Overcoming Language Barriers between Interventionists and Immigrant Parents of Children with
Autism Spectrum Disorder

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Abstract

This study used a video prompting intervention to overcome language barriers between English-speaking trainers and Spanish-speaking immigrant parents of children with autism. Parents were taught instructional strategies targeting independent dressing. A multiple baseline design across three families and a replication using an alternating treatments design with a fourth family were used to evaluate the effects of the intervention. All mothers reached mastery criterion and generalization of instructional strategies was observed for three mothers, with treatment gains maintaining during follow-up. Improvements in independent dressing skills was observed for four children. Findings suggest that video prompting can be used to teach immigrant parents of children with autism who have limited English proficiency when there is a language mismatch between parents and trainers.

Autism spectrum disorder (ASD) is characterized by deficits in social communication as well as restricted and repetitive patterns of behaviors and interests (American Psychiatric Association, 2013). ASD appears to affect individuals across racial and ethnic groups (Wingate et al., 2014). Recent research focusing on culturally and linguistically diverse individuals with ASD indicate that (a) individuals with ASD can be bilingual regardless of cognitive impairments (Hambly & Fombonne, 2014), (b) bilingualism does not negatively impact language development (Drysdale et al., 2015; Lund et al., 2017; Wang et al., 2018), and (c) incorporating heritage languages into interventions may lead to better treatment outcomes (Lim, O'Reilly, Sigafos, Ledbetter-Cho et al., 2019). In their 2019 review, Lim et al. found that amongst studies that investigated the effects of incorporating the heritage languages of participants with neurodevelopmental disorders into treatment, only two out of 18 studies utilized parents as interventionists. Lim et al., (2019) also noted that having parents implement interventions may be more socially valid because heritage languages are more likely to be spoken within the home environment. Additionally, given the limited number of bilingual service providers available (Mitchell, 2016; Olvera & Olvera, 2015), involving parents as therapists may be the most practical solution to providing culturally responsive treatment.

Parent Training

Teaching parents to deliver interventions to their children may not only circumvent the shortage in bilingual service providers (Lim, O'Reilly, Sigafos, Ledbetter-Cho et al., 2019), but as noted by the National Research Council (2001), parent training is also an essential component of successful interventions for children with ASD. Discussion and empirical evidence regarding the importance of involving parents in intervention for children with ASD, especially in terms of facilitating maintenance and generalization of treatment gains, dates back to the early 1970s

(Lovaas, Koegel, Simmons, & Long, 1973; Schopler & Reichler, 1971). Given that children have more contact with their parents as compared to teachers or therapists, parents have potentially greater impacts on their children's outcomes (Jang et al., 2012). Furthermore, effective parent training not only benefits the child with ASD, but may also increase parents' confidence as well as decreasing stress and depression (Iida et al., 2018; McConachie & Diggle, 2007)

Parent training procedures involve multiple components that most commonly begin with a trainer providing the parent with verbal and sometimes, written, instructions (Lang et al., 2009; Postorino et al., 2017). The trainer may then model the procedure and have the parent engage in role-playing before providing verbal feedback (Lang et al., 2009; Postorino et al., 2017). These conventional parent training procedures rely heavily on effective verbal communication between parents and trainers.

Parent Training and Immigrants

Parents, however, may not necessarily speak or understand the language that their trainer is conversing in. For example, in Australia, 11% of immigrants did not speak English well (Australian Bureau of Statistics, 2017) and 40% of immigrants in the United States were identified as having limited English proficiency (Batalova & Zong, 2016). Barriers in language and communication have been associated with poorer outcomes for immigrant families (Okraien et al., 2017). In fact, overcoming language barriers has been identified as a key strategy for increasing immigrant parents' participation in the treatment of their children with disabilities (Brassart et al., 2017). Additionally, having a language barrier has been identified as one of the key obstacles faced by immigrant parents of children with ASD when accessing diagnostic and intervention services for their children (Lim, O'Reilly, Sigafos, Lancioni, et al., 2020). The heavy reliance on verbal communication within parent training procedures may preclude

immigrant parents who do not speak the language of their host country, contributing to disparate outcomes for immigrant families.

One strategy for providing effective parent training to immigrant parents is to match them with trainers who speak the same language. For example, in a community-based program called *Madres a Madres*, Latina female community health workers provided parent training to Latina immigrant mothers (Williamson et al., 2014). Mothers were coached on child development, positive parenting techniques, and positive behavioral management. Based on parent reports, the intervention was successful in improving parenting skills, family management and support, as well as decreasing child internalizing behaviors. Similarly, Kim, Cain, and Webster-Stratton (2008) delivered the *Incredible Years Parenting Program* to 29 immigrant mothers from Korea. Intervention, delivered in small groups, consisted of teaching mothers the strategies for playing with their child, providing effective praise and rewards, setting boundaries, as well as managing problem behaviors. Results demonstrated that the intervention was successful at increasing positive discipline strategies, and gains were maintained 1-year post-intervention.

A common component of both studies discussed above is that intervention was delivered in parents' native languages. In Williamson et al. (2014), not only were materials and training provided in Spanish, but the interventionists were also community members who were encouraged to build rapport and support participants in connecting with other community members. In Kim et al. (2008), materials were translated to Korean and all components of the intervention were delivered in Korean. Adapting interventions to the culture and language of the family is ideal. However, given the shortage in bilingual service providers (Mitchell, 2016; Olvera & Olvera, 2015), such strategies may not always be feasible. Although trainers could engage the help of interpreters, the involvement of such individuals in the delivery of

intervention may be a double-edged sword. For instance, if there is a dialectal mismatch between the interpreter and the parent, inaccurate information and/or cultural misunderstandings may result (Ostergren, 2014). Because formally trained interpreters who work in the educational setting are rare, family members or friends may serve as interpreters (ASHA, n.d.). The use of untrained interpreters, however, may result in key words or concepts being modified or even omitted, which could negatively impact treatment outcomes (Vera, 2002).

Technology

A potential, and more practical solution to overcoming language barriers may be to deliver intervention with the help of technology. In a study by Pham, Kohnert, and Mann (2011), an English-speaking teacher taught a Vietnamese preschooler with a developmental delay to identify English and Vietnamese vocabulary words via a bilingual (English and Vietnamese) intervention procedure. A member of the research team who was bilingual in English and Vietnamese pre-recorded all verbalizations and inserted them into PowerPoint®. During intervention, the teacher played the recordings and provided praise if the participant correctly identified the target word. If the participant emitted an incorrect response, the teacher replayed the recording while pointing to the correct picture. Preliminary results indicated that the intervention was successful at increasing the participant's receptive vocabulary in both Vietnamese and English. This is the only study that has utilized technology to enable an interventionist to deliver treatment to a participant in a language that the interventionist does not speak.

Current Study

The purpose of the current study is to extend the use of pre-recorded intervention materials to parent training. Video prompting is a teaching strategy that uses pre-recorded video clips.

Procedures involve a learner watching video clips depicting each step of a target skill and completing the modeled step (Cruz-Torres et al., 2020). Video prompting has been used to teach a variety of skills including cooking-related tasks, folding laundry, dish washing, and putting on clothes (Banda et al., 2011). However, to the authors' knowledge, the use of video prompting within parent training procedures has not yet been investigated. Because many children with ASD demonstrate deficits in daily living skills (DLS) like dressing, toileting, and feeding (Scahill et al., 2016), which are most often used in the home environment, parent training on how to teach DLS may be particularly important. Thus, the current study investigated whether English-speaking therapists can use video prompting to teach Spanish-speaking immigrant parents to implement instructional strategies for promoting independent dressing in their children with ASD. Specific research questions included:

1. Is video prompting implemented by English-speaking therapists effective at teaching Spanish-speaking immigrant parents of children with ASD to use a visual schedule and a least-to-most prompting procedure to promote independent dressing skills for their children?
2. Do parents' use of instructional strategies generalize from parent-training sessions to sessions in which the parents teach their children?
3. Do parents find the video prompting intervention to be a socially valid teaching procedure?

Method

Participants

To recruit participants for this study, researchers contacted a Board Certified Behavior Analyst (BCBA) who provided applied behavior analysis (ABA) services in Spanish to Hispanic

families. Information on the study and the contact information of the research team was provided to the BCBA. Five families contacted the research team, with four families meeting inclusion criteria. Inclusion criteria were: (a) parents spoke Spanish, (b) parents self-identified as having limited English proficiency (i.e., have difficulty holding and understanding conversations in English), and (c) parents had a child with an official diagnosis of ASD, either from a doctor or a school personnel, and the child did not dress himself/herself independently.

The Language Experience and Proficiency Questionnaire (LEAP-Q; Marian, Blumenfeld, & Kaushanskya, 2007) was used to gather detailed information on parents' exposure to English. The Receptive One-Word Picture Vocabulary Test-Fourth Edition (ROWPVT-4; Brownell, 2000) was administered by an English-Spanish bilingual researcher to determine parents' English receptive vocabulary skills. Parents were shown sets containing four pictures and asked to indicate which picture corresponded with the word spoken by the assessor. The ROWPVT-4 is a norm-referenced assessment that is suitable for use with persons ranging from 2 to 80 years old (test/retest reliability = .78 to .93).

Family 1. Leah was a 30-year-old Hispanic woman who immigrated to the U.S. from Mexico at the age of 18. Her highest level of education obtained was high school and her reported annual household income was between \$35,000 to \$49,999. Leah was a stay-at-home mom. Her household consisted of her husband, two typically developing teenagers, and a daughter with ASD. Leah's answers on the LEAP-Q indicated that Spanish was most commonly used in her environment (i.e., 80% of the time) and she reported choosing to read and speak in Spanish over English 100% of the time. She acquired English when she was 18 years old and did not consider herself to be fluent in English. On a scale of 1-10, she rated her level of competency in English

as 3 in terms of verbal communication, 3 in terms of understanding, and 5 in terms of reading. Her percentile rank on the ROWPVT-4 was less than 1.

Mariana was a 4-year-old female who was diagnosed with level 2 ASD (i.e., requiring substantial support according to the DSM-5) by her pediatrician and neurologist at the age of two. Mariana attended a state preschool program for children with disabilities and received special education services entirely in English. She was bilingual in English and Spanish (i.e., she could follow 2-step vocal instructions, imitate verbalizations, and speak in full sentences in both languages). Parent report and observations by researchers prior to baseline indicated that Mariana did not undress and dress herself independently. Challenging behaviors in the form of crying and screaming were also seen during dressing routines. Prior to the onset of the study, she was not receiving any therapy besides 20 minutes of English Speech therapy per week at school. Mariana had previously received six months of in-home applied behavior analysis (ABA) therapy in Spanish but was not receiving ABA therapy during the study.

Family 2. Pamela was a 30-year-old Hispanic woman who immigrated to the U.S. from Mexico at the age of 17. Her highest level of education obtained was high school and her reported annual household income was between \$25,000 to \$34,999. Pamela was a single mother with a full-time job. There was no one else in her household besides her son, Juan. Pamela's answers on the LEAP-Q indicated that Spanish was most commonly used in her environment (i.e., 80% of the time) and she reported choosing to read and speak in Spanish over English 100% of the time. She acquired English when she was 17 years old and did not consider herself to be fluent in English. On a scale of 1-10, she rated her level of competency in English as 0 in terms of verbal communication, 5 in terms of understanding, and 2 in terms of reading. Her percentile rank on the ROWPVT-4 was less than 1.

Juan was a 7-year-old male who was diagnosed with level 3 ASD (i.e., requiring very substantial support according to the DSM-5) by a neurologist at the age of three. Juan attended a special education classroom and received services entirely in English. He received in-home speech and occupational therapy for 30 minutes twice a week. Prior to the onset of the study, Juan was not receiving ABA therapy. However, he started receiving two hours of in-home ABA therapy in Spanish per week during baseline independent of the study. Dressing skills were not targeted during these ABA sessions. Juan was nonverbal and communicated using a speech-generating device (SGD) provided by the school. His SGD was programmed in English. He was able to request for items using full sentences via his SGD. At home, Juan was able to follow one-step vocal instructions in Spanish. Parent report and observations by researchers prior to baseline indicated that Juan did not undress/dress himself independently. Challenging behaviors in the form of flopping on surfaces, elopement, and self-injury (i.e., slapping his head or stomach with an open hand) were also seen during dressing routines.

Family 3. Teresa was a 39-year-old Hispanic woman who immigrated to the U.S. from El Salvador at the age of 27. Her highest level of education attained was some college and her reported annual household income was less than \$20,000. Teresa was a stay-at-home mom. Her household consisted of her husband, a typically developing teenage daughter, and twin sons who both had diagnoses of ASD. One of the boys (not involved in this study) also had comorbid hydrocephalus and cerebral palsy. Her responses to the LEAP-Q indicated that Spanish was most commonly used in her environment (i.e., 90% of the time). She also reported preferring to read and speak Spanish over English 100% of the time. She acquired English when she was 23 years old and did not consider herself fluent in English. On a scale of 1-10, Teresa rated her level of

competency in English as 3 in terms of verbal communication, 4 in terms of understanding, and 2 in terms of reading. Her ROWPVT-4 percentile rank was less than 1.

Pedro was a 4-year-old male who was diagnosed with level 3 ASD (i.e., requiring very substantial support according to the DSM-5) by a developmental pediatrician at the age of 18 months. He also had myopia and astigmatism. He attended a state preschool program for children with disabilities and received special education services entirely in English. He was bilingual in English and Spanish (i.e., he was able to follow 1-step vocal instructions and imitate verbalizations in both languages). Pedro received in-home occupational therapy for 45 minutes twice a week. Prior to the onset of the study, Pedro was not receiving ABA therapy. However, he started receiving 3 hours of in-home ABA therapy in Spanish per week during baseline from a service independent of the study. Dressing skills were not targeted during these ABA sessions. Parent report and observations by researchers prior to baseline indicated that Pedro did not undress/dress himself independently. Challenging behaviors in the form of eloping, spinning, and crying were also seen during dressing routines.

Family 4. Rebeca was a 33-year-old Hispanic woman who immigrated to the U.S. from Mexico at the age of 27. Her highest level of education obtained was high school and her reported annual household income was between \$25,000 to \$34,999. Rebeca was a stay-at-home mother. Her household consisted of her mother-in-law, father-in-law, and her twin daughters diagnosed with ASD. Rebeca's husband worked in Mexico and was away for most of the year. Rebeca's answers on the LEAP-Q indicated that Spanish was most commonly used in her environment (i.e., 90% of the time). She reported preferring to read and speak in Spanish over English 90% of the time. Rebeca acquired English when she was 12 years old and did not consider herself to be fluent in English. On a scale of 1-10, she rated her level of competency in English as 3 in terms of verbal

communication, 4 in terms of understanding, and 4 in terms of reading. Her percentile rank on the ROWPVT-4 was less than 1.

Ariana and Diana were 8-year-old females diagnosed with level 2 ASD (i.e., requiring substantial support according to the DSM-5) by their pediatrician at the age of two. Ariana and Diana attended a state preschool program for children with disabilities and received bilingual special education services. Prior to the onset of the study, both girls were receiving Speech therapy at a clinic for 45 minutes twice a week and Occupational therapy at a clinic for 1 hour once a week. Both girls received ABA therapy at a clinic two years prior to the study but were not receiving ABA at the time of the study.

Ariana was bilingual in English and Spanish (i.e., she could follow 2-step vocal instructions, imitate verbalizations, and speak using one word in English and Spanish). Parent report and observations prior to baseline indicated that she did not undress/dress herself independently. Challenging behaviors in the form of self-injurious behaviors (e.g., hitting with open hand, pulling hair) were also seen during dressing routines.

Diana was bilingual in English and Spanish (i.e., she could follow 2-step vocal instructions). Diana was mostly non-verbal with the exception of echolalic vocalizations. Parent report and observations prior to baseline indicated that Diana did not undress/dress herself independently. Challenging behaviors in the form of screaming, crying and aggression towards others (i.e., hitting with an open hand, pinching and pushing) was also seen during dressing routines.

Research team. A bilingual graduate student trained in providing behavioral interventions to children with ASD and their families who was fluent in English and Spanish conducted language assessments, translated materials to Spanish, and acted as a model in the videos. Two other

graduate students who did not speak Spanish delivered the intervention. Both of these students had extensive experience delivering clinical intervention services to children with ASD and their families. Prior to intervention, both trainers practiced the intervention (described below) until treatment integrity was at 100% accuracy across two consecutive sessions.

Design

This study was pre-registered on Open Science Framework (Lim, O'Reilly, Vargas, et al., 2019). A multiple baseline design (Cooper et al., 2019) across Families 1, 2 and 3 was used to evaluate the efficacy of the video prompting intervention. A replication was conducted with Family 4 using an alternating treatments design, which can be used to compare conditions in addition to treatments (Barlow et al., 2009). In the current study, the alternating treatments design was used to compare conditions (i.e., Rebeca's fidelity of implementation across her twin daughters).

During baseline, parents were assessed on how they would teach their child the selected target behavior. No training was delivered during baseline. During intervention, video prompting and role-playing were used to train parents to use a visual schedule and a least-to-most prompting procedure to teach their child the target behavior (i.e., undressing/dressing). Family 1 had five baseline sessions, Family 2 had eight baseline sessions, and Family 3 had 11 baseline sessions. Participants were randomly assigned to each leg of the multiple baseline. Family 4 had five baseline sessions per child.

Setting

Sessions were conducted in participants' homes. Because the target skill was independent dressing, sessions were either conducted in a bedroom or bathroom depending on the mothers' preferences.

Materials

After parent reports and observations by researchers confirmed that the children with ASD did not undress and dress themselves independently, a task analysis for undressing/dressing oneself was developed. In order to promote child independence, a visual schedule for undressing/dressing was also created for each child. Following the creation of the visual schedule, a set of instructions for how the parent would teach the child to undress and dress himself/herself was created. Video clips to be used in the video prompting intervention were then filmed based on this task analysis.

Child task analysis of undressing/dressing. The task of undressing/dressing oneself was broken down into specific components. The task analysis for all children included taking off and putting on a shirt and pants, skirt, or shorts.

Visual schedule. Once the child task analysis was finalized, a visual schedule including all the steps each child had to complete to get undressed and dressed was created. The bilingual researcher collected photos of each child completing each step of the dressing task analysis with the consent of his/her parent. Each child's visual schedule consisted of photos of himself/herself completing each step of the task analysis.

Parent task analysis for teaching dressing. A detailed description of the specific steps that a parent needed to perform to teach her child to get dressed using a visual schedule and a least-to-most prompting procedure was created. A member of the research team who was not involved in the creation of the task analysis reviewed it and made changes as needed. Finally, two members of the research team role-played the task analysis (i.e., the steps for using a visual

schedule and a least-to-most prompting procedure to facilitate independent dressing) and made changes as needed.

Videos. Videos were then created for teaching dressing. Videos were filmed in Spanish and began with a short description of the intervention (e.g., You will be watching a video demonstrating how to teach your child to dress himself/herself. After watching each clip, you will practice the step with your trainer. If a mistake was made during practice, your trainer will direct you to watch the step and practice again. Let's begin.). The video clips depicted two Spanish-speaking models, one acting as the parent and the other as the child. In order to individualize the videos for each family, the child model incorporated challenging behaviors that were commonly observed during baseline for each child. The parent model demonstrated how to teach the child to undress and dress him/herself by following the steps on the parent task analysis. Each step was filmed separately. Within each step, for instance pull shirt over one's head, there were clips demonstrating (a) the parent's response if the child responded correctly, (b) the parent's response if the child needed a gestural prompt, (c) the parent's response if the child needed a verbal prompt, (d) the parent's response if the child needed a physical prompt, and (e) the parent's response if child made an error (e.g., tried to put his head in the arm hole). These clips were then uploaded onto PowerPoint®, with one clip per slide. The slide following the last clip of the task analysis contained narrated instructions for the parent to practice the entire task analysis with the trainer. The PowerPoint® slides were then uploaded onto an iPad.

To assess the cultural validity of videos, 14 individuals (i.e., parents of children with ASD, therapists with experience working with children with ASD, and parents of typically developing children) who were fluent in Spanish watched selected clips and filled out a four-point Likert scale questionnaire. Participants were asked to rate the degree to which they agreed

or disagreed with five statements pertaining to the verbalizations and content of the videos (e.g., if someone from Latin America heard these videos, he/she would be able to understand them).

The total number of points for each questionnaire was 20. On average, participants rated the videos to be highly acceptable and easily understood ($M = 19.42$).

Procedural sheet. Because each step of the task analyses had two to five video clips depicting the parent's response based on the child's behavior (e.g., if the child does not respond to the gestural prompt to put on his/her shirt, the parent provides a verbal prompt), procedural sheets were created for both trainers to follow during each intervention session. This was done to ensure that both trainers provided equal opportunities across parents for watching and role-playing each prompt level during intervention.

Procedure

Baseline. During baseline, parents were provided with the visual schedule created for their child and asked to instruct their child to dress themselves. The trainer did not provide any directions on how the parent should instruct his/her child or provide any prompts. Upon the demonstration of an incorrect response or no response for more than 5s by the parent, the trainer indicated to the parent that the session was over and did not provide the parent with any feedback on his/her performance.

Intervention. During every intervention session, a non-Spanish-speaking trainer opened the PowerPoint® with the video clips of the task analysis and placed the iPad in front of the parent. The trainer played clips in the order that was written on the procedural sheet for that session. After watching the first clip, the parent role-played and imitated the step that was viewed with the trainer acting as the child. If the parent demonstrated the step incorrectly, the trainer replayed the clip and directed the parent to practice that step again. No verbal feedback was given by the

trainer. Once the parent demonstrated the step correctly, the trainer played the next clip and role-played that with the parent. This continued until the end of the PowerPoint®.

Once the parent watched and practiced all steps in the task analysis, the iPad was put away and the parent practiced the entire task analysis with the trainer. The trainer's responses during this final role-play was also specified on the procedural sheet (i.e., the procedural sheet indicated whether the trainer should emit the correct response independently, after a gestural prompt, after a verbal prompt, after a physical prompt, or engage in an incorrect response). The session was terminated if the parent demonstrated a step incorrectly. No verbal feedback was provided on what was done incorrectly. Intervention continued until the parent demonstrated all steps on the task analysis with 100% accuracy across two consecutive practice sessions without the PowerPoint® videos.

Post-intervention probes. The same procedures used for baseline were used for post-intervention probes (i.e., the parent was given the visual schedule and asked to instruct the child to dress him/herself and the trainer ended the session if the parent demonstrated a step incorrectly). These probes were conducted after the parent reached mastery criterion role-playing the steps on the parent task analysis with the trainer. Post-intervention probes were collected until the parent's fidelity of implementation was at 100% accuracy across three consecutive probes.

Post-intervention plus error correction. An error correction procedure was added for Family 2 as Pamela's fidelity of implementation remained low. During these sessions, Pamela still continued to instruct Juan to dress himself. Upon the incorrect performance of a step, the trainer interrupted the parent, modeled the correct response with Juan, undid the completed step, and indicated for the parent to demonstrate that step with Juan. For example, if Pamela provided the physical prompt for Juan to pick up his shirt incorrectly, the trainer signaled for Pamela to stop,

put the shirt back on the bed, modeled giving Juan a physical prompt to pick up the shirt, put the shirt back on the bed, and asked Pamela to demonstrate using the physical prompt. Once the parent demonstrated the step correctly, the trainer indicated for the parent to continue with the rest of the task analysis.

Maintenance probes. After mastery-criterion was attained during post-intervention probes, maintenance probes were conducted. During these sessions, the parent implemented the task analysis for teaching dressing independently of the trainer. The trainer was only present to video the sessions for data collection. At least five maintenance probes were collected for each participant.

Follow-up probes. One-month and four-months follow-up probes were collected. These were identical to maintenance probes.

Treatment integrity. Treatment integrity was assessed for at least 33% (range = 35-92%) of intervention sessions across participants by the English-Spanish bilingual graduate student who was not involved in delivering the intervention. Trainers' behaviors that were monitored included: (a) opening PowerPoint® on the iPad and placing the iPad in front of the parent, (b) playing video clips according to the order written on the procedural sheet for that session, (c) indicating for the parent to watch the clip again without providing verbal feedback if the parent made a mistake when role-playing the clip, (d) playing the next clip if the parent demonstrated the step correctly, (e) closing the iPad and practicing the task analysis from the beginning after watching and role-playing the last clip in the PowerPoint® correctly, (f) behaving according to what was written on the procedural sheet during the final role-play, (g) terminating the session if the parent performed a step incorrectly, and (e) not providing any verbal feedback on what the

parent did incorrectly. Treatment integrity was 100% for Family 1, 98.9% for Family 2, 99.2% for Family 3, and 100% for Family 4.

Treatment integrity of the implementation of the post-intervention plus error correction sessions with Family 2 was also assessed. Trainer behaviors monitored were: (a) not interfering if the parent demonstrated the step correctly, (b) modeling the correct response and indicating for the mother to practice with her child when the parent demonstrated a step incorrectly, and (c) not providing any verbal feedback on what the parent did incorrectly. Treatment integrity for 33% of post-intervention sessions with error correction for Family 2 was 96.8%.

Social validity. Once maintenance was completed or in Teresa's case, after the last post-intervention session, the English-Spanish bilingual researcher asked parents to fill out a social validity survey on the acceptability of intervention procedures (see Table 1). Using a four-point Likert-scale, parents answered questions regarding the effectiveness of the intervention, their acceptability of the intervention materials, their understanding of the intervention, their comfort level with their English-speaking trainer, whether they would like to learn other skills using the same training format, and whether they would recommend the intervention to other Spanish-speaking parents. Parents were also encouraged to elaborate on their responses on the survey verbally.

[Insert Table 1 here]

Dependent Variables

Parent fidelity of implementation. The single opportunity method was used to assess the parent's ability to perform each step of the task analysis. Fidelity of implementation was determined by dividing the number of steps performed correctly by the total number of steps in the task analysis, multiplied by 100%.

Child unprompted responses. The number of steps that the child performed correctly and independently on the dressing task analysis was divided by the total number of steps in the task analysis, multiplied by 100%.

Interobserver-agreement (IOA)

Two independent observers who were blind to the purposes of the study coded parent fidelity of implementation and child unprompted responses for at least 33% of sessions per phase for each participant. Both observers were graduate students. Observer 1 coded videos for Families 1 and 2. Observer 2 coded videos for Families 3 and 4. IOA for Family 1 averaged 97% (range = 88-100%) for parent fidelity of implementation and 96% (range = 92-100%) for child unprompted responses. IOA for Family 2 averaged 95% (range = 88-100%) for parent fidelity of implementation and 97% (range = 85-100%) for child unprompted responses. IOA for Family 3 averaged 98% (range = 94-100%) for parent fidelity of implementation and 100% for child unprompted responses. IOA for Family 4 for parent and child measures during sessions with Ariana averaged 93% (range = 75-100%) for parent fidelity of implementation and 94% (range = 85-100%) for child unprompted responses. IOA for Family 4 for parent and child measures during sessions with Diana averaged 93% (range = 75-100%) for parent fidelity of implementation and 93% (range = 85-100%) for child unprompted responses.

Results

Figure 1 displays the results for Families 1-3 and Figure 2 displays the results for Family 4. The percentage of steps performed correctly on the parent task analysis for teaching dressing and the percentage of steps that the child performed correctly and independently on the child task analysis for dressing are displayed in the figures. The percentage of steps are presented on the y-axis and sessions are displayed on the x-axis. Data from intervention are not depicted in the

figures but has been deposited with all the data of the study on Open Science Framework (Lim, O'Reilly, Vargas et al., 2020). Overall, an average of 12 intervention sessions were required for mothers to reach mastery criterion with their respective trainers. Three out of the four mothers generalized skills learned with their trainers to sessions with their children. The percentage of unprompted child responses increased for four out of five children.

[Insert Figures 1 and 2 here]

Family 1

During baseline (prior to intervention), both mother and daughter in Family 1 did not demonstrate any steps correctly on the parent and child task analyses. The total number of intervention sessions that Leah required before meeting mastery criterion (i.e., two sessions at 100% accuracy) was 11. The average number of minutes per intervention session was 10. During post-intervention probes, Leah's performance was initially variable and she required nine post-intervention sessions with Mariana before meeting criterion (i.e., three sessions at 100% accuracy). Since sessions were terminated when Leah demonstrated a step incorrectly, Mariana's percentage of unprompted responses varied based on Leah's performance. During maintenance and follow-up, the data path showed high, stable performance for Leah, with fidelity of implementation remaining above 85%. Mariana's performance during maintenance was stable. From maintenance to follow-up, a change in level can be seen (Maintenance: $M = 52\%$, Follow-up: $M = 69\%$). An increasing trend is also evident in Mariana's performance during follow-up, suggesting continued improvement in independent dressing skills.

Family 2

Family 2's baseline was identical to that of Family 1 in that Pamela and Juan did not demonstrate any steps correctly. Pamela required 11 intervention sessions before meeting

mastery criterion. The average number of minutes per intervention session was 10. During post-intervention, Pamela performed more steps correctly than during baseline but the improvement was minimal. Between the fourth and fifth post-intervention session, data was discarded due to a procedural error. Because improvements in Pamela's fidelity of implementation was not seen after seven sessions, a decision was made to modify procedures and include error correction. The figure reflects the percentage of steps that Pamela performed correctly and independently before any error correction was required. Pamela's performance was variable but an improvement in fidelity of implementation was seen with the addition of the error correction procedure. After 13 post-intervention sessions, changes were made to the visual schedule and setting based on the trainer's observations of Juan's behaviors during sessions, which led to communication between the bilingual researcher and Pamela. Pamela reported that: (1) Juan was near-sighted but did not wear glasses due to challenging behaviors that were associated with glasses, (2) he was used to vertically arranged visual schedules at school, and (3) the bedroom in which sessions were being conducted in was typically used as Juan's break room. Thus, starting from session 22, all sessions were conducted in the bathroom with a new visual schedule using larger photos that were arranged vertically. With the change in visual schedule and location, Pamela's fidelity of implementation decreased but immediately improved the following session. In total, Pamela required seven post-intervention sessions and 12 post-intervention plus error correction sessions to meet mastery criterion. Juan's opportunity to engage in unprompted responses was dependent on Pamela's performance during post-intervention sessions. Pamela's fidelity of implementation remained high and stable during maintenance ($M = 88\%$) and follow-up ($M = 86\%$). Juan's performance during maintenance ($M = 45\%$) and follow-up ($M = 51\%$) remained at similar levels, and less variability was seen during follow-up than maintenance.

Family 3

During baseline, mother and son in Family 3 performed one step correctly on their respective task analyses but never performed any more steps correctly. Teresa required 17 intervention sessions to reach mastery criterion, with each session averaging 10.5 minutes. As a result of scheduling difficulties, Teresa's first post-intervention session occurred two weeks after intervention. There was an increase in fidelity of implementation from baseline but improvement was minimal. Due to family circumstances, attrition occurred after seven post-intervention sessions. Changes in Pedro's behavior were unable to be observed because sessions were terminated based on Teresa's fidelity of implementation and she did not perform more than 25% of steps correctly during post-intervention. Following the last post-intervention session, Family 3's trainer and the bilingual researcher conducted a home visit, during which the trainer modeled all steps on the parent task analysis with Pedro and the bilingual researcher answered any questions that Teresa had. Several attempts to schedule a follow-up session were made but were unsuccessful.

Family 4

During baseline, the mother and twins in Family 4 did not demonstrate any steps correctly on their respective task analyses. Rebeca reached mastery criterion after seven intervention sessions that averaged 9.9 minutes in length. Following intervention, there was an immediate increase in Rebeca's fidelity of implementation with both daughters. Mastery criterion was reached within four post-intervention sessions with Ariana. Mastery criterion was attained after five post-intervention sessions with Diana. Rebeca's fidelity of implementation decreased slightly from post-intervention to maintenance ($M = 84\%$) and follow-up ($M = 76\%$). Ariana's unprompted responses during post-intervention and maintenance showed moderate

performance with some variability. A slight increase in level from maintenance to follow-up was seen (Maintenance: $M = 51\%$, Follow-up: $M = 64\%$). Diana's unprompted responses was variable during post-intervention due to Rebeca's performance during session 14. The data path for Diana's unprompted responses during maintenance showed moderate, stable performance ($M = 56\%$). During follow-up, Diana's performance remained at similar levels ($M = 59\%$) with the last two sessions suggesting an increasing trend.

Social Validity

Overall, mothers rated the training to be effective and acceptable ($M = 24.5$ out of 28). All mothers found the training to be effective ($M = 3.8$ out of 4), felt comfortable with the training videos ($M = 3.5$), found the content clear and easy to understand ($M = 3.3$), understood what the trainer wanted them to do ($M = 3.5$), and felt comfortable with their English-speaking trainers ($M = 3.5$). All mothers also indicated that they would like to learn other skills using similar videos and methods ($M = 3.3$) and would recommend this type of training to other Spanish-speaking parents ($M = 3.8$). All mothers reported feeling limited by not being able to ask their trainer questions but felt that they learned a lot. They also reported that they enjoyed seeing their children's specific behaviors incorporated into the videos and appreciated the convenience of having the trainer at their house.

Discussion

In this study, we demonstrated that English-speaking trainers successfully taught immigrant, Spanish-speaking parents of children with ASD instructional strategies for facilitating independent dressing by using video prompting. Video clips used were pre-recorded in Spanish. All four mothers mastered implementing the instructional strategies for teaching dressing in role-plays with their trainers (i.e., implemented the task analyses at 100% accuracy

across two consecutive sessions) and generalization of instructional strategies was seen for three mothers with their children. Increases in child independent dressing skills were also seen for four out of five children. Social validity results suggest that mothers found the video prompting intervention to be acceptable and effective at improving their children's dressing skills. These results demonstrate that effective parent training does not necessitate the matching of parents with trainers who speak the same language.

Due to the shortage in bilingual service providers (Mitchell, 2016; Olvera & Olvera, 2015), matching immigrant parents with providers who speak the language that they are proficient in is likely impractical. In this study, instead of having bilingual personnel available for every training session with parents, English-speaking trainers taught Spanish-speaking immigrant parents with minimal support from a bilingual provider. Specifically, the bilingual provider was involved during post-intervention support for Families 2 and 3. In Family 2's case, the bilingual provider contacted Pamela to inquire about Juan's challenging behaviors during sessions, leading to the changes in setting (from teaching in the bedroom to instruction in the bathroom) and visual schedule arrangement. In Family 3's case, the bilingual provider joined the English-speaking trainer during the last session to provide further instruction on the correct implementation of the treatment plan after Teresa had indicated that she could not continue participating in the study. Families 1 and 4 did not require the support of the bilingual provider. As demonstrated, the use of the video prompting intervention circumvented the need for a bilingual provider to be consistently present. In terms of practice, this means that instead of placing immigrant families with limited English proficiencies on waitlists to receive services from bilingual providers, they can be assigned to English-speaking providers under the supervision of a bilingual provider. The English-speaking provider would be the main

interventionist and the bilingual provider would be available for additional support as needed.

This would allow for more immigrant families with limited English proficiencies to be served in a more efficient manner, which is important given that having a language barrier is one of the main obstacles to immigrant parents' abilities to access services for their children with ASD (Lim, O'Reilly, Sigafoos et al., 2020).

Engaging and retaining those in need of services who are socially, financially, or culturally disadvantaged continues to be a challenge (Bonevski et al., 2014). For immigrant parents who are disadvantaged, effective parent training must circumvent barriers in more than one area. Not only must intervention procedures include strategies for overcoming language barriers but strategies for circumventing scheduling conflicts due to parental responsibilities must also be included. Scheduling conflicts can lead to sporadic training, as in the case of Teresa where it was common for there to be gaps of one to two weeks between sessions in contrast with the other participants who had sessions with their trainers two to four times a week. This sporadic training could explain why she required 70% more intervention sessions to reach mastery criterion than the other mothers. Furthermore, the first post-intervention session with the other mothers occurred less than one week after mastery criterion was attained whereas the first post-intervention session for Teresa occurred two weeks after she had attained mastery criterion. Longer lengths between practice sessions has been demonstrated to hinder the retrieval of knowledge of a new skill (Savion-Lemieux & Penhune, 2005), which may explain why an increase in fidelity of implementation by Teresa was not seen during post-intervention. Because telehealth programs can be accessed from anywhere at a convenient time for the parent (Baggett et al., 2010), they may mitigate the problem of sporadic training due to parents' time constraints. An area for future research would be to investigate whether using pre-recorded videos in the

language of the service user can be combined with telehealth. For instance, many telehealth programs involve videoconferencing with a therapist (Ingersoll et al., 2016; Suess et al., 2014; Vismara et al., 2018). When using telehealth with an immigrant parent who has limited English proficiency, an asynchronous model of delivery whereby the parent watches a pre-recorded video of the skill being targeted before videoconferencing with a therapist who speaks the same language may be used. By having the parent watch a pre-recorded video, the amount of time the parent and the bilingual provider have to spend online synchronously may be decreased, which is important given the limited number of bilingual providers available.

Parental self-efficacy refers to a parent's perception of how well he/she can handle tasks and challenges related to his/her child and has been found to be associated with behavioral persistence (Johnston & Mash, 1989). Specifically, a parent with higher self-efficacy is more likely to persist in parenting-related tasks than one with lower self-efficacy. The effects of the current training procedure on increasing parental self-efficacy may explain why all mothers rated the intervention to be effective despite issues with the implementation of the procedures (i.e., the need to incorporate an error correction procedure and failure to generalize to sessions with children was observed). This is consistent with previous research which has demonstrated parent training to be effective at increasing parental self-efficacy (Bloomfield & Kendall, 2012; Sofronoff & Farbotko, 2002; Tucker et al., 1998). Given that the emotional, financial, and cultural challenges of immigration can result in lower levels of parental self-efficacy in immigrant parents (Ali, 2008), the effects of the current training procedure on parental self-efficacy should not be overlooked. Future research on parent training for immigrant parents of children with ASD may want to include measures of parental self-efficacy, in addition to direct measures of parent and child behaviors.

Limitations

In this study, parents were taught to use a visual schedule and least-to-most prompting to teach independent dressing skills to their children with ASD. Given that the steps for using a visual schedule and the least-to-most prompting procedure were relatively simple and concrete, it is unclear as to whether the video prompting intervention would be effective at teaching more complex instructional strategies to parents—video prompting may only be effective for teaching instructional procedures that can task analyzed and broken down into clear, concrete steps. An area for future research may be to replicate this work with more complex instructional strategies.

Additionally, because the present study only included Spanish-speaking immigrant parents, these findings may not generalize to immigrant parents of children with ASD who speak other languages. Furthermore, given that the study was conducted in Texas—Hispanics account for almost 40% of the state’s population (Pew Research Center, n.d.)—it was relatively easy to find models who spoke Spanish for the creation of the videos. However, some languages may be less common in specific regions and models who speak that language might not be readily available. In such cases, collaboration across regions may be necessary. With provider registries (e.g., Behavior Analyst Certification Board® Certificant Registry) and file-sharing services such as Box and Google Drive available, collaborating across geographic regions is likely feasible.

Finally, although the effects of possible demand characteristics on parents’ responses to the social validity questionnaire were limited by having the bilingual researcher who was not involved in delivering the intervention administer the social validity questionnaire (Foster & Mash, 1999), parents’ positive ratings of the intervention may have been influenced by the social desirability bias (King & Bruner, 2000). Future research should include evaluations by unbiased

observers as an additional measure of social validity or by having participants respond to social validity questionnaires using software that maintains the anonymity of responders.

Conclusion

According to a 2017 report, 258 million people resided in a country other than the one they were born in and from 2010 to 2015, the number of international immigrants increased by 28 million (United Nations, 2017). Language and communication barriers disadvantage immigrant families (Leclere et al., 1994) and contribute to health inequities (Okraïne et al., 2017). This study addressed the important issue of how English-speaking providers can effectively teach immigrant parents, with limited English proficiency, of children with ASD instructional strategies to use with their children. The findings of this study indicate that effective parent training can occur despite a language mismatch between parent and trainer through the use of a video prompting intervention. Using video prompting, English-speaking trainers successfully taught Spanish-speaking immigrant parents with minimal support from a bilingual provider. This will potentially allow more immigrant parents of children with ASD to receive training, and may lead to more equitable outcomes for these families.

Compliance with Ethical Standards: Approval was obtained from the Institutional Review Board to conduct this study and procedures complied with all requirements. Informed consent to participate and have data published was obtained from all parents. This study was performed in accordance with the ethical standards outlined in the 1964 Declaration of Helsinki.

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Table 1

Social Validity Questionnaire

Instructions: Please read each statement and circle the number that best matches your opinion.

1. The training on how to teach my child to get dressed was effective.	Totally disagree (1)	Disagree (2)	Agree (3)	Totally Agree (4)
2. I felt comfortable with the training videos.	Totally disagree (1)	Disagree (2)	Agree (3)	Totally Agree (4)
3. The content in the video was clear and easy to understand.	Totally disagree (1)	Disagree (2)	Agree (3)	Totally Agree (4)
4. The instructions were clear and I knew what the trainer wanted me to do.	Totally disagree (1)	Disagree (2)	Agree (3)	Totally Agree (4)
5. I felt comfortable during sessions with my English-speaking trainer.	Totally disagree (1)	Disagree (2)	Agree (3)	Totally Agree (4)
6. If given the opportunity, I would like to learn other skills using similar videos and training methods.	Totally disagree (1)	Disagree (2)	Agree (3)	Totally Agree (4)
7. I would recommend this type of training to other Spanish-speaking parents.	Totally disagree (1)	Disagree (2)	Agree (3)	Totally Agree (4)

Figure Captions

Figure 1. Percentage of accuracy on task analyses for teaching dressing (mother) and independent dressing skills (child) across Families 1-3

Figure 2. Family 4's percentage of accuracy on task analyses for teaching dressing (Teresa) and independent dressing skills (Ariana and Diana)

Figure 1 top

Figure 2 top