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<b>14. ABSTRACT</b> The objective of this project is to develop and pilot an internet-delivered parent training program for caregivers of children with autism spectrum disorders (ASD). The intervention will be based on an evidence-based curriculum that uses a blend of developmental and behavioral intervention strategies during daily routines and activities. In the second phase of the project (Years 2 and 3), the focus is on pilot testing two delivery methods for the online parent training program: 1) self-administered only and 2) self-administered plus remote coaching to examine their feasibility, acceptability, and usability. We have enrolled 22 participants (out of 30) and data collection is underway. Preliminary data analyses support the feasibility of the program. Parents in both groups exhibit high rates of program engagement, high levels of program satisfaction, and gains in conceptual intervention knowledge and fidelity of implementation of the intervention with their child. Parents in the self-administered plus remote coaching group demonstrated greater levels of program engagement and program satisfaction.						
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## INTRODUCTION

Autism spectrum disorder (ASD) is a chronic and pervasive neurodevelopmental disorder characterized by deficits in social communication and the presence of restricted and repetitive behaviors (American Psychiatric Association, 2013). Individuals with ASD often require intensive and comprehensive intervention across the life span (Maglione, Gans, Das, Timbie, & Kasari, 2012). There has been a dramatic increase in the number of individuals with this diagnosis over the last two decades, with prevalence rates reaching 1 in 88 (Baio, 2012). However, there has not been corresponding growth in the availability of evidence-based services, contributing to high levels of unmet service needs for individuals with ASD and their families (Bethell, Lindly, Kogan, & Zuckerman, 2014). These issues highlight the need for systematic research focused on developing and improving strategies for dissemination and implementation of evidence-based ASD services.

Parent training programs are one cost-effective and ecologically valid way to increase access to evidence-based ASD intervention. Numerous studies have established that parents can be successfully trained in evidence-based strategies to improve social-communicative functioning in young children with ASD (McConachie & Diggle, 2007). Additional benefits of parent training include increases in generalization and maintenance of child skill, a reduction in parent stress, and increases in family leisure time (Koegel, Schreibman, Britten, Burke, & O'Neill, 1982; Tonge et al., 2006). Yet, there continue to be barriers involved with the dissemination of training to parents, including a shortage of trained professionals, limited financial resources and transportation, lack of child care, geographic isolation, lengthy waitlists, and extensive time commitments (Taylor et al., 2008). Thus, it is essential to consider the adaptation of evidence-based interventions, including parent training programs, to non-traditional service delivery methods (Feil et al., 2008).

Telehealth and technology-based applications have the potential to replace, or at the very least augment, traditional service models to increase access to evidence-based services (Baggett et al., 2010). There are numerous benefits of telehealth programs, including providing a cost-effective means for intervention to be accessed from anywhere at any time (Baggett et al., 2010). Telehealth programs make it possible to sustain highly standardized instruction and maintain fidelity of program implementation, while also supporting individualized learning (Hollon et al., 2002). Importantly, the number of individuals with access to internet-based and computerized technologies has grown considerably in recent years (File,

2013). The percentage of U.S. households with a computer has increased from 8.2% in 1984 to nearly 76% in 2011, while the percentage of US household with internet access has gone from 18% in 1997 to nearly 72% in 2011 (File, 2013). Furthermore, as of 2007, nearly 83% of adults were able to access the internet from home, work, or elsewhere (US Census Bureau, 2009). The use of telehealth programs to provide self-directed instruction in evidence-based interventions has been explored across health-related disciplines, disorders, and treatment approaches with promising outcomes (Webb, Joseph, Yardley, & Michie, 2010). Taken together, these data suggest that telehealth applications may serve as a promising alternative service-delivery model to increase the reach of evidence-based ASD interventions, including parent training programs.

Thus, the objective of this project was to develop and pilot an internet-delivered parent training program for caregivers of children with ASD. The intervention is based on an evidence-based curriculum that uses a blend of developmental and behavioral intervention strategies during daily routines and activities (Ingersoll & Dvortcsak, 2010). In the first phase of the project, we developed the online parent training program. This required modify an existing evidence-based parent training curriculum to be delivered over the internet in 12, self-administered modules containing the intervention content. In addition, we determined the best method for providing remote coaching to parents. The development of the online program was be guided by feedback from 2 focus groups with parents, intervention providers, and program administrators. In the second phase of the project, we formatively evaluated the acceptability, usability and implementation feasibility of two delivery formats of the program to determine the most effective delivery method and used feedback to further refine the program. We randomly assigned families to receive the self-administered modules only (n=15) or the self-administered modules and remote, video-based coaching from a trainer (n=15). At the conclusion of their participation in the program, parents completed measures of comprehension of program content and treatment acceptability/satisfaction. We also assessed parent program engagement and parent fidelity of implementation. The results revealed that internet-based instruction is a feasible method for training parents of children with ASD in evidence-based intervention strategies, and will thus likely enhance dissemination of evidence-based practices to underserved populations.

**KEYWORDS**

Autism spectrum disorder

Intervention

Parent training

Telehealth

Internet-based

## OVERALL PROJECT SUMMARY

**Specific Aim 1:** Modify an evidence-based parent training curriculum to be delivered over the internet

**1a. Create 12, self-directed modules containing the intervention content to be delivered over the internet (months 1-8).** Curriculum modification will involve: 1) modifying the content of the slide presentations which describes the intervention techniques; 2) developing and recording audio text to accompany the slide presentations; 3) developing comprehension check questions; 4) modifying homework assignments to be consistent with the modules; and 5) developing an online systems training module to help parents navigate the program and upload video.

We designed the curriculum content and modified it so that it could be delivered over the internet in 12 self-directed modules. The published curriculum was designed to be conducted with a parent trainer. Thus, we needed to make a number of modifications to the original training materials as well as develop of additional learning tools in order to support parent learning in a self-directed format. The specific modifications/additional learning tools are described below.

- 1) We modified the content of the slide presentations that describe the intervention techniques so that the program can be completely self-directed. All slide presentations were scripted and additional video examples were created. We hired a voice-over professional to record the audio text. All recordings were edited and converted to flash video files so that they could stream over the internet.
- 2) We developed comprehension check questions with automated feedback for each module that allow users to check their understanding of the informational content. In addition, we developed video-based exercises with automated feedback that allow users to evaluate their understanding of the implementation of the techniques (users view brief video clips of adults using the intervention and are asked to rate whether they implemented the techniques correctly or incorrectly).
- 3) We modified the homework assignments to be consistent with the modules. In addition, we added reflection questions to help users report on their experience using the techniques with their child.
- 4) We created a “video library” that provides longer video examples (3 to 5 minutes) of adults using the intervention techniques together with children with ASD. The video library allows the user to enhance their understanding of how the different intervention techniques are used together to target a range of social communication skills in children with a wider range of skill levels. These video clips are organized by child language level to allow users to select clips that are most

relevant for their child.

- 5) We developed a resources page which contains links to paper versions of the online forms, additional informational websites on autism, and published research on parent training.
- 6) We selected an existing forum program (Yet Another Forum – YAF) to support the moderated, interactive forum in which parents can post and respond to questions and comments about their experience with the program, and have integrated this application into our interface.

We originally proposed to use an existing software program (B.I. Care – now Behavior Connect) to deliver the online program. Our research suggested that this program was the best one on the market for exchanging video in order to conduct the remote coaching. However, after working with the company for several months, it became apparent that there were a number of things that we wanted our program to be able to do that were not supported by Behavior Connect. This was particularly the case for the self-directed portion of the program. Thus, in March 2011, we began working with computer programmers at Michigan State University to develop our own user interface and data collection system to deliver the self-directed modules. This secure system allows us to track each user’s activity so that we can determine how much time is spent on each program element. It also includes digital forms that store the user’s responses so that the user can track his or her own progress in the program as well as sends the user’s responses to the trainer for use in remote coaching. The pages are also dynamic, so that we could make changes to the program in response to feedback from users during Phase 2 of the project.

We are very confident that our choice to design the remote delivery program ourselves made the program far more user-friendly. In addition, it gives us much more control over program elements and automatic data collection. The feedback from the two focus groups (see below) fully supported this decision; participants were uniformly positive in their opinion of the user interface and its ease of use. In addition, it allowed us to add several other elements to the self-directed program that should enhance program engagement and learning.

Please see Appendix A for a complete description of the web application with screenshots.

**1b. Conduct series of 2 focus groups with parents, intervention providers, and program administrators to obtain information on key elements of the program (months 4-8).** We will conduct two focus groups with 8-10 key stakeholders to gain feedback on the structural elements of the program. Focus group members will participate in two focus groups, three months apart. In the first focus group,



we will obtain feedback on the structure of the online systems training and self-directed modules. In the first focus group, we will obtain feedback on the structure of the online systems training and self-directed modules. In the second focus group, we will present the modifications to the online systems training and self-directed modules that we made in response to feedback from the first group. We will then obtain additional feedback on these modifications. We will also collect feedback on the remote coaching component of the program. Feedback from focus group members will be integrated and incorporated into the final program.

We conducted the first focus groups with 4 professionals and 4 parents of children with ASD in April 2011 and the second focus group with a subset of the participants from the first focus group (3 professionals and 1 parent) in March 2012. In the first focus group, participants were shown a beta version of one module the self-directed portion of the program and were asked to comment on the program components and user interface. Their feedback was used in the design of the completed self-directed program. In the second focus group, participants were given access to the self-directed program and were asked to comment on the extent to which they felt that the program would achieve its aims, barriers to using the program, what type of children and families would be the most likely to benefit from the program, and how the program should be disseminated. We also asked participants to comment on the remote coaching portion of the program.

**Key themes identified from the focus group analysis included:** 1) **The program would likely achieve its aims;** 2) **the program would be appropriate for a range of families;** 3) **children with significant behavioral difficulties and parents who do not believe that they can help their child gain skills may not benefit as well as others;** 4) **pediatricians' or physicians' offices, diagnostic centers, and educational providers would be the most likely professionals to recommend the program to families;** 5) **limited parental time, accountability, access to technology, and lack of having a professional help the parent through the program could be barriers to the use of self-directed program;** 6) **having parents work with a behavioral expert to address child behavior problems prior to completing the program, offering the self-directed program in combination with a regular parent group to increase accountability and social support, and having a local subject matter expert available who could answer parents' questions as they worked through the program could address these barriers;** 7) **technical difficulties with video-conferencing software, parental discomfort with video-conferencing, and not having the coach be able to work directly with the child while the parent observed could be barriers to the use of remote coaching;** and 8) **having parents observe a sample coaching session prior to having their first coaching session, providing coaching over the phone instead of video-conferencing, or providing coaching based on**

previously recorded videos of the parent and child as opposed to coaching the parents as they interaction with their child could address these barriers.

We conducted our first of two sets of focus groups in April 2011. We recruited four professionals and four parents of children with ASD. Focus group discussions were conducted separately for the two groups (professionals and parents). A week before the focus group, each participant was sent a link to a beta version of one lesson (module) and asked to work through it at home in preparation for the group. During the focus group, participants were asked to comment on the self-directed program. In particular, they were asked to discuss what they perceived to be the most and least positive aspects of the program, what contexts they could see themselves or others using the program, and what changes could be made to increase the likelihood that they and/or others would use it. The group discussions were recorded and analyzed for consistent themes. Overall, the findings from the first focus group were very encouraging. In most cases, professionals and parents were similar in regards to their opinions. Themes brought during the first set of focus groups are highlighted below.

- **The participants identified a number of aspects of the program that they liked**, including: a) self-paced instruction; b) the appropriateness of the techniques; c) the ease and “user-friendliness” of the navigation of the website; d) the length of each module; e) the ability to pause the program; f) the clarity of the video examples; g) the use of the self-check questions and video exercises to check understanding of the program content and techniques implementation; h) the ability to print out the homework; and i) the use of a message board (forum) to communicate with other parents.
- **The participants also made a number of suggestions to improve the program**, including: a) using video of children with a wider range of functioning/developmental levels and who exhibit more difficult behaviors; b) having additional videos at a specific developmental level as well as pre-post videos; c) having more videos of fathers using the techniques; d) replacing the first page with a slideshow detailing how to use the program; e) providing information about for whom the intervention is best suited for to help parents determine if the program is appropriate for their child; f) having a “welcoming” message with friendly pictures and video introduction of remote coaches; g) adding an “Additional Information” or “About the Program” tab that provides links to

other programs or articles to show evidence for the program; h) having the program track the user's place in the program and store the user's answers to the homework rather than having the user's print out and complete the homework off-line; i) adding a FAQ tab for troubleshooting computer problems; j) improving the quality of the audio for the slideshows; and k) including information on the development of the target skills in typical children so that parents can have a reference point for understanding their child's behavior.

- **The participants identified several additional ways that the program could be used,** including: a) being used in combination with a traditional (in person) parent training program; b) as training for additional family members; c) and training and childcare providers. Participants also suggested that it could be provided it to parents on a waitlist for other therapy.

The second focus group was conducted to obtain feedback on the completed self-directed program. We conducted the second focus group with a subset of the participants from the first focus group in March 2012. Three professionals and one parent participated. A week before the focus group, each participant was sent a link to a beta version of the entire program and asked to work through it at home in preparation for the group. During the focus group, participants were asked to comment on the extent to which they felt that the program would achieve its aims, barriers to using the program, what type of children and families would be the most likely to benefit from the program, and how the program should be disseminated. We also asked participants to comment on the remote coaching portion of the program. Specifically we asked them to comment on any concerns about the use of video conferencing to provide coaching, the appropriate frequency and structure of remote coaching sessions, and the usability of available video conferencing programs. In most cases, professionals and parents were similar in regards to their opinions. Themes brought up during the second focus group and interviews are highlighted below.

- 1) **The participants identified a number of aspects of the program that they liked,** including: a) the comprehensiveness of the program; b) the fact that the program was easy to understand; c) how the video examples were presented; and d) that parents could review previously presented

information that is the most relevant for their child's developmental level. It was also felt that this program would work well as a complement to a more comprehensive intervention program.

- 2) **The participants indicated that this program would be appropriate for a range of children,** including: a) children with ASD; b) children with developmental concerns who do not receive a diagnosis of ASD; and c) children who do not qualify for specialized ASD services in the community (at-risk toddlers).
- 3) **The participants indicated that the program would likely be less beneficial for some families,** including: a) those whose children had significant behavioral problems; and b) parents who did not believe in their own ability to influence their child's development.
- 4) **The participants indicated that parents would be referred to the program by a number of sources,** including: a) pediatricians' or physicians' offices; b) diagnostic centers; and c) educational providers; and d) resource guides.
- 5) **The participants identified a number of barriers to parents using the self-directed portion of the program,** including: a) limitations in parents' time, b) limited parent access to technology; and c) not having the support of a professional who could help the parent work through any sections that were difficult to understand or help the parent address any significant child behavior problems.
- 6) **The participants suggested a number of potential methods that could enhance the success of the self-directed program,** including: a) having parents work with a professional to address child behavior problems prior to completing the program; b) offering the self-directed program in combination with a regular parent group to increase accountability and social support; and c) having a local subject matter expert available who could answer parents' questions as they worked through the program.
- 7) **The participants identified the information that would be best to provide during the remote coaching sessions,** including: a) feedback to parents on how they were implementing the techniques with their child; b) how to handle recurrent challenges; and c) information to prepare parents for the next strategies.
- 8) **The participants indicated that the ideal frequency of coaching sessions would range from twice a week to once every 2 weeks, depending on the needs of the family.** There was also a

discussion of providing remote coaching in groups using group video-conferencing to increase the number of families that could be served.

- 9) **The participants indicated several potential barriers to providing remote coaching over the internet**, including: a) technical problems with the video-conferencing software; b) the fact that the coach would not be able to work directly with the child while the parent observed; and c) potential parental discomfort with video-conferencing. However, the participants also thought that video coaching might be preferable for some parents.
- 10) **The participants discussed several options that might make it easier for parents to receive remote coaching**, including: a) having the parents observe a sample coaching session prior to having their first coaching session, b) providing coaching over the phone instead of video-conferencing; and c) providing coaching based on previously recorded videos of the parent and child as opposed to coaching the parents as they interact with their child.
- 11) **The participants indicated that they liked the available features of the proposed video conferencing program (Adobe Connect) for providing remote coaching**, including: a) screen sharing; b) group meetings; and c) screen recording. One of the participants had extensive experience using Adobe Connect to do remote supervision. She indicated that there were numerous technological problems with Adobe Connect when using the program on home computers, and suggested the use of Skype instead due to its ease of use and increased familiarity for families.

**1c. Make refinements to program based on feedback (months 9-12).** We will make final modifications to the program based on feedback obtained from the focus groups. At this point, we will assess whether the program needs to be significantly altered based on feedback from the focus groups. Although we plan to incorporate feedback on the program and assessment protocol throughout this phase of the project, we may find that significant alterations to the delivery format need to be made prior to beginning the pilot study. We will evaluate this possibility at this point and will make adjustments to the timeline accordingly.

We used the feedback obtained from the first focus group to guide the development of the self-directed program. The second focus group was conducted to obtain feedback on the completed self-directed program. Overall, the information obtained from the second focus group was very positive. The participants liked the changes that were made to the program in response to feedback from the first focus

group. Participant feedback suggested that final self-directed program would be likely to achieve its intended goals and no additional changes to the content or format of the self-directed portion of program were identified. After the second focus group, we developed the online systems training module (tutorial) and a program introduction designed to help users determine whether the program is appropriate for them and their child (introductory video, system requirements, terms of use, help).

We used information obtained from the second focus group to inform our protocol for delivering the remote coaching portion of the program. Overall, the information obtained from the second focus group was very encouraging. Although participants felt that traditional live coaching would be the preferred method for working with parents, they agreed that remote coaching using video-conferencing would be beneficial, and the increased access that it would provide would surmount worth any potential limitations. They also offered a number of suggestions for how to make the remote coaching successful. These suggestions were instrumental in our decision of how to conduct the remote coaching portion of the program. Given potential concerns about technology and parent discomfort with video-conferencing, we decided to schedule an initial session in which a coach would come to the parent's home and help the parent register and use the video-conferencing software, prior to conducting the first coaching session. During the discussion of the ideal frequency and format of the coaching sessions, it was proposed that the remote coaching sessions be conducted in 2, 30 minute sessions per week. The first session per week would be a discussion of the lesson with the parent and the second session would be coaching the parent as he or she worked with the child. After discussion, there was general consensus that this would be beneficial, thus we chose to adopt this coaching model. When discussing the Adobe Connect video-conferencing program, one participant who had extensive experience with it indicated that it has numerous technological problems when used on home computers. This information made us reconsider its use. After piloting several programs, we decided to use Skype as our video conferencing program instead. This decision was made due to its ease of use and the fact that individuals are likely to be more familiar with Skype than other similar programs due to its length on the market.

In April 2012, we enrolled one family in the self-directed program plus coaching program (Coaching) in order to pilot the intake assessment protocol, the remote coaching protocol, and to identify any technical issues with the self-directed program or the video-conferencing software used to conduct the remote coaching. The family completed the program in September 2012. Several minor technical

problems were identified during piloting (e.g., problems with sound quality during remote coaching, difficulty with the screen-recording software, problems with the program's recording of users' responses). These issues were resolved. In addition, minor changes were made to the program's content based on the parent's feedback to enhance clarity. In addition, the use of Skype to provide remote coaching was found to be feasible, although several modifications to the coaching protocol used during live coaching had to be made. For example, instead of giving ongoing feedback to the parent while he interacted with the child, the coach had to alternate between observing the interaction, and then providing feedback to the parent while the child played alone so that the parent could hear the coach's feedback. Several minor technical problems with Skype were also identified during piloting (e.g., dropped calls, screen freezing); however, these problems were also found to be common to all available video-conferencing software on the market. While annoying, these issues were not found to be disruptive to parent learning during the remote coaching.

Overall, the pilot parent's response to the self-directed portion of the program was very favorable in terms of program engagement, comprehension, and acceptability/satisfaction. In addition, his response to the remote coaching was positive in terms of number of coaching sessions attended, and acceptability/satisfaction. The parent made excellent gains in his fidelity of implementation of the intervention techniques with his child, suggesting that the program positively impacted technique use as well.

**Specific Aim 2:** Formatively evaluate the acceptability, usability and implementation feasibility of two delivery formats of the program to determine the most effective delivery method and use feedback to further refine the program

**2a. Recruit participants (months 9-30).** We will begin recruiting families to participate in the pilot study in month 9 of the project. We will aim to recruit 35 families with the expectation that some will not qualify or will choose not to participate. This will allow us to pilot a minimum of 15 families for each delivery format. Although we do not anticipate difficulty with participant recruitment, at this point in the study, we will examine our ability to recruit a sufficient number of families to complete the proposed study. If we find that we are having difficulty recruiting the anticipated number of families, we will change our recruitment strategies to include families living further from the research site and by connecting with additional agencies.

We began recruiting participants for this study in March 2012 and began enrollment in September 2012. This strategy allowed us time to determine whether our recruitment strategy would be sufficient

for recruiting the proposed number of participants, while also providing us time to work out any additional issues with the technology involved in the program that arose during our pilot testing, prior to enrollment. Our response rate was good. As of September 2012, we had 17 potentially eligible families contact the lab about participation in the project. We found that our recruitment strategies were working as intended and we anticipated that we would be able to enroll the projected number of participants over the course of this project.

**2b. Conduct intake assessments and have families use and evaluate one of two delivery formats (months 12-33).** We will conduct intake assessments for 30 families to collect demographic information and ensure participants meet inclusion criteria. Half of the families (15) will receive the self-directed modules only. The other half of the families will receive both the self-directed modules and remote, video-based coaching from a trainer. At the conclusion of their participation in the program, parents will complete measures of comprehension of program content and treatment acceptability/satisfaction. We will also assess parent program engagement and parent fidelity of implementation. These measures will be used to determine program acceptability, usability, and implementation feasibility.

We began intake assessment with our first cohort of participants in October 2012. As of October 2014, we have enrolled 28 families. Participating children were matched on expressive language within 3 months on the Mullen Scales of Early Learning and then randomly assigned to the self-directed (SD) or therapist-assisted (TA) group by a coin toss. A total of 13 families were assigned to the SD group and 15 to the TA group. Two families in the self-directed group chose to discontinue use of the program. However, they agreed to complete the post-treatment assessments. We have completed data collection with 22 families (pre-treatment, post-treatment, 1-month follow-up, 4-month follow-up). Six families have not yet finished the program and/or all assessment periods. Once data collection for the full sample is complete, it will be used to assess the acceptability, usability, and feasibility of the self-directed (SD) and the therapist-assisted (TA) formats of the program. Based on our positive preliminary analyses (see below), we have decided to discontinue enrollment for the pilot phase of the study, and begin enrollment in a fully-powered, 3-arm RCT to compare the efficacy of the SD and TA formats.

**2c. Compare the acceptability, usability, and parent fidelity of implementation for the self-directed modules alone versus the self-directed modules in conjunction with remote, video-based coaching from a trainer (months 30-36).** We will evaluate parent program engagement, comprehension of program content, satisfaction with the program materials and delivery format, and parent fidelity of implementation for the two delivery formats. The statistical analyst will assist.



## Participants

Participants in the pilot study included 28 children with ASD and their mothers. The children were on average 45.1 months (range 19 to 73), with a nonverbal mental age of 25.4 months (range 12 to 54), and a verbal mental age of 19.2 months (range 8 to 42) on the Mullen Scales of Early Learning.

Table 1 includes participant characteristics by group for the full sample.

**Table 1: Participant Characteristics**

Group	Child Chronological Age <sup>a</sup> M (SE)	Child Nonverbal Mental Age <sup>a,b</sup> M (SE)	Child Verbal Mental Age <sup>a,b</sup> M (SE)
<b>Self-Directed</b>			
n = 13 (8M, 5F)	45.1 (3.7)	25.4 (3.9)	19.2 (2.7)
<b>Therapist-Assisted</b>			
n = 15 (12M, 3F)	42.7 (3.3)	25.1 (2.5)	22.2 (2.7)

<sup>a</sup>Months; <sup>b</sup>Mullen Scales of Early Learning

## Preliminary Results

Below is a summary of our findings to date. Given different stages of data collection for the different measures, analyses are based on a subsample of participants for whom data has been scored for the relevant measure. The number of participants in each analysis is indicated.

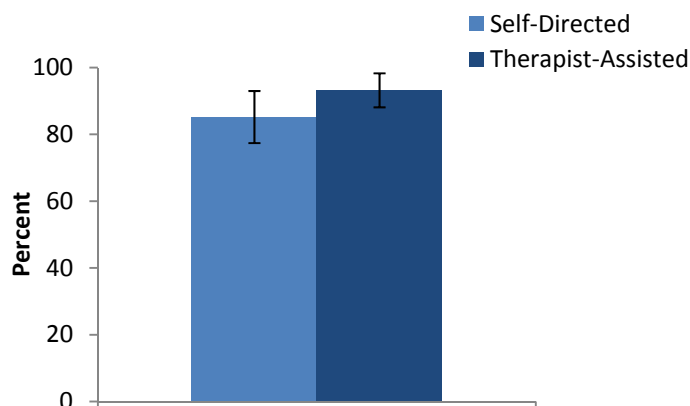
**Parent Program Engagement.** Our primary measure of program engagement was the number of lesson components completed (i.e., self-check questions, exercise, homework plans, reflection questions) by each mother (n=20). We also examined other metrics of parent program engagement including the number of logins (n=14), overall amount of time online (n=14), number of additional program elements accessed (i.e., video library, forum, resources; n=17), and days to completion (n=17). Each of these measures was tracked electronically within the program. The number of remote coaching sessions completed by the parents in the remote coaching group was also tracked.

Of the 20 families for whom we have complete data on our primary measure of program engagement, 95% were considered program completers (completed majority of components for 10 lessons or more), with only one parent discontinuing the program prematurely (after the sixth lesson).

Parents in the coaching group completed all of the remote coaching sessions. We also examined our other metrics of program engagement for the subset of parents for whom these data were available. On average, parents logged into the program an average of 42.5 times (range 11-89). They spent, on average, 11 hrs:14 min on the site (range 4 hrs:7 min to 21 hrs:49 min). Parents completed 89 percent of all lesson components (range 66.2 to 100). On average, parents accessed additional program content 8.11 times over the course of the program (range 1-20). It took parents an average of 140 days to complete the program (range 85-205).

To examine whether program engagement differed as an effect of group, we ran a series of independent t-tests on the various measures of program engagement. There was no difference between groups on our primary measure of program engagement, percent of program components completed (SD:  $M=83.2$ ;  $SE=7.8$ ;  $TA=95.2$ ;  $SE=5.1$ ),  $t(19)=-.87$ , n.s.), see Figure 1.

**Figure 3: Parent Program Engagement by Group**



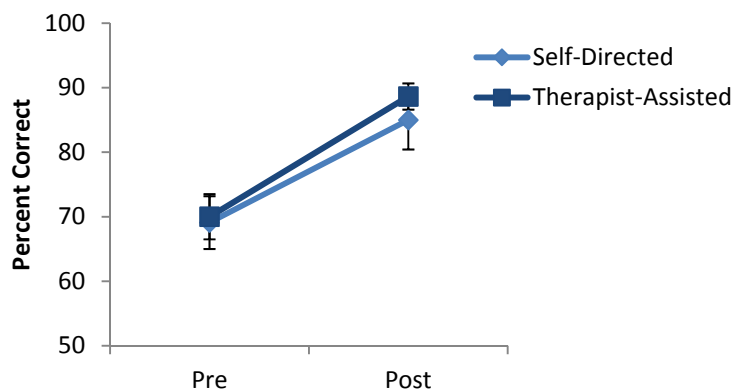
There were, however, group differences on our other metrics of program engagement. Parents in the SD group logged in a significantly fewer times ( $M=31.14$   $SE=4.27$ ) than parents in the TA group ( $M=53.76$ ,  $SE=5.93$ ),  $t(12)=3.11$ ,  $p<.01$ . They also spent less time interacting with the program content ( $M=10$ hrs:59min;  $SE=2$ hrs:2min) than the TA group ( $M=19$ hrs:3min;  $SE=1$ hr:25min),  $t(12)=2.57$ ,  $p<.05$ , and accessed additional elements less ( $M=4.88$ ,  $SE=1.06$ ) than the TA group ( $M=11.00$ ,  $SE=1.99$ ),  $t(15)=2.62$ ,  $p<.05$ . It also took the SD group significantly more days to complete the program ( $M=160.00$ ;  $SE=14.42$ ) than the TA group ( $M=127.78$ ,  $SE=13.53$ ),  $t(15) = -1.66$ , n.s.

Taken together, these findings indicate that parents in both groups had a very high level of engagement with the self-directed program. Parents in the TA group had greater program engagement on

several metrics (number of logins, length of time on site, and number of additional elements accessed), which may have been a direct (i.e., using the site during coaching sessions) or indirect (i.e., increased motivation) effect of the coaching sessions.

**Comprehension of Program Content.** To examine whether parents increased their knowledge of the program content as a result of participating in the program, we examined changes on the ImPACT Intervention Knowledge Quiz from pre- to post-treatment (n=22). The ImPACT Intervention Knowledge Quiz is a 20-item, multiple-choice Intervention Knowledge Quiz that assesses curricular content. A mixed model ANOVA indicated that there was a main effect of time, with participants demonstrating greater intervention knowledge at post-treatment (M=86.82%, SE=2.50) than pre-treatment (M=69.55%, SE=2.70),  $F(1, 20)=38.10$ ,  $p<.001$ . There was no main effect of group or group X time interaction, suggesting that both delivery formats are associated with similar gains in knowledge of key intervention concepts. See Figure 2.

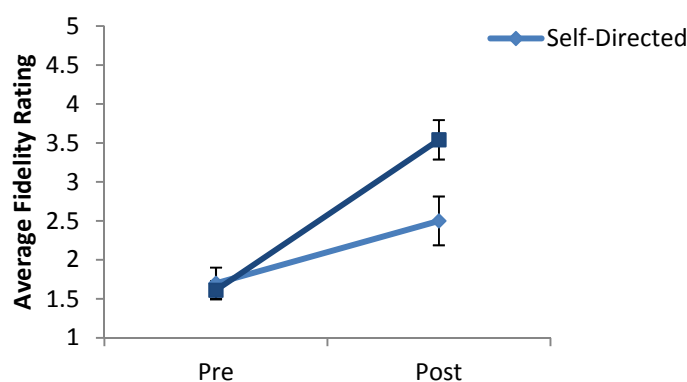
**Figure 2: Parent Intervention Knowledge by Group**



**Parent Fidelity of Implementation.** To examine the degree to which use of the program resulted in changes in parent behavior, the accuracy of the parents' use of the intervention techniques with their child was measured at pre-and post-treatment during a 10-minute parent-child play session and a snack using the Project ImPACT intervention Fidelity Checklist (n=20). Parents are given fidelity ratings on a 5-point scale in five areas: Makes Play Interactive, Models and Expands Language or Play, Increases Opportunities for Initiations, Helps Increase the Complexity of Language, Imitation, or Play, and Paces the Interaction. An Overall Fidelity score is calculated by averaging scores across the five fidelity categories for the play and snack observation. An overall fidelity rating of 4 or greater is the standard for meeting fidelity of implementation.

A mixed model ANOVA indicated a main effect of time,  $F(1, 17)=49.83$ ,  $p<.001$ , such that parents demonstrated greater fidelity of implementation of the ImPACT Intervention at post-treatment ( $M=3.02$ ,  $SE=.20$ ) than pre-treatment ( $M=1.66$ ,  $SE=.11$ ). There was also a significant group X time interaction, such that parents in the therapist-assisted group made greater gains in fidelity than parents in the self-directed group,  $F(1, 17)= 8.65$ ,  $p<.01$ , see Figure 3. These findings indicate that remote coaching improves parents ability to implement the intervention techniques with their child.

**Figure 3: Parent Fidelity by Group**



**Treatment Acceptability.** The acceptability of the intervention procedures and the online delivery format of ImPACT Online program and the parents' overall satisfaction with the program were measured using the Treatment Evaluation for Increasing Skills Scale (TEISS; Berger, Mansten, & Ingersoll, 2013). The TEISS asks individuals to endorse 22 items that assess the acceptability of a treatment's procedures and its perceived effectiveness on a 7-point scale, ranging from 1 to 7, with higher scores indicating greater acceptability. The TEISS has four empirically-derived subscales: Acceptability (9 items), Child Improvement (4 items), (Low) Burden (3 items), and Safety (6 items). Parents were also asked to rate the helpfulness of each component of the web-based program for learning the intervention. These items were combined into a Usability scale (11 items). Finally, parents were asked the degree to which they used the intervention with their child regularly and whether they would recommend the program to others. The average of these two items was used as an overall measure of program satisfaction. Parents receiving the remote coaching component of the program were also asked to endorse 5 additional items that assessed parent satisfaction with the remote coaching and their relationship with

their coach. All parents were also asked to make open-ended comments about benefits and limitations of the program and suggestions for improvement.

Parents (n=21) rated the intervention presented in the program as highly acceptable (M=6.55, SD=.63), leading to improvement in their child's skills (M=5.33, SD=1.364), having a high degree of safety (M=6.60, SD=.60) and having a low level of burden on the family (M=5.79, SD=1.30). Parents rated the self-directed portion of the program as highly usable (M=6.33, SD=.62) and parents in the TA group (n=10) rated the remote coaching component of the program as highly satisfactory (M=6.76; SD=.66). Overall program satisfaction was very high (M=6.64, SD=.55).

To examine whether treatment acceptability differed as an effect of group, we ran a series of independent t-tests on the various measures of acceptability. No significant group differences were observed for treatment acceptability, improvement, burden on family, safety, or usability, all  $p > .10$ . However, parents in the TA group indicated greater overall program satisfaction than the parents in the SD group,  $t(19)=2.23$ ,  $p < .05$ , see Table 2.

**Table 2: Treatment Acceptability by Group**

	Self-Directed M (SE)	Therapist-Assisted M (SE)	t-value
Acceptability	6.33 (.24)	6.78 (.09)	1.69
Improvement	4.84 (.47)	5.89 (.30)	1.84
(Low) Burden on Family	5.49 (.48)	6.13 (.26)	1.15
Safety	6.52 (.22)	6.68 (.13)	.63
Usability	6.21 (.24)	6.47 (.10)	.98
Satisfaction with Coaching	n/a	6.98 (.02)	n/a
Overall Satisfaction	6.41 (.20)	6.90 (.07)	2.23*

**Exploratory Analysis:** We also ran an exploratory analysis to examine relationships between our primary measure of parent program engagement, changes in parent intervention knowledge, changes in fidelity of implementation, and treatment acceptability. Parent engagement with the self-directed program was positively associated with gains in parent fidelity,  $r(19)=.57$ ,  $p < .05$  and overall satisfaction with the program,  $r(19)=.56$ ,  $p < .05$ . Overall satisfaction with the program was also positively associated with changes in parent fidelity,  $r(19)=.55$ ,  $p < .05$ . Changes in parent knowledge and parent fidelity were

not correlated  $r(19)=.08$ , n.s., and percent of program engagement was not correlated with parent knowledge  $r(19)=.20$ , n.s..

### **Parent Interviews**

We also used a semi-structured interview and a Grounded Theory Approach (Corbin & Strauss, 1990) to examine the feasibility, acceptability, and compatibility of the online. Critically, we examined whether parents' reported experience in the online program differed depending on whether they received additional support through the use of an online coach. Specific research questions included: 1.) What is the feasibility and usability of the online, parent-mediated program?; 2.) What are the perceived benefits of the parent-training program; 3.) What supports were necessary in order for parents to complete the online program; and 4.) When and how would parents like to gain access to the online program?

Preliminary data analysis has been conducted from the interviews of 10 participating parents (i.e. 5 in the self-directed group and 5 in the therapist-assisted group). This initial analysis demonstrated that while many emergent themes are paralleled across both the self-directed and coaching groups, several themes also differ by group.

Themes that were reported across both coaching and self-directed groups include: 1) ease of use of the Project ImPACT program; 2) continued use of the program after the conclusion of the research study; 3) the importance of support throughout the program (i.e. from family and friends); 4) reported child social communication gains in response to the ImPACT Online program; and 5) the need to be referred to the program during or even prior to receiving an ASD diagnosis.

Emergent themes that were unique to parents in the self-directed group included: 1) the potential utility (but lack of necessity) of having a coach during their time in the Project ImPACT program; and 2) the benefit of being in an intervention program that had free access. Emergent themes that were unique to parents in the coaching group included: 1) the importance of having a coach for support during participation in program; and 2) the ability to access the online intervention program, even in the presence of life stressors.

### **Summary**

Overall, our initial data analyses suggest that ImPACT Online is highly likely to achieve its aims. The program engagement data indicated high rates of program completion and low rates of attrition for both groups. Although parents in both groups were similarly high on our primary measure of program

engagement (percent of program component completed), our other metrics of program engagement (i.e., number of logins, time on the site, number of additional programs components accessed) indicated that parents in the TA group may have engaged more with the website. It is likely that some of this engagement was due to the parents' interaction with the site during the coaching sessions, but some may have been outside of the coaching sessions. For example, coaches often suggested parents view specific video examples from the video library that were relevant for their child.

Parents in both groups demonstrated significant improvement in their conceptual knowledge of the intervention, and no effects of group were observed. This suggests that the self-directed program was likely the primary means for increasing parents' understanding of the intervention. In contrast, while parents in both groups demonstrated improvements in their fidelity of implementation of the intervention, parents in TA group exhibited greater gains than the parents in the SD group. This suggests that coaching is likely key to translating conceptual knowledge into practical knowledge.

Treatment acceptability ratings were also very positive for the intervention, the self-directed program, and the remote coaching. Overall satisfaction with the program was significantly higher for the parents in the TA group, suggesting that there may be an added benefit of therapist support in terms of parent program utilization and buy-in. Finally, our exploratory analyses indicate a relationship between program engagement and improvements in parent fidelity, suggesting that program engagement is related to the parents' increased ability to implement the intervention effectively with their child. In addition, there was a positive relationship between improvements in parent fidelity and parent satisfaction with the program. This indicates that parents who find the program to be more acceptable are more likely to learn and implement the intervention techniques effectively. Alternatively, parents who gained more from the program may find it to be more acceptable. Our qualitative analysis also indicated a high level of parent satisfaction with the program, and emphasized the program's usability. Parents in both groups identified the potential benefit of receiving therapist assistance while completing the program.

**2d. Incorporate parent feedback into final version of training program (months 30-36). We will incorporate feedback from parents who participated in pilot testing into the final version of the training program. Based on our feedback on the delivery formats, we will decide whether the final version will include video-based coaching.**

Our pilot study indicated that ImpACT Online is highly acceptable to parents of children with

ASD, and can result in improvements in parent knowledge and implementation of the intervention techniques. There were minimal group differences in terms of usability and acceptability of the intervention, as well as changes in intervention knowledge, suggesting that both versions are likely to be effective for increasing parent conceptual learning of the intervention techniques. However, parents in the TA group made greater gains in their fidelity of implementation than parents in the SD group, and parents in both groups identified the potential benefit of receiving therapist assistance during the program. This finding is consistent with research on live parent training programs for children with ASD that find that parent coaching is important for increasing parents' fidelity of implementation.

Although our original intent was to determine whether the final version of ImPACT Online should include remote coaching or not, our pilot data suggest a potential role for both models. There is evidence that remote coaching may enhance some aspects of parent learning, and thus may be a desirable component of the program. At the same time, self-directed programs have far greater dissemination potential as they do not require a trained professional and can typically be administered at a much reduced cost. Given the improvements observed in the SD group, it is likely that remote parent coaching may be necessary for some, but not all parents to successfully implement the intervention techniques with fidelity. In addition, it is not yet clear the degree to which coaching is necessary for producing gains in child outcomes (the ultimate goal of the intervention). Thus, a better understanding of the relative benefits of these two delivery formats on parent and child outcomes, as well as the families for whom each format is most and least effective, is a crucial next step to develop more cost-effective delivery models in which services can be offered at different levels of intensity, depending on specific needs of the family (i.e., stepped-care).

**2e. Apply for R01 (months 34-36). We will write an R01 to conduct a clinical trial to evaluate the treatment effectiveness of the final program developed in this proposal in three sites nationally with Drs. Stahmer and Mandell.**

In May 2014, we submitted a 3-year grant to the Health Resources Service Administration's Maternal and Child Health Bureau Autism Intervention Research Program to conduct a clinical trial of ImPACT Online. We received the award in August and are now transitioning into this new grant, which will involve a 3-arm randomized controlled trial that will allow us to compare both versions of the



program to a web-based information condition. The grant will also examine moderators of parent and child outcomes to inform a stepped-care model of treatment provision.

## KEY RESEARCH ACCOMPLISHMENTS

- We developed the self-directed web-based program and remote coaching protocol (ImPACT Online).
- We conducted focus groups with key stakeholders (parents and professionals) to guide the development of the program and to determine the likelihood that the program will achieve its aims. Key themes identified from the focus group included: 1) The program would likely achieve its aims; 2) the program would be appropriate for a range of families; 3) children with significant behavioral difficulties and parents who do not believe that they can help their child gain skills may not benefit as well as others; 4) pediatricians' or physicians' offices, diagnostic centers, and educational providers would be the most likely professionals to recommend the program to families; 5) limit parental time, accountability, access to technology, and lack of having a professional help the parent through the program could be barriers to the use of self-directed program; 6) having parents work with a behavioral expert to address child behavior problems prior to completing the program, offering the self-directed program in combination with a regular parent group to increase accountability and social support, and having a local subject matter expert available who could answer parents' questions as they worked through the program could address these barriers; 7) technical difficulties with video-conferencing software, parental discomfort with video-conferencing, and not having the coach be able to work directly with the child while the parent observed could be barriers to the use of remote coaching; and 8) having parents observe a sample coaching session prior to having their first coaching session, providing coaching over the phone instead of video-conferencing, or providing coaching based on previously recorded videos of the parent and child as opposed to coaching the parents as they interact with their child could address these barriers.
- We conducted a feasibility trial that examined the effect of the self-directed and therapist-assisted versions of the program on key parent outcomes (usability, acceptability, parent knowledge, and parent implementation). Key findings from the preliminary analyses of the feasibility trial include: 1) Parents in both groups demonstrate high rates of program engagement; 2) Parents in both groups demonstrate significant improvement in conceptual knowledge of the intervention from pre- to post-treatment; 3) Parents in both groups demonstrate significant improvement in

their implementation of the intervention with their child from pre- to post-treatment; 4) Parent gains in fidelity of implementation were greater for the parents in the therapist-assisted group; 5) Parents report a high degree of satisfaction with the program in terms of the acceptability of the intervention, usability of the self-administered program, and benefit of remote coaching; 6) Parents who receive remote coaching were significantly more satisfied with the program; and 7) Parent program engagement is related to changes in parent knowledge and treatment acceptability.

- We received internal and external funding to further evaluate the ImPACT Online program. We received an internal grant from Michigan State University that will allow us to further examine the feasibility of the self-directed model in a large sample (n=200) of community-referred participants. This study will examine the reach of the program, identify barriers to program use, and evaluate a model of treatment adherence and treatment outcome to understand predictors of treatment adherence and the degree to which treatment adherence improves parent outcomes. We also received funding from the US Dept of Health and Human Services HRSA/MCHB to support a clinical trial comparing the self-directed and therapist-assisted models to a web-based information control group on key parent (fidelity and self-efficacy) and child (language) outcomes. The trial will also examine whether parent stress moderates parent outcomes and whether changes in parenting fidelity and/or parent self-efficacy mediate the effect of treatment on child language gains. Finally, it will examine four potential predictors of treatment adherence to the program (therapist assistance, parent computer/internet fluency, parent expectancies, treatment acceptability).

## CONCLUSION

This project used a newly-developed technology to disseminate an evidence-based parent-training intervention for children with ASD. Focus group work with key stakeholders (parents and professionals) during the development phase was key to informing the web-based components of the self-directed portion of the program and the protocol for providing remote coaching for the therapist-assisted portion of the program. Our focus groups also suggested that parents and professionals would likely find the self-directed program highly engaging and easy to use and suggested significant potential for this type of program to increase parent access to evidence-based services. At the same time, they indicated that there may be some barriers to parent use, particularly if the program is not accompanied by in vivo or remote coaching.

In the second phase of our research, we examined the feasibility of this program for teaching parents intervention techniques. We have completed running participants and are in the final stages of data analysis. Our preliminary analyses of our feasibility trial suggest that both delivery models are feasible and lead to improvements in parent knowledge of the intervention and ability to implement the intervention effectively. Parents in both groups found the self-directed portion of the program highly engaging and easy to use, and parents in the therapist-assisted group indicated a high degree of satisfaction with coaching. At the same time, there were some group differences; parent fidelity of implementation and satisfaction was higher when remote coaching was provided. Once data analysis is complete, we will be able to fully analyze our data and submit them for publication.

Although our original intent was to determine whether the final version of ImPACT Online should include remote coaching or not, our pilot data suggest a potential role for both models. There is evidence that therapist assistance in the form of remote coaching may enhance some aspects of parent learning, and thus may be a desirable component of the program. At the same time, self-directed programs have far greater dissemination potential as they do not require a trained professional and can typically be administered at a much reduced cost. Given the improvements observed in the self-directed group, it is likely that remote parent coaching may be necessary for some, but not all parents to successfully implement the intervention techniques with fidelity. In addition, it is not yet clear the degree to which coaching is necessary for producing gains in child outcomes (the ultimate goal of the intervention). Thus, a better understanding of the relative benefits of these two delivery formats on parent

and child outcomes, as well as the families for whom each format is most and least effective, is crucial next step to develop more cost-effective delivery models in which services can be offered at different levels of intensity, depending on specific needs of the family (i.e., stepped-care).

The data from this Idea Award were key to obtaining additional funding to examine these important questions. We have received internal funding to examine the reach, attrition, adherence, and outcomes of the self-directed program in an open-access trial. Self-directed web-based programs in other health fields often report a high level of attrition when participants are able to freely enroll (i.e., open-access) as opposed to being closely monitored as part of an lab-based efficacy trial (Batterham, Neil, Bennett, Griffiths, & Christensen, 2008). Thus, this project will provide important information on the likelihood that the self-directed version of the program will be able to effectively service a wide range of families. We have also received funding to conduct a clinical trial to directly compare the effects of the self-directed and therapist-assisted versions of the program on parent and child outcomes, test mediators and moderators of treatment, and examine predictors of treatment adherence. This information will provide much needed information on the most effective methods for distributing the intervention to parents. If this approach to parent training is successful, it has implications for a wide range of remote training opportunities, including provider training, which will enhance the availability of high quality and efficacious intervention in areas which are currently underserved.

## **PUBLICATIONS, ABSTRACTS, AND PRESENTATIONS**

### **Book Chapters**

Ingersoll, B. & Wainer, A. (2013). Using distance learning technology to increase dissemination of evidence-based practice in ASD. In K. Boser, M. Goodman, & S. Wayland (Eds.), Learning technologies for people with autism and related disorders. Baltimore, MD: Brookes Publishing.

### **Presentations**

Ingersoll, B. (2013, October). Expanding the reach of parent-mediated intervention in ASD using eHealth. Invited talk at the DOCTRID Conference, Dublin, Ireland.

Ingersoll, B. (2014, May) Efficacy of an eHealth-based parent-mediated intervention for young children with ASD: Comparison of two delivery approaches. Poster presentation at the annual meeting of the International Meeting for Autism Research, Atlanta, GA.

**INVENTIONS, PATENTS AND LICENSES**

Nothing to report.

### **REPORTABLE OUTCOMES**

- We have developed the ImPACT Online program, which includes program content, a coaching protocol, as well as a web-based application that delivers the self-directed program. This application can be easily modified to present different material, and can be extended to use with providers. For example, we are currently using the application to deliver a different evidence-based parent training intervention for young children with autism, and using a variation on the materials to conduct provider training.



## OTHER ACHIEVEMENTS

### Degrees obtained

This award supported graduate training of four doctoral students in Clinical Psychology at Michigan State University.

**Katherine Walton** (PhD in 2012). Now an Assistant Professor of Psychology and Psychiatry at Ohio State University.

**Allison Wainer** (PhD expected in 2015). Currently on Clinical Internship at JFP Partners, University of Colorado, Denver.

**Natalie Berger** (MA in 2013, now completing PhD)

**Katherine Pickard** (MA in 2014, now completing PhD)

### Grants Obtained

Key products from this award were instrumental in obtaining additional grant funding to further study the ImPACT Online parent training program or to evaluate other web-based training programs providing instruction in different interventions or for use with different stakeholder groups (e.g., children with ASD, providers).

#### To study ImPACT Online

**Michigan State University RAIN D Seed Grant** (\$100,000). ImPACT Online: Increasing access to parent training in ASD internet-delivered instruction in evidence-based intervention. Will examine the reach and implementation of a self-directed telehealth parent training program for young children with ASD (February 1, 2014-January 31, 2016)

Role: PI

**Health Resources and Services Administration, Maternal and Child Health** (\$899,388 total).

Comparative efficacy of a self-directed and therapist-assisted telehealth parent training intervention for children with ASD. Will examine the efficacy of a self-directed and therapist-assisted version of a telehealth program designed to teach parents of young children with autism strategies to support their child's social communication (September 1, 2014-August 30, 2017)

Role: PI

#### To develop web-based training for providers on Project ImPACT

**Institute for Education Sciences, Goal 2** (MSU subcontract: \$122,667 total). Adapting an evidence-based program for infants and toddlers at high risk of autism. Will adapt parent training curriculum for toddlers at risk for ASD and examine community implementation (July 2013 – June 2016) PI: Stahmer

Role: Co-I

#### To study different web-based parent training intervention

**Autism Speaks Dennis Weatherstone Mentor-Based Graduate Student Fellowship** (\$56,000 total). Using an internet-based program to teach naturalistic intervention techniques to parents of children with autism. Investigated the efficacy of using an internet-based intervention with remote coaching to train parents of young children with autism to teach their child imitation skills. (September 2011-August 2013). Role: Faculty Mentor, Mentee: Allison Wainer

#### To examine web-based technology enhancements for social skills group for children with ASD

**Organization for Autism Research** (\$30,000 total). Assessing the effectiveness of video-based group instruction to enhance traditional social skills training for school-aged children with autism

spectrum disorders. Investigated the efficacy of video enhanced social skills instruction for children with ASD. (May 2013-April 2014)  
Role: Co-PI with Plavnick

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## APPENDICES

### Appendix A

Website: <https://psychology.msu.edu/AutismLab/ImpactOnline/>

### How to Complete Each Lesson

**Slideshow** – You should begin each lesson by watching the narrated slideshow. The slideshow will introduce the topic of the lesson and will provide video examples to help you learn the information. You can stop and restart or repeat any of the slides using the slideshow’s Table of Contents.

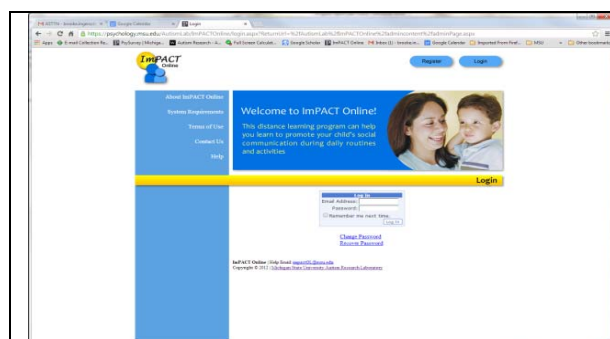
**Manual** – The manual presents the same information contained in the slideshow. It is a helpful reminder of the information covered in the lesson. You can print out a copy of the manual for the lesson at any time.

**Self-Check** – After watching the slideshow, you should complete the self-check questions. These multiple-choice questions are designed to help you check your understanding of the information. You will be given automated feedback based on your answers to help you learn. If you have difficulty with any of the questions, you can re-watch the relevant parts of the slideshow.

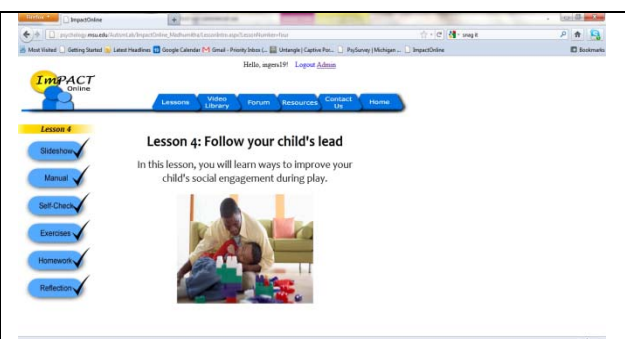
**Exercises** – After you have done the self-check, you should complete the exercises. For each exercise, you will view a brief video clip, and will be asked to answer whether you saw a correct example or incorrect example of the behavior or technique presented in the lesson. These video-based exercises are designed to help you identify important concepts and correct implementation of the techniques. You will be given automated feedback based on your answers to help you learn. If you have difficulty with any of the exercises, you can re-watch the relevant parts of the slideshow.

**Homework** – After you have completed the lesson, you should complete your homework plan. The homework plan will ask you to identify your child’s goals, activities in which you will practice, and how you will implement the specific techniques within those activities to target your child’s goals. You can print out your homework plan to keep track of how you will implement the techniques during your daily routines. You should then carry out your homework plan daily over the next week.

**Reflection** – After you have practiced the techniques outlined in your homework plan, you should complete the reflection questions. The reflection questions are designed to help you reflect on how you used the techniques, how your child responded, what aspects went well, and what aspects were challenging. You can print out your answers to the reflection questions to keep track of how your child responds to your use of the intervention. After completing the reflection questions, you are ready to move on to the next lesson.



Login Screen: Users can set their own passwords. The program remembers and tracks their activity.



Home page for Lesson 4: Top tabs are accessible from any lesson. Side buttons are specific to each lesson and walk users through each training

 <p>1<sup>st</sup> activity – Slideshow: Users watch flash video of narrated slideshow with embedded video examples of techniques.</p>	<p>activity.</p>  <p>2<sup>nd</sup> Activity – Manual: Users can download and print PDF of manual which provides a written description of lesson that corresponds to slideshow.</p>
 <p>3<sup>rd</sup> activity – Self-Check: Users answer comprehension check questions based on content of slideshow. Program provides automated positive and corrective feedback.</p>	 <p>4<sup>th</sup> activity – Exercises: Users observe brief video clips must indicate whether technique is implemented correctly or incorrectly. Program provides automated positive and corrective feedback.</p>
 <p>5<sup>th</sup> Activity – Homework: Users complete homework plan. Page has fillable boxes which record responses and can send responses to trainer. Users can print homework plan.</p>	 <p>6<sup>th</sup> Activity – Reflection: Users complete reflection questions based on their practice. Page has fillable boxes which record responses and can send responses to trainer. Users can print reflection.</p>

### Additional Learning Tools

The **Video Library** tab on the top menu contains longer video examples of adults using a number of the intervention techniques together. These clips are designed for you to see what the intervention looks like when the techniques are used in combination to teach the different core social-communication skills. The video library is organized by child language level.

The **Forum** tab on the top menu allows you to share information with other parents using the program. You are encouraged to read other's comments and questions and to post your own. The message board will be monitored to make sure that the content is appropriate and helpful.

The **Resources** tab on the top menu contains paper copies of all forms, as well as additional information on the evidence-base for this intervention, and links to relevant websites.

The **Contact Us** tab on the top menu will let you email questions about the program to MSU Autism Research Lab staff.



## Using Distance Learning Technology to Increase Dissemination of Evidence-Based Practice in Autism Spectrum Disorder



Brooke Ingersoll and Allison Wainer

Given the need for intensive early intervention in children with autism spectrum disorders (ASDs; Maglione, Gans, Das, Timbie, & Kasari, 2012; National Research Council [NRC], 2001) and the growing number of children requiring such services (Matson & Kozlowski, 2011), an expansion in the availability of, and access to, evidence-based treatments is essential. Unfortunately, there has not been a corresponding growth in the dissemination of evidenced-based interventions for children with autism. This, in turn, has engendered a service–need discrepancy for children with autism and their families (Sperry, Whaley, Shaw, & Brame, 1999; Stahmer & Gist, 2001; Symon, 2005). Indeed, the majority of families of children with autism in the United States report receiving substantially fewer hours of services than the 25 hours per week recommended by the National Research Council (2001; Hume, Bellini, & Pratt, 2005). Further, much of the intervention being provided to children with ASD is not considered evidence based (NRC, 2001). This is due, in part, to the fact that many individuals working with children with ASD do not receive sufficient instruction in evidence-based intervention techniques (NRC, 2001). Barriers associated with training therapists in evidence-based intervention techniques include limited monetary resources, significant time demands, and problems with the portability of intervention from the research laboratory to existing clinical settings (Kazdin, 2004). As such, it is necessary to consider training models in which these barriers can be overcome in time- and cost-effective ways.

One approach to increasing access to evidence-based interventions for children with ASD has been to train parents. Teaching parents to provide intervention themselves can increase the number of intervention hours that a child receives and improve long-term outcomes. A number of studies have demonstrated that parent



training is an effective approach for improving social-communicative development and decreasing problem behavior in children with ASD (Brookman-Frazee, Vis-mara, Drahota, Stahmer, & Openden, 2009). Research indicates that parents can learn to use intervention strategies with fidelity (Alpert & Kaiser, 1992) and that parent use of these strategies results in increased language, social interaction, and play skills (Drew et al., 2002; Gillett & LeBlanc, 2007; Green et al., 2010; Kasari, Gulsrud, Wong, Kwon, & Locke, 2010; Laski, Charlop, & Schreibman, 1988), as well as decreased problem behaviors (Aman et al., 2009) in their child with ASD. Parent training also improves the quality of life for the family by reducing parental stress (Tonge et al., 2006) and increasing parental leisure and recreation time (Koegel, Schreibman, Britten, Burke, & O'Neill, 1982). This benefit is important, given the high rate of stress and depression in parents of children with ASD (Dumas, Wolf, Fisman, & Culligan, 1991).

Despite the benefits of training parents to provide evidence-based interventions to their children with ASD, formal parent-training programs are rare in community-based settings. In an Indiana survey, only 21% of parents of children with ASD under 8 years of age reported receiving parent training (Hume et al., 2005). A major obstacle to the provision of parent training in community settings is the lack of appropriately trained providers (Mahoney et al., 1999), underscoring the need for cost-effect dissemination efforts for providers. Further, most parent-training programs for children with ASD involve frequent parent coaching by a therapist. Thus, the absence of reliable transportation, lack of child care, cost of treatment, and limited flexibility in scheduling can significantly affect access to these services (Koegel, Symon, & Kern Koegel, 2002). These barriers are even more pronounced for families in rural areas, for whom long distances, poor roads, and climatic barriers also limit access to services (Horner et al., 1994). Thus, dissemination efforts, which can increase access to instruction in evidence-based interventions, are also needed for parents.

## DISTANCE LEARNING TOOLS

Computerized distance learning programs have the potential to help address, and surmount, many of the challenges associated with traditional dissemination models by granting remote access to training in evidence-based practices. There are numerous benefits associated with using computer and Internet-based technology to disseminate evidence-based practices, including the potential for intervention to be accessed from anywhere at any time and the ability to individualize training while keeping instruction standardized and maintaining fidelity of program implementation (Hollon et al., 2002; Mandel, Bigelow, & Lutzker, 1998). Computerized distance learning programs also favor an exciting and interactive learning experience, allowing for the combination of many instructional formats, including graphics, animation, video, and audio. This format makes it possible for the learner to directly interact with the instructional content; hypothetical situations, vignettes, and practice exercises can be transformed from words on a page into such rich media forms as video or animation, which then can be used to develop and test the participant's knowledge (Weingardt, 2004). Moreover, advances in computer and Internet technology have made it possible for users to stream or upload video of themselves using intervention techniques and to receive remote feedback or coaching from an expert

trainer via phone, e-mail, or web chat. Given the promise of such service delivery models, research has begun to explore the use of distance learning technology to supplement, or even replace, traditional training models that typically require both significant travel and time commitments.

This approach to disseminating evidence-based interventions is low cost and can surmount many barriers to participation in traditional training programs. Computer and Internet-delivered programs have been utilized to train professionals in a variety of health- and education-related settings (Benjamin et al., 2008; Weingardt, Cucciare, Bellotti, & Lai, 2009). Moreover, distance learning technology has been utilized to train parents in evidence-based techniques for reducing disruptive child behaviors and increasing positive parenting behaviors (Feil et al., 2008; Kacir & Gordon, 1999; Taylor et al., 2008). The promise of disseminating evidence-based interventions to professionals and parents via distance learning technology has recently been recognized in the autism intervention field. Over the past few years, several online programs that require a paid subscription have become available, including RethinkAutism (<http://www.rethinkautism.com>), AutismPro (<http://www.autismpro.com>), Advanced Training Solutions (<http://www.advancedtrainingsolutions.com>), and Skills by the Center for Autism and Related Disorders (<http://www.skillsforautism.com>). In addition, several programs are also provided over the Internet free of charge, including Autism Distance Education Parent Training (ADEPT), offered through University of California, Davis's MIND Institute ([http://www.ucdmc.ucdavis.edu/ddcenter/CEDD\\_ourproducts.html](http://www.ucdmc.ucdavis.edu/ddcenter/CEDD_ourproducts.html)), and the Autism Internet Modules (AIM), offered through the Ohio Center for Autism and Low Incidence (OCALI; <http://www.autisminternetmodules.org>).

### Features of Distance Learning Programs

The U.S. Department of Education characterized distance learning activities in terms of three dimensions in their recent meta-analysis evaluating the effectiveness of online learning (U.S. Department of Education, 2010). The first dimension is whether the program is intended to replace face-to-face instruction or to supplement or augment face-to-face instruction. Programs whose aim is to replace face-to-face instruction should demonstrate learning outcomes that are at least equivalent to traditional forms of instruction. On the other hand, programs whose aim is to supplement face-to-face instructions should demonstrate outcomes that are better than face-to-face instruction alone. Although many online or distance learning courses use online components to supplement face-to-face instruction by encouraging learners to engage more with the material (e.g., learners attend lecture and then complete online quizzes to test their comprehension of the material), distance learning programs aimed at disseminating autism interventions have focused primarily on the goal of replacing some or all components of face-to-face instruction.

The second dimension is the learning experience itself or how learners acquire knowledge. Distance learning experiences, like face-to-face learning, can be conceptualized as expository, active, or interactive. In expository learning, the content is transmitted to the learner by lecture, written material, or some other mechanism. For autism programs, this has primarily involved the presentation of written information, slide shows, or streaming or recorded lectures presented via DVD or Internet technology. In active learning, the learner acquires knowledge through

interaction with the instructional content in the form of self-check exercises or quizzes or interactive simulations. For autism programs, this type of learning has primarily involved the use of self-check exercises tapping the understanding of the instructional content and video ratings tapping the recognition of correct and incorrect examples of implementation.

In interactive learning, the learner builds knowledge through collaborative interaction with others. In most distance learning contexts, interactive learning is conducted between learners (e.g., students taking an online course participate in a guided discussion over an online message board). In distance learning programs aimed at disseminating autism interventions, it is more common to see interactive learning conducted through the use of technology to provide the learner with feedback or coaching regarding their use of the intervention with the children with ASD. In this way, the learner gains knowledge through interaction with an expert, rather than with other learners.

The third dimension used to characterize distance learning is whether the activity is *synchronous*, with instruction occurring in real time, or *asynchronous*, with a lag between the presentation of the material and the learner's response. Autism programs using synchronous instruction have used live webcasts or teleconferencing to present lectures or workshops, as well as live coaching via video chat programs, such as Skype or GoogleTalk. Autism programs using asynchronous instruction have utilized written information, recorded webcasts, or videotaped lectures presented via DVD or over the web, as well as video-based coaching in which an expert coach provides feedback to the learner based on a prerecorded video of the learner using the techniques at an earlier time.

## IMPLEMENTATION

Although current research is sparse, there is growing support for the efficacy of such technology for disseminating training in evidence-based ASD intervention. At the writing of this chapter, 12 studies had been published in peer-reviewed journals that evaluated computerized distance learning programs for training providers or parents in ASD interventions. These programs vary across the U.S. Department of Education's three distance learning dimensions (see Table 15.1). It is important to note that several of the programs were developed in order to enhance and streamline traditional face-to-face instruction, whereas others were developed with the potential to replace in-person training models all together. Although both uses of distance learning are beneficial for moving the ASD intervention field forward, the programs that replace face-to-face instruction hold the most promise for surmounting barriers associated with current service delivery models. Moreover, the relationship of the online program to face-to-face instruction should influence the types of activities utilized, the synchronicity of instruction, and important outcome measures. Thus, programs developed to augment in-person training are discussed first, followed by those programs with the potential to replace traditional face-to-face instruction.

### Distance Learning Programs Designed to Supplement Face-to-Face Instruction

Of the 12 computerized distance learning programs for ASD interventions that have been assessed in the literature, 3 were evaluated as supplemental tools to augment in-person instruction. These programs typically have combined online distance

**Table 15.1.** Distance learning programs for interventions for persons with autism spectrum disorders

Article	Learners		Relationship to Face-to-Face Instruction				Types of Computerized Learning Activities				Synchronicity of Instruction			Outcomes Measured		
	Providers	Parents	Replace	Supplement	Expository	Active	Inter-active	Synchronous	Asynchronous	Usability	Knowledge	Learner fidelity	Child behavior			
														Active	Inter-active	Synchronous
Baharav & Reiser (2010)		X		X		D		X								X
Buzhardt & Heitzman-Powell (2005)	X		X		A, B, C	E			X					X		
Gibson et al. (2010)	X		X		B	D		X					X			X
Graneeshah et al. (2010)	X		X		A, C			X						X		
Hamad et al. (2010)	X		X		A, B, C	E			X					X		
Howroyd & Peeters (2007)	X		X		B, C	E, F		X								
Machalicek, O'Reilly, Chan, Lang, et al. (2009); Machalicek, O'Reilly, Chan, Rispoli, et al. (2009); Machalicek et al. (2010)						D								X		X
Nefdt et al. (2009)	X		X		A, B, C	E			X					X		X
Wainer & Ingersoll (2013)	X		X		A, B, C	E			X					X		X
Vismara et al. (2009)	X		X		A, B, C			X						X		X

**Note:** X is used to indicate that the program included the specific attribute described above. The specific types of computerized activities used are denoted using the following letters:  
A. Lectures, slideshows  
B. Written information, manual  
C. Video examples, animation  
D. Video conferencing (teleconferencing, Skype)  
E. Quizzes, self-check, application exercises  
F. Behavior tracking

learning activities with traditional in-person training to disseminate ASD intervention techniques. For example, Granpeesheh and colleagues (2010) compared the effectiveness of an e-Learning program with traditional in-person didactic training to teach new behavioral therapists the principles and procedures involved with applied behavior analysis (ABA). The e-Learning program was asynchronous and consisted of several expository learning activities. In particular, this program utilized training modules with animated slides, audio recordings, and video demonstrations. After completing the modules, participants attended a 2-hour follow-up discussion with an expert therapist to address questions about the teaching techniques. Results from this study indicate that participants in both training groups significantly increased their knowledge about ABA principles and procedures, with those in the traditional training group demonstrating slightly more gains than those in the e-Learning condition (Granpeesheh et al., 2010). These results suggest that a computerized training program can be an effective supplemental information delivery system, yet it is unclear how these gains in knowledge translate to the ability to correctly implement the ABA techniques. It is important to note that support from expert trainers seemed to produce additional learning benefits.

Buzhardt and Heitzman-Powell (2005) also investigated a program to introduce ABA principles to behavioral aides working with children with ASD. The program instruction was delivered asynchronously and utilized expository as well as active learning activities. The online lessons included text, graphics, animation, and short quizzes to learn about the various ABA procedures. Participants had a week to work through each module; however, they reported that it took an average of 56 minutes to complete each tutorial and an average of 21 minutes to complete the associated quizzes. In order to bolster participants' ability to implement ABA techniques, a 3-hour-long, group face-to-face training session was held with the participants each week after they completed the corresponding module. During these sessions, the participants spent 2 hours practicing or observing ABA with two to three different children with ASD. The end of each session was spent summarizing the practice session and introducing the next week's topic. Participants increased their scores on a knowledge quiz of ABA from pre- to posttraining. Moreover, participants reported that the technology was easy to use and noted high levels of satisfaction with the training program. Although the live practice sessions were integrated into the program in order to help participants apply ABA techniques, the study investigators did not evaluate changes in participant fidelity of intervention implementation.

Baharav and Reiser (2010) explored the use of distance learning to supplement traditional face-to-face training for parents implementing in-home speech and language therapy. Participants attended weekly in-person clinic-based training sessions and then received weekly home-based remote coaching and feedback sessions. In this case, the remote coaching program was interactive and delivered synchronously. Moment-to-moment feedback was delivered using an Internet-based video chat system and wireless Bluetooth headsets. Results from the pilot study with two parents and their children with ASD suggested that the remote coaching was both feasible and effective; they found that child gains achieved in traditional therapy settings could be maintained and improved when the parent received remote synchronous feedback and supervision from an expert therapist. Moreover, the parents found that the technology was useable and the distance coaching was valuable. Nonetheless, the parents indicated some challenges associated with the

remote coaching including the difficulty of staying within the range of the webcam and the uncontrolled nature of training sessions conducted in the home (Baharav & Reiser, 2010).

The foregoing studies lend preliminary evidence to the suggestion that distance learning tools may be helpful supports to augment traditional face-to-face learning formats. The use of this technology to supplement in-person training may help to make a more interactive and effective training program and may reduce the overall number of hours of face-to-face instruction needed. However, such programs do not necessarily address the issue of increasing access to intervention for individuals without access to traditional face-to-face programs. Given that the need for increased access to ASD intervention is so great, research on distance learning in ASD intervention has also focused on programs with potential to replace more traditional in-person training models.

### **Distance Learning Programs Designed to Replace Face-to-Face Instruction**

A number of distance learning programs have been developed with the potential to replace face-to-face instruction. These programs can be classified as either self-directed, in which the learner completes the training independently, or remote coaching, in which the learner receives active coaching from an expert at a distance.

**Self-Directed Programs** Several studies have examined the potential of self-directed distance learning programs to provide total training in ASD intervention techniques. Such programs have been designed with the possibility of replacing traditional in-person face-to-face training models. These programs have primarily utilized expository and active learning activities with content that is delivered asynchronously. For example, Hamad, Serna, Morrison, and Fleming (2010) explored the feasibility and utility of an Internet-based distance learning program to teach ASD service providers, educators, paraprofessionals, and parents behavioral intervention techniques. The online course consisted of three training modules that introduced the concepts of positive reinforcement, relationship building, and prompting. The modules included lecture, video examples across several different children, providers, and settings, self-check exercises, and links to other sources of information about the behavioral intervention techniques. In an initial evaluation of the program, approximately half of the users took from 1 to 4 hours to complete each of the modules and the other half from 5 to 8 hours to complete each module (Hamad et al., 2010). In this study, users significantly increased their scores on a knowledge quiz of behavioral intervention techniques from pre- to posttraining. Although individuals with bachelor's degrees and associate's degrees had mean pretests scores that were significantly lower than did individuals with master's degrees, all three groups performed comparably on the posttest measure. This finding is encouraging, given the dearth of research that has evaluated the effect of education level on distance learning program outcomes. In addition, the majority of participants rated the program very highly in terms of usability, quality, and appropriateness of the course materials (Hamad et al., 2010). Although this study suggests that this type of distance learning program is feasible and satisfactory for increasing knowledge, it remains unclear whether this program would be sufficient for training users to implement behavioral intervention. Furthermore, only 60% of individuals who were enrolled



in the study completed the course, yet variables influencing course completion were not evaluated.

In another study, Howroyd and Peeters (2007) described a self-directed distance learning program, AutismPro, that is aimed at teaching parents strategies for building social-emotional, communication, academic, language, understanding, self-care, and motor skills in their young children with ASD. The program consists of an online software system that utilizes multimedia to teach various intervention techniques, including video demonstrations and step-by-step procedures for implementing the strategies with a given child. The software also provides the user with treatment recommendations and allows for child progress to be tracked. An initial evaluation of the program explored the feasibility, utility, and perceived value of this program for parents of children with ASD (Howroyd & Peeters, 2007). The results from this study suggest that parents were able to navigate the online program and felt that the instructional content was appropriate, easy to understand, and helpful. Finally, parents felt that this was a valuable program to help support, guide, and manage their child's intervention. It is important to note that this research did not evaluate parents' implementation of the content introduced in AutismPro. Although program usefulness was rated highly, it is unknown how well parents were actually learning and utilizing the information presented in the course. Moreover, only approximately half of families given access returned their ratings of the program. As such, the experiences and perceptions of the other half of program users are unknown. Nonetheless, this initial study suggests that distance learning programs may be ecologically valid ways to increase access to training and educational information for parents of children with ASD.

Acknowledging the lack of research evaluating procedural knowledge, Nefdt, Koegel, Singer, and Gerber (2010) examined the use of a self-directed distance learning program on parents' fidelity of intervention implementation. Parents of young children with autism were randomly assigned to a treatment or control group. Parents in the treatment group received a distance learning program that taught motivational techniques from pivotal response training (PRT), an intervention approach aimed at increasing children's social communication, primarily their verbal language, whereas parents in the control group were simply monitored. The program consisted of 14 training modules presented via DVD with an accompanying paper-based parent manual. Each module presented information via text and audio lecture and provided short video examples of each technique. Parents completed short quizzes to check for comprehension at the conclusion of each module. In addition, at the conclusion of the program, parents participated in an interactive learning task where they assessed others' abilities to implement PRT techniques. Results indicated that parents were generally willing to complete such a program and that those who completed it were able to implement PRT strategies with fidelity, provided more language opportunities for their children, and displayed greater confidence when interacting with their children. In addition, children of these parents showed an increase in their use of verbal language compared to the children in the control group (Nefdt et al., 2010). Thus, results suggest that such a training program has the potential to take the place of traditional in-person training models. However, since the distance learning program was not compared to a face-to-face training program, it is unclear whether gains in parent and child skills were commensurate with gains seen in traditional training models.

Most recently, Wainer and Ingersoll (2013) used a single-subject, multiple-baseline design to examine the ability of a self-directed distance learning program to train new research assistants and parents in reciprocal imitation training (RIT), a naturalistic behavioral imitation intervention for young children with ASD. The training program was administered using commercially available distance learning course management software. Course content was presented via narrated slide presentations augmented with video examples and written descriptions of the techniques. Each lesson concluded with a short comprehension quiz and several interactive learning tasks in which users rated others' abilities to implement RIT techniques. The program consisted of five training modules that took between 4 and 40 minutes to view, depending on lesson content and the number of embedded video examples. Research assistants took an average of 14 days to work through the entire program, whereas parents took an average of 22 days to do the same. Results from this initial study indicated that both sets of participants increased their knowledge of RIT and naturalistic intervention from pre- to posttraining. All participants increased their use of the intervention techniques during the treatment phase. Moreover, two thirds of the participants were able to achieve fidelity of RIT implementation based solely on their use of the self-directed program. The remaining participants were able to achieve fidelity of implementation after one 30-minute in-person coaching session consisting of demonstration, feedback, and discussion. In addition, participation in this training led to increases in child imitation rates during adult-child interactions. It is important to note that parents found that this program and service delivery model were effective, acceptable, and usable. Results suggest that this self-directed distance learning program may be effective for disseminating training in ASD intervention techniques. Whereas this program utilized face-to-face coaching for one third of the participants, future research is underway to evaluate the use of a synchronous remote coaching and feedback system in order to augment the asynchronous distance learning program.

**Remote Coaching Programs** Advances in computer and Internet technology have made it possible for individuals utilizing distance learning programs to receive remote coaching and feedback from expert trainers. Although feedback can be delivered via asynchronous programs (e.g., a user uploads video and a coach watches it at a later time), research has primarily focused on feedback provided via synchronous programs, such as videoconferencing or live video chat. The majority of this research has evaluated programs that utilize expository and/or interactive learning activities to replace traditional in-person face-to-face dissemination of evidence-based intervention techniques.

In a series of studies, Machalicek and colleagues (Machalicek, O'Reilly, Chan, Lang, et al., 2009; Machalicek, O'Reilly, Chan, Rispoli, et al., 2009; Machalicek et al., 2010) examined the use of videoconferencing to provide immediate feedback to teachers learning to implement several different behavior management strategies. In each study, a live Internet-based, video-chat system was utilized so that trainers could observe the teachers in the classroom and provide moment-to-moment feedback using built-in computer microphones and speakers. Machalicek, O'Reilly, Chan, Lang, et al. (2009) evaluated the efficacy of this approach for training preservice teachers to implement preference assessments with individuals with ASD and developmental disabilities. Before engaging in the distance learning, teachers were



provided with a brief written description of the procedures involved with conducting preference assessments and told to practice these with their student. During subsequent sessions, teachers implemented the task procedures while supervisors watched the implementation via the videoconferencing technology. Supervisors collected data on teacher performance and provided immediate feedback throughout the session. Teachers were able to implement the procedures with 100% accuracy during their supervised sessions. Because teachers were already implementing the techniques correctly, it was impossible to evaluate the incremental utility of the remote coaching on implementation. Nonetheless, these initial evaluations suggest that videoconferencing is a feasible option for providing synchronous feedback and coaching during implementation of a set protocol.

In a related study, this group evaluated the use of the same technology to train preservice teachers to conduct a functional analysis for two children with ASD who were exhibiting problem behavior (Machalicek, O'Reilly, Chan, Rispoli, et al., 2009). Teachers were supervised implementing their first-ever functional behavior analysis via this distance learning technology. Advanced trainers instructed the teachers through the analysis procedures and provided corrective feedback if there were errors in implementation. Classroom interventions based on the information provided by the functional analysis resulted in a decrease in problem behavior for the two children, corroborating the validity of the functional analysis. In a follow-up study, Machalicek et al. (2010) evaluated the efficacy of this synchronous distance learning approach for training teachers to conduct a functional analysis for children with ASD exhibiting problem behavior. Teachers initially learned about functional analysis by reading a written description outlining the procedures involved in the task delivered via e-mail. During subsequent sessions, teachers implemented the procedures in the classroom while receiving supervision via video teleconferencing. Immediate corrective feedback (including modeling of a correct procedure) was provided if the teacher made an error in implementation. Although the six teachers implemented functional analysis with relatively high accuracy after only reading the manual, performance was also quite variable across teachers and tasks. During the video teleconferencing coaching condition, teachers improved their implementation and all teachers reached fidelity within 19 sessions. Teacher fidelity maintained for several weeks after performance feedback was discontinued; however, fidelity declined significantly thereafter, suggesting that continued performance feedback may have been necessary for maintaining teacher fidelity.

Taken together, the studies done by Machalicek and colleagues suggest that distance learning technology can be feasibly and effectively used to provide immediate feedback and coaching to individuals learning to implement intervention techniques. It is important to note that utilization of this technology did present challenges to trainers and trainees. For example, when teachers were working with children who had more frequent or severe disruptive behaviors, they were more likely to experience technical difficulties (Machalicek et al., 2010).

Gibson, Pennington, Stenhoff, and Hopper (2010) explored the use of videoconferencing to provide consultation support to preschool staff learning to implement functional communication training, a procedure that involves implementing functional behavioral assessments of problem behaviors and then replacing such behaviors with more appropriate communicative responses. A live web-based, teleconferencing system (Skype) was utilized so that trainers could observe the staff in

the classroom and provide feedback using built-in computer microphones and ear buds. Before implementing the techniques directly with a child, the participants were e-mailed procedural instructions for the intervention and engaged a videoconference with an expert consultant. During this initial training videoconference, the consultants demonstrated the techniques and then coached the staff with moment-to-moment feedback as they practiced the procedures. The training lasted approximately 45 minutes, at which time the participants demonstrated 100% accuracy of the techniques and felt confident in their abilities to implement the intervention procedures. During the classroom intervention sessions, the consultants viewed the participants' implementation but waited until after the procedure concluded in order to give feedback on the intervention implementation to all participants at once. Once the staff began implementing the intervention, the target child's problem behaviors decreased. The results from this study suggest that classroom staff could be successfully trained to implement effective intervention techniques via an interactive synchronous distance learning program.

**Blended Programs** To date, a limited amount of research has explored the integration of asynchronous self-directed programs using expository and active learning elements with synchronous interactive coaching components. Such blended models hold particular promise in that they provide both didactic instruction as well as live feedback, both of which are common elements in effective training programs. In one study, investigators compared the effectiveness of a DVD-delivered self-directed training program with either in-person didactic instruction and team supervision or remote didactic instruction and team supervision to train community-based therapists working with children with autism and their families (Vismara, Young, Stahmer, Griffith, & Rogers, 2009). This particular study evaluated both instructional format (e.g., self-directed vs. self-directed with didactic instruction and supervision) and service delivery model (e.g., live instruction vs. remote instruction) for improving fidelity of intervention implementation, as well as improving fidelity of parent coaching. The self-directed portion of the training utilized a DVD with the treatment manual, copies of data collection materials, and video examples of the techniques. The didactic portion of the training consisted of a 10-hour, 2-day seminar that presented information about the intervention and techniques via a slide show, video examples, group discussion, and role play. Finally, the team supervision component of the training consisted of a 2-hour small-group meeting where expert coaches answered questions and provided individual feedback based on previously submitted video of therapists implementing the intervention techniques. Each small group received a 1-hour telephone call at the end of training. All therapists utilized the same self-directed training program; half of them participated in the seminar and supervision in person; the other half participated in the seminar and supervision remotely via video teleconferencing (Vismara et al., 2009).

Results from this study indicated that after participating in the self-directed component, therapists significantly improved their implementation of intervention techniques and parent coaching. Moreover, these abilities improved even more after therapists received the didactic instruction and team supervision. The majority of therapists required these additional training components to achieve fidelity of implementation in the direct implementation of the intervention, and only one

out of seven therapists was able to achieve fidelity of parent coaching by the end of all training components. It is important to note that there were no differences in fidelity of intervention or parent coaching between the in-person and remote didactic instruction and team supervision groups. Together, these findings suggest that asynchronous self-directed learning and synchronous interactive coaching can be effectively integrated into blended distance learning programs that are comparable to in-person training formats. Given the time, cost, and logistics associated with traditional in-person expert coaching, results from this study suggest that the potential for the replacement of such models with remote instruction and feedback is particularly promising.

## IMPLICATIONS

Thus far, there is emerging evidence to suggest that computerized distance learning programs can effectively disseminate training in evidence-based interventions to parents and providers who work with children with ASD. A number of different distance learning programs that employ a variety of learning activities have been developed and evaluated. There is preliminary evidence to suggest that distance learning alone or in combination with face-to-face instruction can increase parent and provider knowledge of key intervention concepts (Buzhardt & Heitzman-Powell, 2005; Granpeesah et al., 2010; Hamad et al., 2010), as well as correct implementation of intervention procedures for increasing appropriate social communication skills (Nefdt et al., 2010; Vismara et al., 2009; Wainer & Ingersoll, 2013) and decreasing problematic behaviors (Gibson et al., 2010; Machalicek, O'Reilly, Chan, Lang, et al., 2009; Machalicek, O'Reilly, Chan, Rispoli, et al., 2009; Machalicek et al., 2010). Although fewer studies have examined changes in child behaviors, those that have, have found that increases in adult fidelity of implementation are associated with improvements in child behavior (Machalicek, O'Reilly, Chan, Lang, et al., 2009; Vismara et al., 2009; Wainer & Ingersoll, 2013). Most studies have found high user satisfaction ratings for the distance learning components, though some have found that learners were less confident in the skills they learned through self-directed distance learning activities than through face-to-face or remote interactive activities (i.e., videoconferencing; Vismara et al., 2009; Wainer & Ingersoll, 2013). So far, no studies have examined the effect of distance learning on the maintenance of learner skill or child improvements after the training phase. Skill maintenance might be expected to wane over time, especially for programs that are completely self-directed. Thus, evaluating maintenance over time is an important next step for studies evaluating the efficacy of distance learning programs for training parents and providers in ASD interventions.

Although there is growing evidence for the efficacy of distance learning programs for teaching individuals to implement ASD interventions, it is unclear how this method of instruction compares to traditional training models. Although many of the programs reviewed above have the potential to replace in-person face-to-face instruction, research demonstrating that such programs are at least equivalent to traditional training models is lacking. Only two studies thus far have compared distance learning directly to traditional training models for teaching intervention strategies (Granpeesheh et al., 2010; Vismara et al., 2009). Vismara and colleagues (2009) did not find any differences in therapist fidelity or child outcomes for

face-to-face training versus video conference training. Granpeesheh and colleagues (2010) found that participants in the face-to-face training condition made greater gains in knowledge than those in the distance learning condition. However, there were a number of differences between the two conditions in terms of the learning activities employed as well as the time involved. For example, the face-to-face condition included didactic instruction, group discussion, and role play and took learners 16 hours to complete; whereas the distance learning condition included slide shows with corresponding audio lectures and video examples and took roughly 10 hours to complete. Thus it is not clear whether differences in knowledge acquisition were due to differences in the method of presentation or in the learning activities employed. Given the conflicting results, additional research is needed that can compare distance learning to face-to-face instruction for ASD interventions. Such comparisons are challenging because computerized distance learning often lends itself to the use of different instructional strategies than face-to-face instruction. Since different learning activities may have a differential impact on knowledge or skill acquisition, it may be desirable to compare similar learning activities implemented in a face-to-face or distance learning format.

Clearly, more research is needed to determine which individual training activities are important for learner acquisition of evidence-based interventions for children with ASD and whether those activities are better implemented in a synchronous or asynchronous manner. Of course, this issue is not unique to distance learning. The effectiveness of different distance learning components or activities is likely to differ depending on the learning objective. For example, it might be expected that didactic and active learning activities may be most effective for increasing conceptual knowledge regarding the intervention, whereas interactive learning activities, particularly in the form of expert feedback or coaching conducted through video-conferencing, may be more important for increasing procedural knowledge (i.e., fidelity of implementation).

Despite limited data from autism interventions, there is substantial research on the comparative efficacy of distance learning programs for teaching a wide variety of concepts and skills to adults of varying backgrounds. Several recent meta-analyses of distance learning have been published (e.g., Allen et al., 2004; Bernard et al., 2004; Cavanaugh, 2001; U.S. Department of Education, 2010). These meta-analyses have found distance learning to be at least equivalent to live instruction for both declarative knowledge and procedural learning. A recent meta-analysis by the U.S. Department of Education (2010) that compared online learning to face-to-face instruction or blended online and face-to-face instruction found that learners that completed all or some of their learning online (blended instruction) outperformed those who completed all of their learning face to face. Blended learning programs that included online and face-to-face elements had a greater advantage than online-only programs. However, the report noted that across studies, learners engaged more with the material in online or blended courses than in face-to-face courses; thus it is unclear whether the time with the material or the delivery method is responsible for outcomes. Given these findings, research aimed at disseminating evidence-based treatments may wish to examine whether adding distance learning components to face-to-face training models can improve learning outcomes.

Finally, the potential reach of distance learning programs for disseminating autism interventions is wide, particularly for those programs that are self-directed

and accessed over the Internet. At the same time, little is known about how potential learners access and use such programs. The one study that looked at completion rates found that only 60% of learners who began the program completed it (Hamad et al., 2010). Since there was no comparison condition, it is unclear whether this rate is lower than would be expected for more traditional training approaches. However, it might be expected that the use of distance learning programs may differ from face-to-face training models, particularly for programs that are self-directed. It is also unknown what factors may affect whether or not learners use distance learning programs. For programs that use the Internet, access to and familiarity with computer and Internet technology might be expected to influence learners' willingness to engage in the program and may also affect learning outcomes. However, more research is needed in this area.

## SUMMARY

The literature thus far is supportive of the role that distance learning programs can play in the dissemination of evidence-based interventions for children with ASD. The use of computerized technology has the potential to significantly increase access to services for children with ASD. Emerging research in this area as well as research on distance learning more broadly suggests that distance learning results in learning outcomes are at least equivalent, if not superior, to traditional training approaches. More research is needed on ways to optimize the use of distance learning technology for disseminating ASD interventions and improving child and family outcomes.

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## Appendix C

### **Efficacy of an eHealth-based parent-mediated intervention for young children with ASD: Comparison of two delivery approaches**

**Background:** Parent-mediated intervention for children with ASD has been shown to improve both parent and child functioning. However, access to parent-mediated intervention services is often limited in rural and under-resourced areas. eHealth, the delivery of health information over the internet, has the potential to increase access to parent-mediated intervention in these communities.

**Objective:** The goal of this study was to examine the effect of two versions of an eHealth intervention for parents of young children with ASD on parent learning and child social communication skills.

**Method:** A randomized control trial was used to examine the effects a self-directed eHealth program used alone (n=15) or in combination with remote coaching (n=15) on parent and child behavior. Children were matched with 3 months of expressive language age on the Mullen and then randomly assigned to the self-directed only (SC-Only) or self-directed plus remote coaching (SD+RC) condition. Parents were given up to 6 months to complete the program. Outcome variables included parent intervention knowledge, parent intervention fidelity during a parent-child interaction in the home, parent-report and observational measures of child social communication skills, and parenting stress. In addition, program usage data was monitored and treatment acceptability was measured at post-treatment.

**Results:** Preliminary analyses from the first 13 parents indicate high rates of program engagement in both groups with parents completing an average of 92% of program elements. Treatment acceptability rates were similarly high across both groups. There was a main effect of time on parent knowledge and parent fidelity from pre-post treatment, with parents demonstrating greater knowledge and higher fidelity at post-treatment and pre-treatment. There was a trend for greater gains in both in the SD+RC group. Children in both groups demonstrated significant gains in expressive vocabulary on the M-CDI and social communication skills on the SCC. There was a significant interaction, such that children in the SD+RC group made significantly more gains in standard scores on the socialization domain of the Vineland than the children in the SD-Only group. Parents in both groups showed increased positive feelings towards child, but no change in negative feelings on the FIQ. Exploratory analyses revealed a positive association between treatment acceptability and program elements completed. Program elements completed were associated with change in parent fidelity. Change in parent fidelity was positively associated with changes in positive feelings on FIQ and marginally with Communication Domain scores on Vineland. Parent report of regular use of intervention was associated with improvements in Socialization Domain standard scores on Vineland and words produced on MCDI.

**Conclusions:** Both approaches show promise for increasing parents' use of evidence-based intervention techniques. Program use and treatment acceptability were high and were associated with gains on parent report measures of child social communication. There was a trend toward greater parent learning and child improvements in the group that received remote coaching. Additional research that can identify parents who are most likely to need remote coaching would assist in the development of a stepped care model that can increase parent access to evidence-based services in underserved communities.



## Appendix D

### Brooke R. Ingersoll

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## EDUCATION

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Ph.D. in Psychology - University of California, San Diego (2003)

Advisor: Laura Schreibman, Ph.D.

M.A. in Psychology - University of California, San Diego (1999)

Advisor: Laura Schreibman, Ph.D.

B.A. in Psychology and French - University of Michigan, Ann Arbor (1996)

## PROFESSIONAL APPOINTMENTS

---

Associate Professor – Department of Psychology, Michigan State University, East Lansing, MI (2013-Present)

Assistant Professor – Department of Psychology, Michigan State University, East Lansing, MI (2007-2013)

Visiting Assistant Professor - Department of Psychology, Lewis & Clark College, Portland, OR (2005-2007)

Director, Autism Treatment & Research Program – Hearing & Speech Institute, Portland, OR (2002-2004)

Post-Doctoral Clinical Fellow – Child Development & Rehabilitation Center, Oregon Health & Science University, Portland, OR (2003-2004)

## LICENSURE & CERTIFICATION

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Licensed Psychologist

State of Oregon – License #1728 (April 2006-2009) Currently inactive status

State of Michigan – License #6301013668 (September 2007-Present)

Board Certified Behavior Analyst-Doctoral level. #1-13-1659 (June 2004-Present)

## HONORS & AWARDS

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Mark O. Hatfield Research Fellowship (\$150,000) – Northwest Health Foundation (2006)-declined

Outstanding Teaching Award - Oregon Speech-Language & Hearing Association (2006)

Curriculum Revision Grant to Enhance Civic Learning (\$1500) - Lewis & Clark College (2005)

N. L. Tartar Research Fellowship Award (\$2000) - Oregon Health & Science University (2004)

Interdisciplinary Training Fellowship in Language, Communication, and the Brain (\$17,500) – National Institute of Deafness and Communication Disorders (2001-2002)

Dissertation Research Award (\$1000) - American Psychological Association (2001)

Travel Grant (\$250) - Department of Psychology, UC-San Diego (1999-2002)

Class Honors - University of Michigan (1993-1995)

## GRANTS & CONTRACTS

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### Current Funding

Health Resources and Services Administration, Maternal and Child Health (\$899,388 total)

Comparative efficacy of a self-directed and therapist-assisted telehealth parent training intervention for children with ASD. Will examine the efficacy of a self-directed and therapist-assisted version of a

telehealth program designed to teach parents of young children with autism strategies to support their child's social communication (September 1, 2014-August 30, 2017)

Role: PI

MSU Research in Autism, Intellectual, and Neurodevelopmental Disorders (RAIND) Seed Grant (\$100,000)

ImPACT Online: Increasing access to parent training in ASD internet-delivered instruction in evidence-based intervention. Will examine the reach and implementation of a self-directed telehealth parent training program for young children with ASD (February 1, 2014-January 31, 2016)

Role: PI

Institute for Education Sciences, Goal 2 (MSU subcontract: \$122,667 total)

Adapting an evidence-based program for infants and toddlers at high risk of autism. Will adapt parent training curriculum for toddlers at risk for ASD (July 2013 – June 2016) PI: Stahmer

Role: Co-I

Department of Defense Autism Research Program (\$558,547 total)

Development of an internet-based parent training intervention for children with ASD. Will develop and pilot a distance-learning program to teach parents of young children with autism strategies to support their child's social communication. #AR093396. (September 2010-August 2013, no cost extension through 9/30/2014)

Role: PI

### **Completed Funding**

Organization for Autism Research (\$30,000 total)

Assessing the effectiveness of video-based group instruction to enhance traditional social skills training for school-aged children with autism spectrum disorders. Investigated the efficacy of video enhanced social skills instruction for children with ASD. (May 2013-April 2014)

Role: Co-PI with Plavnick

Autism Speaks Treatment Award – Pilot Level (\$112,604 total)

Effectiveness of Reciprocal Imitation Training for Adolescents with Low-Functioning Autism.

Conducted a pilot RCT to evaluate the preliminary efficacy of using a naturalistic imitation intervention developed for preschoolers with ASD with adolescents with ASD and severe to profound intellectual disability. (December 2011-November 2013)

Role: PI

Autism Speaks Dennis Weatherstone Graduate Student Fellowship (\$56,000 total)

Using an internet-based program to teach naturalistic intervention techniques to parents of children with autism. Investigated the efficacy of using an internet-based intervention with remote coaching to train parents of young children with autism to teach their child imitation skills. (September 2011-August 2013). Role: Faculty Mentor, Mentee: Allison Wainer

Livingston Education Service Agency (\$65,429)

Implementation of Project ImPACT. Contract to provide training for intervention providers in Project ImPACT curriculum (September 2010-June 2012).

Role: PI

Autism Speaks Student Fellowship (\$56,000)

A sibling-mediated imitation intervention for young children with autism. Investigated the efficacy of training older siblings to implement a naturalistic imitation intervention with their younger siblings with autism. (January 2009-December 2010). Mentee: Katherine Meyer

Role: Faculty Mentor

MSU Families And Communities Together (FACT) Coalition Grant (\$50,000)

Improving outcomes for children with autism: Training teachers as parent trainers. Investigated the effect of a classroom-based parent training model on social-communication development in preschool-aged children with autism. (April 2008-March 2010).

Role: Principal Investigator

Cure Autism Now Foundation/Autism Speaks (\$137,264)

Teaching imitation skills to young children with autism: Predicting response to a naturalistic social-communication intervention. Investigated efficacy of a naturalistic imitation intervention for young children with autism. (Aug. 2006-July 2009)

Role: PI

Oregon Department of Education, Office of Student Learning and Partnerships (\$30,000)

Regional Program Autism Training Sites: Parent training project.

Sub-contract to support the training of early childhood special education teachers to provide parent training to families of children with autism. (Sept. 2005-June 2007)

Role: PI

Organization for Autism Research (\$24,184).

Teaching children with autism to imitate symbolic gestures using a naturalistic intervention.

Investigated the effect of a naturalistic imitation intervention on the imitation and spontaneous use of meaningful gestures in young children with autism. (April 2004-March 2005)

Role: PI

Spirit Mountain Community Fund (\$48,500); Collins Foundation (\$50,000); Autzen Foundation (\$2500)

Development and implementation of evidence-based services for children with autism and related disorders. Supported the development of intervention services for children with autism, including parent training, parent support group, and sibling support group. (May 2004-June 2006)

Role: PI

UC M.I.N.D. Institute Scholars Award (\$50,000)

Teaching children with autism to imitate using a naturalistic treatment approach: Effects on imitation, social, language, and play behaviors. Investigated the effect of a naturalistic imitation intervention on object imitation and social-communication skills in young children with autism. (July 2002-June 2004)

Role: Student PI

## **PUBLICATIONS (\*indicates student paper)**

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### **Books**

Ingersoll, B. & Dvorcsak, A. (2010). Teaching social-communication: A practitioner's guide to parent training for children with autism. New York: Guilford Press.

### **Peer-Reviewed Articles (\*indicates student paper)**

1. Pickard, K.\* & Ingersoll, B. (in press). High and low level IJA on the early social communication scale: Distinct relationships with measures of imitation and language ability. *Journal of Autism and Developmental Disorders*.
2. Wainer, A.\* & Ingersoll, B. (in press). Increasing access to an ASD imitation intervention via a telehealth parent training program. *Journal of Autism and Developmental Disorders*.
3. Berger, N.\* & Ingersoll, B. (in press). A further investigation of goal-directed intention understanding in young children with autism spectrum disorders. *Journal of Autism and Developmental Disorders*.
4. Pickard, K.\* & Ingersoll, B. (in press). From research settings to parents the role of parent social networks in the choices parents make about services for their child with autism spectrum disorder. *Clinical Psychological Science*.
5. Walton, K.\* & Ingersoll, B. (in press). The influence of maternal speech on the expressive language production of children with ASD: A microanalysis of mother-child play interactions. *Autism – International Journal of Research and Practice*.

6. Berger, N.\* & Ingersoll, B. (2013). Short Report: An exploration of imitation recognition in young children with autism spectrum disorders. *Autism Research*, 6, 411-416.
7. Ingersoll, B. & Wainer, A. (2013). Initial efficacy of Project ImPACT: A parent-mediated social communication intervention for young children with ASD. *Journal of Autism and Developmental Disorder*, 43, 2943-295.
8. Wainer, A.\* & Ingersoll, B. (2013). Intervention fidelity: An essential component for bridging ASD parent training intervention research and practice. *Clinical Psychology: Research and Practice*, 20, 335-357.
9. Walton, K.\* & Ingersoll, B. (2013). Expressive and receptive fast-mapping in children with autism and typical development: The influence of orienting cues. *Research in Autism Spectrum Disorders*, 7, 687-698.
10. Wainer, A.\*, Block, N., Donnellan, B., & Ingersoll, B. (2013). The broader autism phenotype and friendships in non-clinical dyads. *Journal of Autism and Developmental Disorders*, 43, 2418-2425.
11. Ingersoll, B., Walton, K., Carlsen, D., & Hamlin, T. (2013). Social intervention for adolescents with low-functioning autism: Initial efficacy of Reciprocal Imitation Training. *American Journal of Intellectual and Developmental Disabilities*, 118, 247-261.
12. Ingersoll, B. & Wainer, A. (2013). Pilot study of a school-based parent training program for preschoolers with ASD. *Autism – International Journal of Research and Practice*, 17, 434-448.
13. Walton, K.\* & Ingersoll, B. (2013). Improving social skills in adolescents and adults with autism and severe to profound intellectual disability: A review of the literature. *Journal of Autism and Developmental Disorders*, 43, 594-615.
14. Wainer, A.\* & Ingersoll, B. (2013). Disseminating ASD interventions: A pilot study of a distance learning program for parents and professionals. *Journal of Autism and Developmental Disorders*, 43, 11-24.
15. Ingersoll, B., Walton, K., Bonter, N., & Jelinek, S. (2012). A comparison of naturalistic behavioral and developmental, social-pragmatic interventions on language use and social engagement in children with autism. *Journal of Speech, Language, and Hearing Research*, 55, 1301-1313.
16. Ingersoll, B. (2012). Brief Report: Effect of a focused imitation intervention on social functioning in children with autism. *Journal of Autism and Developmental Disorders*, 42, 1768-1773.
17. Walton, K.\* & Ingersoll, B. (2012). Evaluation of a sibling-mediated imitation intervention for young children with autism. *Journal of Positive Behavior Interventions*, 14, 241-253.
18. Ingersoll, B., Hopwood, C. J., Wainer, A., & Donnellan, M.B. (2011). A comparison of three self-report measures of the broader autism phenotype in a non-clinical sample. *Journal of Autism and Developmental Disorder*, 41, 1646-1657.
19. Wainer, A.\*, Ingersoll, B. & Hopwood, C. J. (2011). The structure and nature of the broader autism phenotype in a non-clinical sample. *Journal of Psychopathology and Behavioral Assessment*, 33, 459-469.
20. Ingersoll, B. (2011). Recent advances in early identification and treatment of social communication deficits in autism. *Current Directions in Psychological Science*, 20, 335-339.
21. Ingersoll, B. & Meyer, K. (2011). Do object and gesture imitation skills represent independent dimensions in autism?. *Journal of Developmental and Physical Disabilities*, 23, 421-431.
22. Meyer, K.\*, Ingersoll, B., & Hambrick, D. (2011). Factors influencing adjustment in siblings of children with autism spectrum disorders. *Research in Autism Spectrum Disorders*, 5, 1413-1420.
23. Ingersoll, B., Meyer, K. & Becker, M. (2011). Short Report: Increased rates of depressed mood in mothers of children with ASD associated with the presence of the broader autism phenotype. *Autism Research*, 4, 143-148.
24. Ingersoll, B. (2011). The differential effect of three naturalistic language interventions on language use in children with autism. *Journal of Positive Behavior Interventions*, 13, 109-118.
25. Ingersoll, B. & Meyer, K. (2011). Examination of correlates of different imitative functions in young children with autism spectrum disorders. *Research in Autism Spectrum Disorders*, 5, 1078-1085.
26. Wainer, A.\* & Ingersoll, B. (2011). The use of innovative computer technology for teaching social communication to individuals with autism spectrum disorders. *Research in Autism Spectrum Disorders*, 5, 96-107.

27. Ingersoll, B. & Hambrick, D. Z. (2011). The relationship between the broader autism phenotype, child severity, and stress and depression in parents of children with autism spectrum disorders. *Research in Autism Spectrum Disorders*, 5, 337-344.
28. Ingersoll, B. (2010). Brief Report: Pilot randomized controlled trial of Reciprocal Imitation Training for teaching elicited and spontaneous imitation to children with autism. *Journal of Autism and Developmental Disorders*, 40, 1154-1160.
29. Ingersoll, B. & Lalonde, K. (2010). The impact of object and gesture imitation training on language use in children with autism. *Journal of Speech, Language, and Hearing Research*, 53, 1040-1051.
30. Ingersoll, B. (2010). Broader autism phenotype and nonverbal sensitivity: Evidence for an association in the general population. *Journal of Autism and Developmental Disorders*, 40, 590-598.
31. Ingersoll, B. (2010). Teaching social communication to children with autism: A comparison of naturalistic behavioral and developmental, social pragmatic interventions. *Journal of Positive Behavior Interventions*, 12, 33-43.
32. Quirnbach, L. M., Lincoln, A. J., Feinberg-Gizzo, M. J., & Ingersoll, B., & Andrews, S. M. (2009). Social Stories: Mechanisms of effectiveness in increasing game play skills in children diagnosed with autism spectrum disorder using a pretest posttest repeated measures randomized control group design. *Journal of Autism and Developmental Disorders*, 39, 299-321.
33. Ingersoll, B. (2008). The effect of context on imitation skills in children with autism. *Research in Autism Spectrum Disorders*, 2, 332-340.
34. Ingersoll, B. (2008). The social role of imitation in autism: Implications for the treatment of imitation deficits. *Infants & Young Children*, 21, 107-119.
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36. Ingersoll, B. (2007). Teaching imitation to children with autism: A focus on social reciprocity. *Journal of Speech and Language Pathology & Applied Behavior Analysis*, 2, 269-277.
37. Ingersoll, B. & Gergans, S. (2007). The effect of a parent-implemented naturalistic imitation intervention on spontaneous imitation skills in young children with autism. *Research in Developmental Disabilities*, 28, 163-175.
38. Whalen, C., Schreibman, L. & Ingersoll, B. (2006). The collateral effects of joint attention training on social initiations, positive affect, imitation, and spontaneous speech for young children with autism. *Journal of Autism and Developmental Disorders*, 36, 655-664.
39. Ingersoll, B. & Schreibman, L. (2006). Teaching reciprocal imitation skills to young children with autism using a naturalistic behavioral approach: Effects on language, pretend play, and joint attention. *Journal of Autism and Developmental Disorders*, 36, 487-505.
40. Ingersoll, B. & Dvortcsak, A (2006). Including parent training in the early childhood special education curriculum for children with autism spectrum disorders. *Journal of Positive Behavior Interventions*, 8, 79-87.  
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42. Ingersoll, B., Dvortcsak, A., Whalen, C., & Sikora, D. (2005). The effects of a developmental, social-pragmatic language intervention on rate of expressive language production in young children with autistic spectrum disorders. *Focus on Autism and Other Developmental Disabilities*, 20, 213-222.
43. Stahmer, A. & Ingersoll, B. (2004). Inclusive programming for toddlers with autistic spectrum disorders: Outcomes from the Children's Toddler School. *Journal of Positive Behavioral Interventions*, 67, 67-82.
44. Ingersoll, B., Schreibman, L., & Tran, Q. (2003). The effect of sensory feedback on immediate object imitation in children with autism. *Journal of Autism and Developmental Disorders*, 33, 673-683.

45. Stahmer, A., Ingersoll, B., & Carter, C. (2003). Behavioral approaches to promoting play. *Autism – International Journal of Research and Practice*, 7, 401-414.
46. Ingersoll, B., Schreibman, L., & Stahmer, A. (2001). Brief Report: Differential treatment outcomes for children with autistic spectrum disorder based on level of peer social avoidance. *Journal of Autism and Developmental Disorders*, 31, 343-349.
47. Sherer, M., Pierce, K., Parades, S., Kisacky, K., Ingersoll, B., & Schreibman, L. (2001). Enhancing conversation skills in children with autism via video technology: Which is better, "self" or "other" as a model?. *Behavior Modification*, 25, 140-158.

### **Book Chapters**

1. Ingersoll, B. & Wainer, A. (2014). The broader autism phenotype. In F. Volkmar, A., Klin, R. Paul, & D. Cohen (Eds.), *Handbook of autism and pervasive developmental disorders*, 4<sup>th</sup> Edition. New York, NY: Wiley.
2. Ingersoll, B. & Wainer, A. (2013). Using distance learning technology to increase dissemination of evidence-based practice in ASD. In K. Boser, M. Goodman, & S. Wayland (Eds.), *Technology tools for students with autism: Innovations that enhance independence and learning*. Baltimore, MD: Brookes Publishing.
3. Walton, K.\*, Wainer, A., Berger, N., & Ingersoll, B. (2013). Peer and adult socialization. In S. Goldstein and J. Naglieri (Eds.), *Interventions for autism spectrum disorders: Translating science into practice*. New York, NY: Springer.
4. Ingersoll, B. & Wainer, A. (2012). The role of parents in school based curriculums. In P. Mundy and A. Mastergeorge (Eds.), *Autism for Educators, Volume 1, Empirically Supported Educational Interventions for School Age Children with Autism*. New York: Jossey-Bass.
5. Schreibman, L. & Ingersoll, B. (2011). Naturalistic approaches to early behavioral intervention. In D. G. Amaral, G. Dawson, and D. H. Geschwind (Eds.), *Autism spectrum disorders*. New York: Oxford University Press.
6. Ingersoll, B. & Schreibman, L. (2009). Reciprocal Imitation Training: A naturalistic behavioral approach to teaching imitation to young children with autism. In P. Reed (Ed.), *Behavioral theories and interventions for autism*. New York, NY: Nova Science Publishers.
7. Ingersoll, B. & Dvortcsak, A. (2009). Increasing generalization through the use of parent-mediated interventions. In Christina Whalen (Ed.), *Real Life, Real Progress: A practical guide for parents and professionals on generalization for children with autism spectrum disorders* (pp. 173-194). Baltimore, MD: Paul H. Brookes.
8. Ingersoll, B. (2008). Behavioral language interventions for autism. In G. R. Buckendorf (Ed.), *Autism: A guide for educators, clinicians, and parents*. Greenville, SC: Thinking Publications.
9. Whalen, C., Ingersoll, B., & Liden, L. (2007). Evidence-based computer assisted treatment for autism spectrum disorders. In J. Lazar (Ed.), *Universal usability: Designing computer interfaces for diverse user populations*. New York, NY: Wiley.
10. Schreibman, L. & Ingersoll, B. (2005). Behavioral interventions to promote learning in individuals with autism. In F. Volkmar, A., Klin, R. Paul, & D. Cohen (Eds.), *Handbook of autism and pervasive developmental disorders*, 3<sup>rd</sup> Edition, Volume 2: Assessment, interventions, and policy (pp. 882-896). New York, NY: Wiley.

### **Book Reviews and Encyclopedia Entries**

1. Ingersoll, B. & Wainer, A. (2013). Generalization and maintenance. In F. Volkmar (Ed.), *Encyclopedia of Autism Spectrum Disorders*. New York, NY: Springer.
2. Ingersoll, B. & Meyer (Meyer), K. (2013). Play intervention. In F. Volkmar (Ed.), *Encyclopedia of Autism Spectrum Disorders*. New York, NY: Springer.
3. Ingersoll, B. & Jelinek, S. (2013). Symbolic play. In F. Volkmar (Ed.), *Encyclopedia of Autism Spectrum Disorders*. New York, NY: Springer.
4. Ingersoll, B. (2008). Working with families of children with autism. *PsycCritiques*, 53.
5. Ingersoll, B. (2007). The struggle for intimacy: Relationships in individuals with Asperger's. *PsycCritiques*, 52.

### **In Progress**

1. Pickard, K.\* & Ingersoll, B. (in revision). Quality versus quantity: Disparities in parents' service access, barriers to service access, and unmet service needs.
2. Berger, N.\* & Ingersoll, B. (in revision). An exploration of imitation recognition behaviors in typically developing children and children with autism spectrum disorder.
3. Ingersoll, B., Berger, N., Wainer, A., & Walton, K. (under review). Efficacy of a naturalistic developmental-behavioral intervention for young children with ASD.
4. Schreibman, L., Dawson, G., Rogers, S., Ingersoll, B. et al. (under review). Naturalistic developmental behavioral interventions: Empirically validated treatments for ASD.
5. Ingersoll, B., Berger, N., Carlsen, D., & Hamlin, T. (in preparation). Pilot feasibility study of Reciprocal Imitation Training for Adolescents with ASD and Significant ID.
6. Plavnick, J., Hume, K., Ingersoll, B., Shivers, C., & Kaid, T. (in preparation). Video-based group instruction for adolescents with autism spectrum disorders: A model of iterative intervention development and social skill instruction.

## **PRESENTATIONS (\*indicates student presentation)**

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### **Peer-reviewed Presentations**

1. Cook, S., Dilley, L., Stockman, I., & Ingersoll, B. (2014, November). Prosodic characteristics in the speech of young children with autism spectrum disorder. Poster presentation at the annual meeting of the American Speech-Language Hearing Association, Orlando, FL.
2. Wainer, A.\* & Ingersoll, B. (2014, May). Increasing access to an evidence-based ASD intervention via a telehealth parent training program intervention via a telehealth parent training program. Poster presentation at the annual meeting of the International Meeting for Autism Research, Atlanta, GA.
3. Pickard, K.\* & Ingersoll, B. (2014, May). From research settings to parents: The referral sources of evidence-based and non evidence-based practices sources of evidence-based and non evidence-based practices. Poster presentation at the annual meeting of the International Meeting for Autism Research, Atlanta, GA.
4. Berger, N.\* & Ingersoll, B. (2014, May). Disseminating an evidence-based ASD intervention: predictors of community providers' likelihood of implementation of community providers' likelihood of implementation. Poster presentation at the annual meeting of the International Meeting for Autism Research, Atlanta, GA.
5. Ingersoll, B. (2014, May). Towards understanding the active ingredients of parent-mediated social communication interventions for young children with ASD. In M. Lerner (Chair), Active ingredients and therapeutic processes in interventions for autism spectrum disorders. Educational symposium at the annual meeting of the International Meeting for Autism Research, Atlanta, GA.
6. Ingersoll, B. (2014, May) Efficacy of an eHealth-based parent-mediated intervention for young children with ASD: Comparison of two delivery approaches. Poster presentation at the annual meeting of the International Meeting for Autism Research, Atlanta, GA.
7. Wainer, A.\* & Ingersoll, B. (2013, May). Initial evaluation of the Social Communication Checklist. Poster presentation at the annual meeting of the International Meeting for Autism Research, San Sebastian, Spain.
8. Berger, N.\* & Ingersoll, B. (2013, May). Social-communicatively cured versus goal-directed intention understanding in children with ASD. Poster presentation at the annual meeting of the International Meeting for Autism Research, San Sebastian, Spain.
9. Ingersoll, B. (2013, May). From the community to the lab (and back): Identifying important treatment components of a parent training intervention. Poster presentation at the annual meeting of the International Meeting for Autism Research, San Sebastian, Spain.
10. Berger, N.\* & Ingersoll, B. (2013, May). Psychometric properties and treatment comparisons: Measuring the social validity of skill building interventions for toddlers with autism spectrum disorders. Poster presentation at Autism Speaks' Toddler Treatment Network Pre-conference, International Meeting for Autism Research, San Sebastian, Spain.
11. Pierucci, J. M., Gilpin, A. T., Barber, A. B., & Ingersoll, B. (2013, April). Project ImPACT pilot study: Examining intervention effects on developmental and social skills of toddlers with ASD. Poster presentation at the biennial meeting of the Society for Research in Child Development, Seattle, WA.



12. Berger, N.\* & Ingersoll, B. (2013, April). An exploration of imitation recognition behaviors in typically developing children and children with autism spectrum disorder. Poster presentation at the biennial meeting of the Society for Research in Child Development, Seattle, WA.
13. Walton, K.\* & Ingersoll, B. (2013, April). Fast-mapping of noun labels in children with autism and typical development. Poster presentation at the biennial meeting of the Society for Research in Child Development, Seattle, WA.
14. Moran, T.\*, Berger, N., Ingersoll, B., Moser, J., & Durbin, E. (2012, October). Oh no, look away! Electroencephalographic evidence for vigilance-avoidance in anxiety. Poster presentation at the Society for Research in Psychopathology, Ann Arbor, MI.
15. Wainer, A.\*, Block, N., Berger, N. & Ingersoll, B. (2012, October). The broader autism phenotype and friendship quality in college students. Poster presentation at the Society for Research in Psychopathology, Ann Arbor, MI.
16. Ingersoll, B., Wainer, A., & Mandell, D. (2012, May). Designing for dissemination: A model for the development of parent-mediated social communication interventions in ASD. Talk at Autism Speaks' Toddler Treatment Network Pre-conference, International Meeting for Autism Research, Toronto, Ontario, Canada.
17. Ingersoll, B., Bonter, N., Wainer, A., & Walton, K. (2012, May). Efficacy of therapist-implemented social communication intervention for young children with ASD. Poster presentation at the International Meeting for Autism Research, Toronto, Ontario, Canada.
18. Walton, K.\*, Sherwood, I., & Ingersoll, B. (2012, May). The influence of maternal speech on the expressive language production of young children with ASD. Poster presentation at the International Meeting for Autism Research, Toronto, Ontario, Canada.
19. Wainer, A.\* & Ingersoll, B. (2012, May). Investigating the efficacy of parent training service delivery models. Poster presentation at the International Meeting for Autism Research, Toronto, Ontario, Canada.
20. Berger, N.\* & Ingersoll, B. (2012, May). Correlates of early imitation recognition in preschoolers with ASD. Poster presentation at the International Meeting for Autism Research, Toronto, Ontario, Canada.
21. Wainer, A.\* & Ingersoll, B. (2011, September). An internet-based program to disseminate training in evidence-based autism intervention. 12<sup>th</sup> Annual National Outreach Scholarship Conference. East Lansing, MI.
22. Hopwood, C., Ingersoll, B., & Wainer, A. (2011, June). Interpersonal correlates of the broader autism phenotype. Paper presented at the annual meeting of the Society for Interpersonal Theory and Research, Zurich, Switzerland.
23. Wainer, A.\*, Ingersoll, B., Hopwood, C. (2011, August). The structure and nature of the broader autism phenotype. Poster accepted for presentation at the Annual APA Convention, Washington DC.
24. Ingersoll, B. (2011, May). The feasibility and preliminary effectiveness of a school-based, blended developmental and behavioral parenting intervention for children with ASD. Poster presentation at the International Meeting for Autism Research, San Diego, CA.
25. Jelinek, S.\*, Ingersoll, B., Meyer, K., & Bonter, N. (2011, May). A comparison of naturalistic behavioral and developmental, social-pragmatic interventions on language use and social engagement in children with autism. Poster presentation at the International Meeting for Autism Research, San Diego, CA.
26. Meyer, K.\*, Ingersoll, B., Carlsen, D., & Hamlin, T. (2011, May). Evaluation of an imitation intervention for low-functioning adolescents with autism. Poster presentation at the International Meeting for Autism Research, San Diego, CA.
27. Wainer, A.\*, & Ingersoll, B. (2011, May). Using an internet-based training program to disseminate naturalistic behavioral techniques to individuals working with young children with autism. Poster presentation at the International Meeting for Autism Research, San Diego, California.
28. Ingersoll, B. (2011, April). Broader improvements in social communication in autism as a result of a focused imitation intervention. Poster presentation at the biennial meeting of the Society for Research in Child Development, Montreal, Canada.
29. Meyer, K.\* & Ingersoll, B. (2011, April). Factors influencing adjustment in siblings of children with autism spectrum disorders. Poster presentation at the biennial meeting of the Society for Research in Child Development, Montreal, Canada.



30. Meyer, K.\* & Ingersoll, B. (2010, May). Evaluation of a sibling-mediated imitation intervention for children with autism. Poster session presented at the annual meeting of the International Meeting for Autism Research, Philadelphia, PA.
31. Wainer, A.\* & Ingersoll, B. (2010, May). Using a distance learning program to introduce naturalistic behavioral techniques to parents of young children with autism. Poster session presented at the annual meeting of the International Meeting for Autism Research, Philadelphia, PA.
32. Ingersoll, B. & Bonter, N. (2009, May). A randomized control trial of Reciprocal Imitation Training in young children with autism. Poster session presented at the annual meeting of the International Meeting for Autism Research, Chicago, IL.
33. Meyer, K.\* & Ingersoll, B. (2009, May). Correlates of elicited and spontaneous imitation in young children with autism. Poster session presented at the annual meeting of the International Meeting for Autism Research, Chicago, IL.
34. Lalonde, K.\* & Ingersoll, B. (2009, May). A comparison of the effect of object and gesture imitation training on language use in children with autism. Poster session presented at the annual meeting of the International Meeting for Autism Research, Chicago, IL.
35. Ingersoll, B. (2008, August). Early intervention in autism: Comparison of behavioral and developmental approaches. In *Current Trends in Autism*. Paper presented at the annual meeting of the American Psychological Association.
36. Ingersoll, B. & Dvortcsak, A. (2007, June). Research to practice: Training teachers to provide parent education. In A. Stahmer (Chair), *Use of behavioral interventions in community early intervention programs for children with autism*. Symposium conducted at the annual meeting of the Association for Behavior Analysis, San Diego, CA.
37. Quirnbach, L. M., Lincoln, A. J., & Feinberg-Gizzo, M. J., & Ingersoll, B., (2007, May). Social Stories: Mechanisms of effectiveness in increasing game play skills in children diagnosed with autism. Paper presented at the annual meeting of the International Meeting for Autism Research, Seattle, WA.
38. Ingersoll, B., Askew, J., Cooper-Caroselli, Z., D'Angelo, E., Gergans, S., Norse, D., & Whitford, L. (2006, June). Imitation in autism: Performance on social vs. non-social imitation tasks. Poster session presented at the annual meeting of the International Meeting for Autism Research, Montreal, Canada.
39. Whalen, C., Liden, L., Ingersoll, B., Dallaire, E., & Liden, S. (2006, May). Facilitating language and social behaviors using the TeachTown program. In C. Whalen (Chair), *TeachTown: A comprehensive computer-assisted ABA treatment program for children with autism*. Symposium conducted at the annual meeting of the Association for Behavior Analysis, Atlanta, GA.
40. Ingersoll, B., Gergans, S., Lewis, E., & Kroman, E. (2006, February). Teaching symbolic gesture use to young children with autism using a naturalistic behavioral intervention. Poster session presented at the annual meeting of the California Association for Behavior Analysis.
41. Whalen, C., Liden, L., Ingersoll, B., & Dallaire, E. (2006, February). Using computers to facilitate language and social interaction. Poster session presented at the annual meeting of the California Association for Behavior Analysis.
42. Ingersoll, B. (2005, April). The effect of parent-implemented Reciprocal Imitation Training on imitation skills in young children with autism. Poster session presented at the bi-annual meeting of the Society for Research in Child Development, Atlanta, GA.
43. Ingersoll, B. (2005, April). The social role of imitation in autism: Evaluation and intervention implications. Invited address at the annual meeting of the Western Psychological Association, Portland OR.
44. Dvortcsak, A & Ingersoll, B. (2004, November). Parent-mediated intervention: Teaching parents strategies to promote their child's communication development. Presentation at the Oregon Speech-Hearing Association, Portland, OR.
45. Ingersoll, B. & Schreibman, L. (2004, May). Teaching the imitation and spontaneous use of gesture in young children with autism. Paper presented at the annual meeting of the International Meeting for Autism Research, Sacramento, CA.
46. Ingersoll, B., Dvortcsak, A., Sikora, D., & Buckendorf, B. (2003, November). Efficacy of Floor Time as an intervention strategy for children with autism. Poster session presented at the annual meeting of the American Speech-Language Hearing Association, Chicago, IL.

47. Dvortcsak, A., Ingersoll, B. & Buckendorf, B. (2003, November). Developmental and naturalistic behavioral approaches: Theory and practice. Paper presented at the annual meeting of the American Speech-Language Hearing Association, Chicago, IL.
48. Ingersoll, B. & Schreibman, L. (2002, October). The effect of reciprocal imitation training on imitative and spontaneous pretend play in children with autism. Poster session presented at the annual meeting for the International Meeting for Autism Research, Orlando, FL.
49. Ingersoll, B. & Stahmer, A. (2002, May). Teaching peer interaction skills in toddlers with autism: Effects of contingent imitation training. In A. Stahmer (Chair), The role of typical toddlers in the early social development of children with autism. Symposium conducted at the annual meeting of the Association for Behavior Analysis, Toronto, Canada.
50. Ingersoll, B. & Schreibman, L. (2001, November). Training spontaneous imitation in children with autism using naturalistic teaching strategies. Paper presented at the annual meeting of the International Meeting for Autism Research, San Diego, CA.
51. Stahmer, A. C. & Ingersoll, B. (2001, November). Assessing the outcome of toddlers with autistic spectrum disorder in inclusive programming: Standardized and functional measures. Paper presented at the annual meeting for the International Meeting for Autism Research, San Diego, CA.
52. Ingersoll, B., Schreibman, L., & Tran, Q. (2001, May). Using toy preference to enhance motivation for imitation in children with autism: Assessment and treatment. In L. Schreibman (Chair), Linking assessment research to behavioral treatments for children with autism. Symposium conducted at the annual meeting of the Association for Behavior Analysis, New Orleans, LA.
53. Ingersoll, B., Tran, Q., & Schreibman, L. (2001, May). Sensory versus social motivation effects on the imitation performance of children with autism. Poster session presented at the biennial meeting of the Society for Research in Child Development, Minneapolis, MN.
54. Ingersoll, B., Stahmer, A., & Schreibman, L. (2000, May). Functional communication skills in an inclusive setting: Outcomes for young children with autistic spectrum disorder. Poster session presented at the annual meeting of the Association for Behavior Analysis, Washington, DC.
55. Ingersoll, B., Schreibman, L., & Stahmer, A. (2000, February). Inclusive classroom model for children at-risk for autism. In M. H. Charlop-Christy and L. Schreibman (Co-chairs), Teaching social skills to children with autism. Symposium conducted at the annual meeting of the California Association for Behavior Analysis, San Francisco, CA.
56. Ingersoll, B., Stahmer, A., & Schreibman, L. (1999, May). Differential treatment outcomes for children at-risk for autism based on social subtype. Poster session presented at the annual meeting of the Association for Behavior Analysis, Chicago, IL.

### **Invited Talks and Colloquia**

1. Ingersoll, B. (2014, October). Community-focused parent mediated interventions for young children with autism. Invited talk at MU Thompson Center Autism Conference, University of Missouri, Jefferson City, MO.
2. Ingersoll, B. (2014, September). Project ImPACT: A parent-mediated social communication intervention. Invited talk at the Michigan Autism Conference, Western Michigan University, Kalamazoo, MI.
3. Ingersoll, B. (2014, January). Teaching social imitation: An introduction to Reciprocal Imitation Training. Invited talk at Southwest Autism Research and Resource Center (SARRC). Phoenix, AZ.
4. Ingersoll, B. (2013, October). Parent-mediated intervention for young children with ASD: An introduction to Project ImPACT. Keynote presentation at the Center for Autism and Related Disorders –Kennedy Krieger Institute’s Annual Conference. Bethesda, MD.
5. Ingersoll, B. (2013, October). Teaching social imitation: An Introduction to Reciprocal Imitation Training. Invited talk at the Center for Autism and Related Disorders –Kennedy Krieger Institute’s Annual Conference. Bethesda, MD.
6. Ingersoll, B. (2013, October). Expanding the reach of parent-mediated intervention in ASD using eHealth. Invited talk at the DOCTRID Conference, Dublin, Ireland.

7. Ingersoll, B. (2012, October). Closing the research-to-practice gap: A model for the development of parent-mediated intervention in ASD. Colloquium at MSU's Clinical Science Forum, East Lansing, MI.
8. Ingersoll, B. (2012, December). Improving social communication in children with ASD: Initial efficacy of a blended intervention model. Colloquium at Hope Network Behavioral Health Services' Grand Rounds. Grand Rapids, MI.
9. Ingersoll, B. (2012, April). An introduction to Project ImPACT. Invited talk at the START Conference. Lansing, MI.
10. Ingersoll, B. (2012, February). Parent-mediated interventions. Autism Speaks' Moving the Needle Initiative, Washington DC.
11. Ingersoll, B. (2011, November). Family functioning in ASD: The role of the BAP. Colloquium at MSU's Clinical Brown Bag Series, East Lansing, MI.
12. Ingersoll, B. (2011, January). Project ImPACT: Improving parents as communication teachers. Invited talk at the Center for Autism and Related Disorders -University of Central Florida's Annual Conference. Orlando, FL.
13. Ingersoll, B. (2011, January). Teaching individuals with autism to imitate in a social context. Invited talk at the Center for Autism and Related Disorders -University of Central Florida's Annual Conference. Orlando, FL.
14. Ingersoll, B. (2010, October). Teaching social communication to children with autism. Invited talk at the Center for Autism and Related Disorders- Albany's Annual Conference. Albany, NY.
15. Ingersoll, B. (2010, October). RIT: A social communication intervention for children with autism. Colloquium at MSU's Communication Sciences and Disorder Colloquium Series, East Lansing, MI.
16. Ingersoll, B. (2010, April). Improving imitation in young children with autism. Breakout session at MSU's Autism Conference, East Lansing, MI.
17. Ingersoll, B. (2009, November). Imitation in autism: Defining the deficit. Colloquium at MSU's Cognitive Forum, East Lansing, MI.
18. Ingersoll, B. & Meyer, K. (2009, September). Project ImPACT: Teaching parents of children with ASD strategies to enhance their child's social communication. Workshop at the Annual Michigan Department of Community Mental Health Home and Community Based Waivers Conference, Lansing, MI.
19. Ingersoll, B. & Craft, A. (2009, May). Project ImPACT: Teaching parent strategies to improve social-communication skills in their children with autism spectrum disorders. Workshop at the Michigan Association of Community Mental Health Boards Spring Conference, Kalamazoo, MI.
20. Ingersoll, B. & Meyer, K. (2008, October). Project ImPACT: Teaching parents of children with ASD strategies to enhance their child's social communication. Workshop at the Annual Michigan Department of Community Mental Health Home and Community Based Waivers Conference, Lansing, MI.
21. Ingersoll, B. (2006, February). The social function of imitation in infancy: Implications for autism. Department of Psychology, Reed College, Portland, OR.
22. Ingersoll, B. (2006, February). Social communication interventions for children with autism. School of Professional Psychology, Pacific University, Forest Grove, OR.
23. Ingersoll, B. (2005, May). Imitation in autism: A social deficit? Center for Human Development Seminar Series, University of California, San Diego, CA.
24. Ingersoll, B. (2004, November). The social role of imitation skills in children with autism: Assessment and treatment. Grand Rounds, Child Development & Rehabilitation Center, Oregon Health & Science University, Portland, OR.
25. Ingersoll, B. (2004, April). Parent training for children with autism and communication disorders. Community Connections Network Annual Conference, Troutdale, OR.
26. Ingersoll, B. (2004, March). Imitation as a social behavior: Implications for the assessment and treatment of imitation deficits in children with autism. Vanderbilt Kennedy Center for Research on Human Development, Vanderbilt University Medical School, Nashville, TN.
27. Ingersoll, B. (2004, January). Parent-mediated intervention for children with autism. Department of Occupational Therapy, Child Development & Rehabilitation Center, Oregon Health & Science University, Portland, OR.

28. Ingersoll, B. (2003, April). Teaching children with autism imitation using a naturalistic treatment approach: Effects on social-communication behaviors. Department of Occupational Therapy, Child Development & Rehabilitation Center, Oregon Health & Science University, Portland, OR
29. Ingersoll, B. (2003, February). The effect of reciprocal imitation training on social-communicative behavior in young children with autism. Paper presented at the research meeting of the M.I.N.D. Institute Research Program, Davis, CA.
30. Ingersoll, B. (2002, April). Teaching children with autism to imitate using a naturalistic treatment approach: Effects on imitation, social, and language behaviors. PDP/NLP Colloquium Series, University of California, San Diego, CA.
31. Wagner, S. & Ingersoll, B. (1997, October). Including students with autism/PDD in regular education classes: Considerations for success. Invited workshop at the annual meeting of the Georgia Association for Young Children, Atlanta, GA.

## **TEACHING EXPERIENCE**

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### **Michigan State University**

PSY 424: Child and Family Psychopathology  
 PSY 493: Special Issues: Autism  
 PSY 993: Clinical Supervision  
 PSY 854: Behavior Disorders of Childhood  
 PSY 312: Introduction to Clinical Psychology

### **Lewis & Clark College**

Early Intervention in Autism  
 Behavior Modification  
 Research Methodology  
 Introduction to Psychology

### **UC-San Diego**

Introduction to Abnormal Psychology

### **Mentoring**

#### Honors Thesis Committees

Quy O. Tran – UC-San Diego (2000)  
 Stephanie Laut – Michigan State University, Option B (2009), Chair  
 Ian Sherwood - Michigan State University, Option A (2010), Chair  
 Sara Tischler - Michigan State University, Option B (2010), Chair  
 Kelly Phelan - Michigan State University, Option B (2011), Chair  
 Nicole Block - Michigan State University, Option A (2012), Chair  
 Lauren Mansten - Michigan State University, Option A (2013), Chair

#### Masters Committees

Katie Meyer – Michigan State University, Clinical Psychology (2009), Chair  
 Brittany Lannert – Michigan State University, Clinical Psychology (2010)  
 Allison Wainer – Michigan State University, Clinical Psychology (2011), Chair  
 Natalie Berger - Michigan State University, Clinical Psychology (2013), Chair  
 Katherine Pickard - Michigan State University, Clinical Psychology (2014), Chair

#### Comprehensive Exam Committee

Katie (Meyer) Walton - Michigan State University, Clinical Psychology (2010)  
 Julie Ramisch – Michigan State University, Human Development and Family Studies (2011)  
 Allison Wainer – Michigan State University, Clinical Psychology (2012)  
 Ashlea Klahr - Michigan State University, Clinical Psychology (2012)

#### Doctoral Committees

Linda Quirnbach - California School of Professional Psychology (2006)  
 Julie Ramisch – Michigan State University, Human Development and Family Studies (2012)

Katie (Meyer) Walton - Michigan State University, Clinical Psychology (2012), Chair  
 Ashlea Klahr - Michigan State University, Clinical Psychology (2013)  
 Allison Wainer – Michigan State University, Clinical Psychology (2013), Chair

## **CLINICAL EXPERIENCE**

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Clinical Supervision, Autism Clinic – Michigan State University Psychological Clinic. Provide clinical supervision to graduate-level practicum students Clinical Psychology program who are receiving specialized training in working with individuals with autism and related disorders.

Director, Autism Treatment & Research Program – Hearing & Speech Institute, Portland, OR. Founded and directed intervention program for children with autism and their families. Responsibilities included development and provision of clinical services, hiring and supervision of program staff, grant writing, and budget development. Clinical services included individualized parent training program, parent education and support group, sibling social-language group, and behavior management. Clinical services supervised by Darryn Sikora, Ph.D., Licensed Psychologist. (August 2002-December 2004)

Post-Doctoral Clinical Fellow (APA-approved) – LEND Program, Oregon Institute on Development & Disability, Child Development & Rehabilitation Center, Oregon Health & Science University, Portland, OR. (August 2003-July 2004)

Early Childhood Assessment Clinic. Conducted clinical assessments of children aged 18 months to five years referred for developmental concerns including developmental delay, language delay, autism, behavior problems, abuse and neglect as part of a multi-disciplinary diagnostic team. Responsibilities included administering and interpreting standardized assessments, conducting the interpretive session, and report writing. Supervisor: Susan Horton, Ph.D., Licensed Psychologist  
 ADHD & Learning Disabilities Clinic. Conducted clinical assessments of children aged six to 12 years referred for attention, learning, and behavioral problems as part of a multi-disciplinary diagnostic team. Responsibilities included administering and interpreting standardized assessments, conducting the interpretive session, and report writing. Supervisor: Russell Jackson, Ph.D., Licensed Psychologist

Pre-doctoral Clinical Psychology Intern/Practicum Student – Autism Clinic, University of California, San Diego. Conducted parent training and behavioral therapy with children with autism aged 2-10 years. Administered and interpreted standardized assessments and wrote reports. Provided training in behavior modification and language intervention to area school districts and regional center. Supervisor: Laura Schreiber, Ph.D., Licensed Psychologist (October 1998-August 2002)

## **PROFESSIONAL TRAININGS & WORKSHOP PRESENTATIONS**

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Pickard, K., Berger, N., & Ingersoll, B. (2014, October). Project ImPACT Introductory Workshop. Professional training workshop, Muskegon Intermediate School District. Muskegon, MI.

Pickard, K., Berger, N., & Ingersoll, B. (2014, August). Project ImPACT Introductory Workshop. Professional training workshop, Macomb County Community Mental Health. Clinton Township, MI.

Ingersoll, B. (2014, August). Providing supports to families with children with autism: The how and the what. Professional training workshop, Macomb County Community Mental Health. Clinton Township, MI.

Ingersoll, B. (2014, May). Project ImPACT Introductory Workshop. Professional training workshop, East Lansing, MI.

Pickard, K. & Ingersoll, B. (2013, December). Project ImPACT/Parent Coaching. START Early Childhood/Toddlers with ASD Training. Zeeland, MI.

Berger, N., Pickard, K., & Ingersoll, B. (2013, November). Implementing Project ImPACT. Annual Home and Community Based Waiver Conference. East Lansing, MI.

Ingersoll, B. (2013, December). Overview of Project ImPACT. Webinar for Michigan Department of Community Health, Lansing, MI.

Ingersoll, B., Wainer, A., & Berger, N. (2013, August). Project ImPACT Introductory Workshop. Professional training workshop, Flint, MI.

- Wainer, A. & Ingersoll, B. (2013, July). Project ImpACT Parent Training Workshop. Professional training workshop, Ghent, Belgium.
- Ingersoll, B. (2013, May). Focusing on developing early social communication in young children in autism utilizing an ABA approach. Autism Alliance of Michigan conference, Lansing, MI
- Ingersoll, B. (2013, May). Project ImpACT Introductory Workshop. Professional training workshop, East Lansing, MI.
- Ingersoll, B. (2013, May). Reciprocal Imitation Training: Introductory Workshop. Professional training workshop, Seattle, WA.
- Ingersoll, B. (2012, November). Project ImpACT Parent Training Workshop. Professional training workshop, East Lansing, MI.
- Ingersoll, B. (2012, August). Project ImpACT Introductory Workshop. Professional training workshop, East Lansing, MI.
- Wainer, A. & Ingersoll, B. (2012, July). Implementing Project ImpACT. In-service training for the Research Group in Developmental Disorders Ghent University, Ghent, Belgium
- Walton, K., Wainer, A., & Ingersoll, B. (2012, April). Implementing Project ImpACT. In-service training for Surrey Place Center, Toronto, Ontario, Canada
- Walton, K., Wainer, A., & Ingersoll, B. (2011, September). Implementing Project ImpACT. In-service training for Eastern Upper Peninsula Intermediate School District, Sault Ste. Marie, MI.
- Ingersoll, B. (2011, May). Project ImpACT Introductory Workshop. East Lansing, MI.
- Wainer, A. & Ingersoll, B. (2011, March). Implementing Project ImpACT. In-service training for University of Oklahoma Health Sciences Center, Oklahoma City, OK.
- Ingersoll, B. (2011, January). Implementing Project ImpACT. In-service training for Ingham Intermediate School District, Mason, MI.
- Ingersoll, B. (2010, September). Implementing Project ImpACT. In-service training for Livingston Educational Services Area, Howell, MI.
- Wainer, A., Bonter, N., & Ingersoll, B. (2010, August). Implementing Project ImpACT. In-service training for Kaiser Permanente, Ottawa, CA.
- Wainer, A. & Ingersoll, B. (2010, May). Implementing Project ImpACT. In-service training for BRIDGE Collaborative, San Diego, CA.
- Wainer, A., Bonter, N., & Ingersoll, B. (2010, April). Implementing Project ImpACT. In-service training for Great Start Collaborative, Lansing, MI.
- Ingersoll, B., Wainer, A., & Bonter, N. (2010, March). Implementing Project ImpACT. In-service training for Clinton County Regional Education Services Area, St. Johns, MI.
- Ingersoll, B., Wainer, A., & Bonter, N. (2010, January). Implementing Project ImpACT. In-service training for Livingston Educational Services Area, Howell, MI.
- Ingersoll, B. (2009, October). Implementing Project ImpACT. In-service training for Ottawa Area Intermediate School District, Holland, MI.
- Ingersoll, B. (2009, October). Overview of Project ImpACT. BRIDGE Conference Series, San Diego, CA.
- Ingersoll, B. (2009, October). Implementing Project ImpACT. In-service training for Ottawa Area Intermediate School District, Holland, MI.
- Rogers, S. & Ingersoll, B. (2009, June). Early identification of autism: What is the newest research telling us? Presentation for the National Professional Development Center on Autism Summer Institute, Lansing, MI.
- Vismara, L. & Ingersoll, B. (2009, June). Partnering with families in evidence based practices. Presentation for the National Professional Development Center on Autism Summer Institute, Lansing, MI.
- Ingersoll, B., Meyer, K., & Bonter, N. (2009, June). Reciprocal Imitation Training. Staff training workshop for Center for Discovery, Harris, NY.
- Ingersoll, B. (2008, September). Teaching the social use of imitation: Reciprocal Imitation Training. Parent training workshop for Erinoak Autism Intervention Services, Mississauga, ON, Canada.
- Ingersoll, B. (2008, July). Implementing Project ImpACT. In-service training for Ottawa Area Intermediate School District, Holland, MI.
- Ingersoll, B. (2008, June). Implementing Project ImpACT. Staff training workshop for UCSD Autism Research Program, La Jolla, San Diego.

- Ingersoll, B. (November, 2007). Training teachers to provide parent education for children with autism. Research to Practice Conference, sponsored by Department of Family and Child Ecology, Michigan State University, East Lansing, MI
- Ingersoll, B. (2007, June). Teaching the social use of imitation: Reciprocal Imitation Training. In-service training for Erinoak Autism Intervention Services, Mississauga, ON, Canada.
- Ingersoll, B. & Dvortcsak, A. (2007, March). How to teach parents strategies to promote their child's social communication. In-service training for Asante Child Development Services, Medford, OR.
- Ingersoll, B. & Hatt, N. (2007, January). Teaching the social use of imitation: Reciprocal Imitation Training. In-service training for Toronto Preschool Autism Program, Toronto, ON, Canada.
- Ingersoll, B. & Hatt, N. (2006, November). Inclusive programming for students with autism. In-service training for Corvallis School District, Corvallis, OR.
- Ingersoll, B. & Dvortcsak, A. (2006, October). How to teach parents strategies to promote their child's social communication. In-service training for Multnomah Education Service District, Portland, OR.
- Ingersoll, B. & Dvortcsak, A. (2006, September). How to teach parents strategies to promote their child's social communication. In-service training for High Desert Education Service District, Bend, OR.
- Ingersoll, B. & Dvortcsak, A. (2006, March; 2007, March). How to teach parents strategies to promote their child's social communication. In-service training for Willamette Education Service District, Salem, OR.
- Ingersoll, B. & Dvortcsak, A. (2006, January). How to teach parents strategies to promote their child's social communication. In-service training for Linn-Benton-Lincoln Education Service District, Corvallis, OR.
- Ingersoll, B. & Dvortcsak A. (2005, September-November; 2004, September-November; 2005, March-May). Strategies for promoting your child's social-communication. Parent training series for families at Northwest Regional Education Service District, Hillsboro, OR.
- Ingersoll, B. & Wiebers-Jensen, M. (2004, September-October). Self-care workshop for parents. Hearing & Speech Institute, Portland, OR.
- Dvortcsak A. & Ingersoll, B. (2004, April). Naturalistic therapy approaches for children with autism and related disorders. In-service training for Bend-La Pine School District, Bend, OR.
- Ingersoll, B. & Dvortcsak, A. (2004, March). Training parents to teach their children with autism. In-service training for Northwest Regional Education Service District, Hillsboro, OR.
- Ingersoll, B. & Jensen, B. (2004, February-March). Behavior management workshop for parents. Hearing & Speech Institute, Portland, OR.
- Ingersoll, B. (2003, March). Naturalistic teaching strategies: Teaching language and play in the natural environment. Saddleback Unified School District, Mission Viejo, CA.
- Ingersoll, B. (2001, August). Behavior management for teachers. Saddleback Unified School District, Mission Viejo, CA.
- Ingersoll, B. (1999, October). Pivotal response training. West Orange County Consortium for Special Education, Huntington Beach, CA.

## **MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS**

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International Society for Early Intervention  
 International Society for Autism Research  
 American Psychological Association, Division 33 (ID/DD)  
 Society for Research on Child Development

## **PROFESSIONAL SERVICE**

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### **Editorial Activities**

Editorial Boards

Research in Developmental Disabilities  
 Autism – International Journal of Research and Practice  
 Journal of Autism and Developmental Disorders

Ad-hoc Reviewer of Journals

Acta Psychologica, Autism – International Journal of Research and Practice, Autism Research, Autism Research and Treatment, Child Language Teaching & Therapy, Developmental Psychology, Cognitive and Behavioral Practice, Cognitive Development, Education and Treatment of Children, International Journal of Psychophysiology, Journal of Applied Behavior Analysis, Journal of Autism & Developmental Disorders, Journal of Child and Family Studies, Journal of Early Intervention, Journal of Experimental Analysis of Behavior, Journal of Psychology & Psychiatry and Allied Disciplines, Perception

#### Ad-hoc Grant Reviewer

Institute for Education Sciences (2008, 2009)  
 Autism Speaks (2008, 2009, 2011, 2012)  
 CUNY Collaborative Incentive Research Grants Program (2008)  
 PCS-CUNY Research Awards Program (2010)  
 Spencer Foundation (2007)  
 Cure Autism Now, Grants Program (2004, 2005, 2007)  
 Netherlands Organization for Health Research and Development, ZonMw Programme (2007)  
 Organization for Autism Research, Applied Research Competition (2004, 2005, 2006)  
 Ireland's Health Research Board (2011)  
 Singapore's National Medical Research Council (2011)

#### Ad-hoc Reviewer of Books

American Psychological Association Publications  
 John Wiley & Sons Publications

#### Conference Committee Reviewer

Biannual meeting of the Society for Research in Child Development (2006)  
 International Meeting for Autism Research (2013)

#### Evidence-Based Practice Reviewer

National Professional Development Center for Autism Spectrum Disorders (2012)

### **Community Leadership**

Co-Chair – Autism Speaks' Toddler Treatment Network Conference (2013-Present)  
 Planning Committee – Autism Speaks' Toddler Treatment Network Conference (2012-2013)  
 Member – Naturalistic Interventions Working Group, Autism Speaks (2012-Present)  
 Participant – Autism Speaks' Moving the Needle Initiative Conference (March 2012)  
 Member - Technical Expert Panel, Autism Intervention Research Network on Behavioral Health, Health Resources and Services Administration (2009-2010)  
 Member – Michigan ASD State Plan Advisory Committee (2010-Present)  
 Member –Interagency Autism Planning Group for Michigan, National Profession Development Center on ASD (2009-2010)  
 Member - Human Services Directors' Interagency Committee on Autism, Lansing, MI (2007-2009)  
 Scientific Advisory Board – TeachTown, Seattle, WA. (2006-2012)

### **MEDIA ATTENTION**

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O'Neill, P (2004, February 10). Inside a child's quiet world. The Oregonian  
 Boll, M. (2009, February 20). Reciprocal imitation therapy. Interview for Autism Podcast  
 Miller, R. (2010, January 29). Social communication intervention. Interview for Michigan Radio  
 Evans, L. (2012, February 3). WILX Channel 10 covered my lab's research.