tr>
<td>students in community employment</td>
<td>students in community employment</td>
</tr>
<tr>
<td>training.</td>
<td>training.</td>
</tr>
<tr>
<td></td>
<td>4.33</td>
</tr>
</tbody>
</table>

*Note:* 1 = strongly disagree; 5 = strongly agree
ducted prior to implementing instruction to ensure accurate delivery of prompts.

A number of limitations of the study should be noted. First, generalizations about the effectiveness of each prompting strategy are limited because of the small number of students who participated in the study. Second, the study did not assess the generalization of the targeted employment skills to other similar settings. Finally, we did not measure the types of student response errors under each prompting condition. Therefore, it is not clear whether the two procedures produced different types of student errors.

Despite these limitations, our comparison of the MTL and LTM procedures suggests that both strategies are effective in teaching employment skills to students with disabilities. Recent legislation (Workforce Innovation and Opportunity Act, 2014) and Employment First initiatives reinforce the importance for transition professionals to provide employment training to students with more significant disabilities in applied settings. Training in community based employment settings will require teachers to employ an array of instructional strategies that are evidenced-based and that meet the needs of the student. Additional research is needed to examine how to teach supervisors, coworkers, and other natural supports to use various instructional procedures to teach youth and young adults with moderate disabilities in integrated employment settings.

References


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The eighth volume of the CEC Division on Autism and Developmental Disabilities’ Prism series, *Friendship 101* focuses on building social competence, friendship making, and recreation and leisure skills among students with autism spectrum disorder and other developmental disabilities. Chapters in this evidence-based, user-friendly guide address the needs of students in different developmental periods (from pre-K through young adulthood), providing teachers, parents, faculty and teacher educators with tools and strategies for enhancing the social skill development of these children and youth. Presented through an ecological perspective, together these chapters emphasize building social competence within and across school, home, and community contexts.

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