Project ECHO
Supporting Parents of Children With Disabilities Using an Online, Telementoring Service Delivery Model

Katherine J. Bateman, PhD, BCBA-D;
Ilene S. Schwartz, PhD; Ryan P. Grimm, PhD

Children with intellectual and developmental disabilities engage in higher rates of challenging behavior (CB) than their typically developing peers. Effective and sustainable intervention and supports designed to reduce CB, as well as promote the development of positive, prosocial behavior, are urgently needed. One approach to targeting CB is providing parents with education and support to serve as the agents of behavior change. The purpose of this study was to examine the effectiveness of a parent education (PE) program focused on the principles of applied behavior analysis delivered using the Project ECHO service delivery model. Results demonstrate positive outcomes in parents' senses of competency and empowerment. In addition, parents identified the intervention as acceptable, suggesting this model as a highly effective and sustainable PE model for this population. **Key words:** *disability, education, parents, teleintervention*

PARENTS[1] are the first and most consistent teachers in their children's lives. Parents of children with intellectual and developmental disabilities (I/DD) often face special challenges to meet their children's unique needs. Furthermore, compared with their typically developing peers, children with I/DD engage in higher rates of challenging behavior (CB) and often need specialized instruction to learn appropriate alternatives to CB and to demonstrate valued and functional skills that facilitate successful participation at home and in the community (e.g., Bradshaw, Steiner, Gengoux, & Koegel, 2015; Matson & Rivet, 2008; Volkmar, Lord, Bailey, Schultz, & Klin, 2004). Engagement in CB may impede meaningful participation in early learning activities targeting skill building, often resulting in social isolation and feelings of loneliness for children and families. In addition, CB may cause delays in social, emotional, and/or cognitive development; acquisition of preacademic skills; and preparedness for school (Espinosa, 2002; La Paro, M., Pianta, & Cox, 2000). Early and targeted intervention for children with I/DD is needed to decrease CB and increase positive outcomes for children and their families (Antill, 2019; Sanders et al., 2020; Schwartz, Ashmun, McBride, Scott, & Sandall, 2017).

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[1]*We will use "parent" throughout this document to refer to parent(s), family members, and caregivers.*

Author Affiliations: *College of Education, University of Washington, Haring Center for Inclusive Education, Seattle (Drs Bateman and Schwartz); and SRI International, Menlo Park, California (Dr Grimm).*

Correspondence: *Katherine J. Bateman, PhD, BCBA-D, College of Education, University of Washington, Haring Center for Inclusive Education, Box 357925, 1981 NE Columbia Rd, Seattle, WA 98195 (Kjb27@uw.edu).*

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Research has well established the association between CB and negative outcomes for both children and their family members (Bearss et al., 2018; Dunlap et al., 2006; Wood, Cho Blair, & Ferro, 2009). For children, CB may result in denied access to learning opportunities in less restrictive environments including childcare, recreational programs, and even programs offered by spiritual communities (e.g., Clayback & Hemmeter, 2021; Shoham-Vardi et al., 1996). For parents, child engagement in CB has demonstrated higher rates of stress, anxiety, and depression (Estes et al., 2009; Lai, Goh, Oei, & Sung, 2015; Postorino et al., 2017). Families of children with I/DD report restricted social networks and sources of social support, indicating increased feelings of isolation (Antill, 2019; Schwartz & Kelly, 2021). Research has also demonstrated that parenting stress and CB in children with I/DD have a strong relationship over time, with stress interfering with the use of effective parenting strategies, which in turn affects rates of CB (Joachim, Sanders, & Turner, 2010; Neece, Green, & Baker, 2012).

NEED FOR SUPPORTS TO ADDRESS CB

Addressing CB is identified as one of the most serious concerns facing intervention programs, public schools, and families (e.g., Doubet & Ostrosky, 2015; Hemmeter, Ostrosky, & Fox, 2021; Sugai, Lewis-Palmer, & Hagan, 1998). Furthermore, 15%–25% of children with disabilities demonstrate behaviors that interfere with successful participation in home, school, and community routines (Baker et al., 2002; Conroy, Sutherland, Snyder, & Marsh, 2008; Hattier, Matson, Belva, & Horovitz, 2011; Phillips & Shonkoff, 2000). There is an overwhelming amount of evidence demonstrating that behavioral interventions targeting CB have consistently shown positive outcomes for children with I/DD and their families (e.g., Bradshaw et al., 2015; Reichow & Wolery, 2009; Smith, Groen, & Wynn, 2000), yet many children and families face barriers accessing these interventions. These barriers, including lack of

in-home services in rural areas and issues related to insurance coverage for services (Hebbeler et al., 2012; Machalicek et al., 2016), decrease family participation in, and overall acceptance of, interventions. Ultimately, the sustainability of intervention and outcomes related to behavior change are diminished because of these factors and families are left without services, navigating the concomitant effects of CB independently.

Although there are many service barriers that do exist, research continues to identify that when children with autism spectrum disorder (ASD) and I/DD receive high-quality intervention and treatment, gains are demonstrated across numerous developmental domains (Rogers et al., 2021). Applied behavior analysis (ABA) is among the most widely used evidence-based interventions to address CB (Steinbrenner et al., 2020). Cooper, Heron, and Heward (2020) describe ABA as the science of systematically applying the principles of behavior to improve socially significant behaviors. Intervention utilizing ABA focuses on teaching adaptive and prosocial behavior while decreasing CB through implementation of numerous evidence-based practices designed to meet the unique needs of each individual (Cooper et al., 2020). Research has demonstrated the positive impact of ABA, and meta-analyses have shown medium to large effects of long-term, comprehensive ABA interventions on developmental outcomes for children with autism and other disabilities in early childhood (Eldevik et al., 2009; Feeley & Jones, 2006; Reichow & Wolery, 2009). Specifically for individuals with I/DD, ABA has been used in research to teach skills and behaviors targeting increased quality of life (e.g., Machalicek et al., 2021; Maffei-Almodovar, & Sturmey, 2018; Stauch, Plavnick, Sankar, & Gallagher, 2018).

INCREASING ACCESS TO ABA BY TEACHING PARENTS TO SERVE AS IMPLEMENTERS

One approach to meet the growing needs of children with I/DD and their families who

face barriers accessing behavioral intervention is to teach parents to serve as agents of behavior change. A robust research base demonstrates the effectiveness of interventions that focus on teaching parents to serve as implementers of intervention (i.e., Bearss et al., 2018; Estes et al., 2014; Kaiser & Roberts, 2013). Teaching parents to implement intervention may increase their knowledge of behavioral strategies and ultimately increase their capacity to engage with their children in a positive manner. This approach is promising, as parents serve as key stakeholders in intervention due to their constant presence in their children's daily lives.

Extensive evidence indicates that with the appropriate level of education, parents can successfully implement behavioral strategies targeting decreases in CB and increases in appropriate behavior at home and in their communities (e.g., Barton & Fettig, 2013; Bearss et al., 2018. When parents feel confident and competent implementing behavioral strategies to support their children, these strategies are implemented with fidelity (Casagrande & Ingersoll, 2017; Singh et al., 1995). Increased fidelity of intervention leads to enhanced outcomes of intervention (Breitenstein et al., 2010; O'Donnell, 2008).

IMPLEMENTATION OF ONLINE PARENT EDUCATION INTERVENTIONS

Traditional parent education (PE) interventions are often delivered via in-person coaching sessions. Effective implementation of most in-person PE programs requires families to be physically present to access services, often in settings other than their homes. Because of the immobility of these services, many families are left without access to meaningful services. Unfortunately, this outcome is true even when schools and early intervention centers are not experiencing shutdowns due to a pandemic. To address this problem, and better meet the needs of consumers, literature on the expansion of PE to include service delivery models that utilize online learning platforms has increased (Machalicek et al., 2016; Pennefather, Hieneman, Raulston, & Caraway, 2018; Vismara, Young, & Rogers, 2012; Wacker et al., 2013). Remote, online intervention delivery may rectify some common barriers to accessing in-person intervention, such as lack of services in rural areas (Hebbeler, Spiker, & Kahn, 2012; Koegel, Symon, & Kern Koegel, 2002), as well as conflicts with the daily demands of caregiving roles including both scheduling childcare and travel time (Goodwin, 2008; Vismara et al., 2012). Utilizing online service delivery models widens the options for families to access meaningful services, resulting in increased care.

Results from research demonstrate the effectiveness of online delivery of intervention for families of children with disabilities (e.g., Baharav & Reiser, 2010; Suppo & Mayton, 2014; Wainer & Ingersoll, 2015). Providing parents with education online may increase attendance and access to meaningful emotional support and increased connection with others. Furthermore, online intervention is relatively inexpensive to implement when compared with in-person models and improves outreach to underserved, low-resourced communities with ease.

INTERVENTION PROVIDED VIA TELEHEALTH

Recently, schools and behavioral health agencies increased their use of telehealth and teleintervention strategies to provide education and coaching to young children and families as a result of the COVID-19 pandemic (e.g., Ferguson, Craig, & Dounavi, 2019; Lerman et al., 2020; Vismara et al., 2018). The Health Resources & Services Administration (HRSA), defines telehealth as the use of electronic information and telecommunication technologies to provide care when the patient and the health care provider are not in the same place at the same time. In the medical field, recent closures due to COVID-19 provided increased opportunities for behavioral health interventions to be

provided remotely. In education, educational and therapeutic agencies have also increased their use of telecommunication technologies to provide services, referring to them as teleintervention. Most of these services are provided individually, with one provider working with one client at a time.

Although this format is demonstrated in research to be effective (Owen, 2020; Yang et al., 2021), not all services are a strong match for this delivery model. Additional strategies and service delivery platforms to provide other types of services, including group interventions, professional development, support groups, and PE, are needed to further increase access to meaningful intervention and services.

PROJECT ECHO

Project ECHO (Extension for Community Healthcare Outcomes; Arora, Thornton, Jenkusky, Parish, & Scaletti, 2007), is a model of online telementoring that is effective across disciplines in improving the capacity of professionals in underresourced areas (e.g., Holmes, Keyser-Marcus, Dave, & Mishra, 2020; Sockalingam et al., 2018; Zhou, Crawford, Serhal, Kurdyak, & Sockalingam, 2016). It is an evidence-based approach for delivering and facilitating high-quality virtual case-based support, training, and opportunities for collaboration among participants. Originally developed in medicine as a method to provide treatment to patients diagnosed with hepatitis C in rural areas, Project ECHO showed increases in participants' knowledge and skills, particularly for those in rural and low-resourced areas (Arora et al., 2011). Since its initial launch, Project ECHO has been used to address topics such as multiple sclerosis, pain management, autism diagnosis, and dementia. More recently, the Project ECHO model has been adapted outside of medicine, seeking to increase capacity of providers in the fields of education and social work.

The Project ECHO model uses a hub-spoke framework to virtually connect a team of experts (the *hub*) with rural and remote prac-

titioners (the *spokes*) in order to leverage scarce resources and create a collaborative learning *network* (Arora et al., 2011). Each Project ECHO session is highly structured. These sessions include a case-based presentation led by a participant, as well as a short, targeted didactic presentation given by a specialist on the hub team. This format allows for consistency across network meetings.

In the case-based presentation, a participant presents a case about a patient or a client that he/she/they are seeking guidance and feedback on. Following this presentation, an opportunity for other spokes in the network, as well as the experts on the hub team, to ask questions is provided. Then, the spokes and hub team provide recommendations and suggestions regarding treatment for the patient or the client discussed in the case-based presentation. In the didactic presentation, a lecture-type workshop is provided to deliver new content related to the broader topic or discipline of the Project ECHO series. For example, in a Project ECHO series targeting hepatitis C for medical providers, the didactic session may include instruction on best-practices related to diagnosing, treating, and managing this diagnosis. In a Project ECHO series targeting special education services for educators, the didactic session includes instruction related to supporting students with disabilities.

Different from telehealth, Project ECHO is unique in that it uses a telementoring approach. Telementoring does not establish a provider and patient/client relationship, making this service delivery model a good match for group interventions. The Project ECHO model has been effectively adapted in education, with active hubs in 11 states (Project ECHO®, 2019). These education networks provide community and school-based practitioners, many servicing large, rural areas, with real-time access to and support from multidisciplinary hub teams of university-based specialists in fields such as autism spectrum disorder, family services, school leadership, and learning disabilities (Project ECHO, 2019). Currently, there are no

published reports of using ECHO to provide support to parents of children with I/DD.

Providing PE through the ECHO model facilitates outreach to low-resourced and isolated parents. As participants, parents share experiences with each other and engage in problem solving around behaviors in a way that creates a social and community network with other parents and members of the hub team. At the same time, they benefit from the inclusion of short, targeted didactic sessions or workshops, aimed at increasing knowledge of ABA and equipping parents with strategies to address CB at home.

Raultson et al. (2019) identify three enabling factors that contribute to parental attendance in behavioral coaching and education sessions: (a) supportive, professional feedback; (b) accessible, flexible, and affordable training; and (c) social–emotional support and community connection. First, the Project ECHO model creates opportunities for consistent, ongoing feedback from experts in the field through its case-based approach. Second, because ECHO uses an online platform, it provides free, direct access to parents, especially those in rural and/or low-resourced areas, eliminating the need for parents to secure transportation and childcare. Third, the overall goal of ECHO is to build "learning loops" to foster communities of support and overall membership, thereby facilitating social–emotional support and connection among parents.

COVID-19 PANDEMIC

The COVID-19 pandemic and its consequent shutdowns and closures impacted access to intervention for families across the country, adding to an already long list of barriers to access to services and supports. The versatile nature of the ECHO model is resistant to these challenges and barriers to access. By design, this evidence-based intervention was developed with the goal to "move knowledge, not people," and it is implemented entirely remotely.

The ECHO model has been shown to be effective, efficient, and, most importantly, sustainable. Even in the midst of a global health challenge, families are able to access meaningful, important intervention. By improving access to life-changing services, Project ECHO targeting CB has a strong potential to create a positive impact on quality of life for children and families affected by IDD.

RESEARCH QUESTION

This study sought to increase the overall quality of life for all family members of children with I/DD who engage in CB. Intervention provided parents with PE targeting evidence-based practices rooted in ABA to produce meaningful changes to their daily lives. To this end, we sought to answer the following research question: What are the effects of implementation of Project ECHO targeting the principles of ABA on parents' sense of empowerment and competence for parents of children with I/DD?

METHODS

Participants

Parents of children with I/DD who demonstrated CB at home and were not currently receiving home-based behavioral services were recruited for this study. Information about the PE opportunity was shared via flyers through multiple agencies serving families of children diagnosed with I/DD across the Pacific Northwest. Participants contacted the lead investigator via email to identify interest in participation in intervention. Next, parents were screened on the basis of participation criteria. Parents who currently had access to home-based behavioral services, parents who did not have sufficient English skills to participate in the online PE program, and families who did not have access to the technology needed to run online sessions (i.e., a stable Internet connection and a device to access Zoom) were excluded from this study.

Twenty-two families indicated interest in participation in intervention. Five families were excluded as they all were currently already accessing home-based behavioral services.

Seventeen English-speaking families of children 1.5–8 years of age diagnosed with I/DD participated in this study. Although all adult family members were invited to participate in ECHO sessions, one parent was identified as the primary parent for data collection. Of the 17 participating parents, 88% were female, 70% identified as White, 24% Asian, and 6% American Indian or Alaska Native. Parents participating in this study had various education levels. Their children with I/DD ranged in ages from 3 to 7 years. (See Table 1 for parent and child demographics.) The participating parents are referred to as the *network* in the Project ECHO model and in this article. All participants completed the entirety of intervention.

The hub team consisted of two board-certified behavior analysts, a certified special education teacher, a parent advocate who is the parent of an adult with I/DD, and the facilitator. All members of the hub team were White women.

Setting and materials

This study took place remotely on Zoom, as parent participants joined intervention from across the Pacific Northwest. The hub team was also based in the Pacific Northwest.

Materials necessary to participate in this study included a Smart Device (i.e., smartphone, tablet, laptop, etc.), a stable Internet connection, and a Zoom account. Prior to the start of intervention, instructions to access a free version of Zoom was shared with participants.

Parents received one-page weekly handouts on the corresponding behavior principle and instructional strategy taught during PE sessions.

Procedures

Weekly project ECHO sessions

Sessions using the Project ECHO model were live and held weekly for 1 hr in the early evening for 16 consecutive weeks. All parents participated simultaneously in the group format, and all members of the hub team were present for all sessions. These sessions provided parents with a platform to

Table 1. Parent and Child Demographics

Parent Demographics							
Gender		**Ethnicity**		**Race**		**Zip**	
Male	12%	Not Hispanic or Latino	100%	Asian	24%	No. of Zip codes represented	14
Female	88%			American Indian or Alaska Native	6%		
				White or Caucasian	70%		
Child Demographics							
Age (Years)		**Gender**		**Diagnosis**			
3	35%	Male	71%	ASD	47%		
4	12%	Female	29%	Down syndrome	35%		
5	12%			ADHD	6%		
6	17%			Genetic disorder	12%		
7	24%						

Note. ADHD = Attention-deficit/hyperactivity disorder; ASD = autism spectrum disorder.

Table 2. Scope and Sequence of Didactic Instruction/Workshops

Week	Didactic Instruction/ Workshop Topics
1	Reinforcement
2	ABCs of behavior: Antecedent, behavior, consequence
3	Function of behavior
4	Strategies to prevent challenging behavior
5	Replacement behaviors and skills
6	Teaching new behaviors and skills
7	Strategies to decrease challenging behavior
8	Review

Table 3. Project ECHO Session Protocol

Session Timeline	Project ECHO Session Protocol Components
5 min	Introductions
2.5 min	Announcements
15 min	Didactic instruction/workshop
5 min	Case presentation
2.5 min	Summary of case presentation
10 min	Clarifying questions (network & hub)
15 min	Recommendations (network and hub)
5 min	Summary of recommendations

problem solve any problems that occurred during implementation of target behavioral strategies learned during the previous PE sessions. The Project ECHO followed the same format every week. Sessions started with announcements and introductions. This was followed by a 20-min didactic lesson led by a member of the hub team. The weekly lesson focused on strategies of effective teaching and basic principles of ABA, such as understanding the function of behavior, using positive reinforcement, and closing the instructional loop. See Table 2 for scope and sequence of didactic/workshop instruction. Following the didactic lesson, a parent presented a case about a CB occurring at home. The network and hub team members then had the opportunity to ask clarifying questions and provide recommendations and suggestions. All evidence-based recommendations and suggestions provided by the hub team were made using their own professional judgments. Each PE session ended with the facilitator verbally summarizing feedback. Following the Project ECHO session, the presenting parent received written feedback of suggestions and recommendations identified during the ECHO session. See Table 3 for Project ECHO session protocol.

Although each parent was given the opportunity to present a case presentation during the 16 weeks of intervention, some parents opted out. To address missed sessions, the didactic instruction/workshops were recorded and provided to parents who were unable to attend.

Parent handouts

Brief, one-page parent handouts were provided weekly to participants. These handouts were bullet-pointed documents and included a summary and list of key takeaways for each didactic instruction lesson/workshop taught during the Project ECHO PE session. These handouts corresponded with each didactic topic. See Appendix for an example of a parent handout.

Procedural fidelity

For each Project ECHO session, procedural fidelity was reported through the use of a self-report procedure checklist, which included the following components: (1) introductions, (2) announcements, (3) didactic instruction/workshop, (4) case presentation, (5) summary of case presentation, (6) clarifying questions from network and hub, (7) recommendations from network and hub, and (8) summary of recommendations.

These data were collected and coded daily during all sessions. Procedural fidelity results indicated that procedures were followed to 100% fidelity across all intervention sessions.

Measures

The Family Empowerment Scale

The Family Empowerment Scale (FES; Koren, DeChillo, & Friesen, 1992) was administered to assess parents' sense of empowerment preintervention and postintervention using Google Forms. The FES is a parent-report questionnaire that uses a 5-point (1 = not true at all to 5 = very true) Likert-type rating. It is a widely used measure of treatment effect on parents' sense of empowerment, and it has strong psychometric properties in developmental disability samples (Banach, Iudice, Conway, & Couse, 2010; Koren et al., 1992). An evaluation of the validity of the FES as a measure in developmental disability samples found reasonable model fit in a conceptually meaningful four-factor analysis with congruence coefficients ranging from .88 to .98. The four factors are systems advocacy, knowledge, competence, and self-efficacy. Internal consistency estimates ranged from 0.78 to 0.89 for subscales (Singh et al., 1995).

Parenting Sense of Competence Scale

The Parenting Sense of Competence Scale (PSOC; Gibaud-Wallston & Wandersman, 1978) identifies changes in parent knowledge of intervention practices preintervention and postintervention. It is a parent report questionnaire that uses a 6-point (1 = strongly disagree to 6 = strongly agree) Likert-style rating with two subscales: skill/knowledge and valuing/comfort. The PSOC is a widely used measure of treatment effect on parents' overall sense of competence related to parenting (e.g., Cooklin, Giallo, & Rose, 2012; Dunn, Cox, Foster, Mische-Lawson, & Tanquary, 2012) and has strong psychometric properties. An evaluation of the validity of the PSOC in samples of parents of children aged 5–12 years found a reasonable model fit in an exploratory factor analysis of the two-subscale tool. Good internal consistency has been found for mother's ratings (0.80) and father's ratings (0.77–0.80) on both subscales, as well as good evidence of convergent and divergent validity (Ohan, Leung, & Johnston, 2000).

Social validity

To identify parents' perceptions of implementation of PE using the Project ECHO model, anonymous surveys were electronically distributed using Google Forms to participants (parents). Surveys included five questions that were to be answered on a 5-point Likert-type scale. The questions included in the survey were as follows:

1. To what extent do you feel that this intervention seemed effective in increasing your knowledge to address CB at home?
2. To what extent do you feel that this intervention seemed effective in supporting consistent implementation of strategies to decrease CB at home?
3. To what extent do you feel that this intervention seemed effective in answering questions and providing expertise in regard to CB at home?
4. To what extent do you feel that this intervention increased your confidence addressing CB at home?
5. To what extent do you feel that this intervention increased your social relationships and community of support with other parents and providers?

The social validity survey included an opportunity for parents to report any additional feedback regarding intervention. We also collected attendance data at weekly sessions as a behavioral correlate of social validity.

Data analysis

Prior to analyses, this study examined distributions of each variable for departures from normality. A series of paired samples t tests were conducted to examine whether mean differences between pre- and postintervention were statistically significant. Analyses were performed on each of the four subscales of the FES and the two subscales of the PSOC using SPSS 26. To account for multiple comparisons among the four subscales of the FES, this study used the Benjamini–Hochberg method (Benjamini & Hochberg, 1995) to adjust p values as this is the

method recommended by What Works Clearinghouse (U.S. Department of Education, Institute of Education Sciences, n.d.). The *p* values for the FES factors were adjusted as they were considered to be related. The PSOC was not included in the adjustment as it was considered to be measuring a separate domain.

Data from social validity surveys were analyzed by calculating the mean of responses for each question. Attendance was analyzed by calculating the mean of days participants were present during intervention.

RESULTS

Descriptive statistics

Descriptive statistics of the FES and the PSOC are presented in Table 4. All variables demonstrated skewness and kurtosis values less than |1|.

Differences in pre- and posttest measures

A series of paired samples *t* tests were conducted to compare differences in pre- and postintervention scores on the four factors of the FES and the total score of the PSOC. For the FES systems advocacy factor, the increase from pre- to postintervention scores was significant ($M = 3.47$, $SD = 4.30$, $p = .004$). The increases from pre- to postintervention for the knowledge ($M = 4.12$, $SD = 6.08$, $p = .013$) and competence ($M = 2.47$, $SD = 4.11$, $p = .025$) scores were also statistically significant. The increase from pre- to postintervention for the self-efficacy score was not statistically significant ($M = 1.53$, $SD = 3.44$, $p = .086$). These results remained the same even after adjusting p values using the Benjamini–Hochberg procedure. For the PSOC skill/knowledge subscale, the increase from pre- to postintervention was significant ($M = 2.63$, $SD = 4.67$, $p = .040$). The difference between means of the PSOC value/comfort subscales was not statistically significant ($M = 2.88$, $SD = 5.99$, $p = .074$). See Table 4 for mean differences.

Table 4. Descriptive Statistics for FES and PSOC Subscales Pre- and Postintervention

Variable	Pre						Post					
	n	*M*	*SD*	Range	Skewness	Kurtosis	*n*	*M*	*SD*	Range	Skewness	Kurtosis
FES												
Systems advocacy	17	29.24	6.69	19–44	0.36	−0.19	17	32.71	7.09	19–45	−0.14	0.55
Knowledge	17	40.12	5.10	32–52	0.34	0.42	17	44.24	6.68	31–52	−0.65	−0.49
Competence	17	32.06	3.78	27–39	0.15	−0.97	17	34.53	2.24	30–38	−0.23	−0.43
Self-efficacy	17	25.00	2.52	19–29	−0.71	0.52	17	26.53	2.32	21–30	−0.77	0.88
PSOC	17	64.88	7.15	57–82	1.15	0.83	16	70.81	9.40	53–87	−0.26	−0.54
Skill/knowledge	17	32.00	5.07	23–44	0.43	0.71	16	35.00	4.75	25–41	−0.75	−0.09
Value/comfort	17	32.88	4.54	26–43	0.62	0.11	16	35.81	5.66	27–46	−0.11	−0.99

Note. FES = Family Empowerment Scale; PSOC = Parenting Sense of Competence Scale.

Social validity

Social validity results indicated that parents found this intervention to be effective at increasing knowledge to address CB at home. All five questions had a mean rating of 4 or above on a 5-point scale. Parents indicated that this intervention was effective in answering questions and providing expertise regarding CB at home, receiving a rating of 5 from all participants (see Table 5). In addition, anecdotal and survey responses indicated that parents felt increased confidence and competence addressing CB at home. Parents reported that the intervention provided a safe space for families navigating similar experiences to connect and find support.

The average for attendance for weekly sessions was 81% (range: 68%-100%), indicating high acceptability of intervention as parents continued to attend weekly Project ECHO sessions throughout the 16-session series.

DISCUSSION

The primary purpose of this study was to investigate the effects of an education and support program seeking to increase the knowledge of CB for parents of children with I/DD. Results of this study were consistent with multidisciplinary research utilizing the Project ECHO model. Yet, this study was novel and one of the first demonstrations of Project ECHO with families. It demonstrated the effectiveness of this model to increase parents' sense of empowerment as well as overall knowledge of behavioral interventions for CB that could be used in their homes. Parents found this intervention to be helpful and acceptable. Details of the findings and implications are discussed later.

As identified, outcomes of this study are consistent with outcomes identified in research using the Project ECHO model across disciplines (e.g., Bennett et al., 2018; Mazurek, Curran, Burnette, & Sohl, 2019; Sockalingam et al., 2018; Wood et al., 2018). This innovative training model was developed to train and mentor providers in the community to increase high-quality support and education for recipients of care by Project ECHO participants (Arora et al., 2007). The results of this intervention support this service delivery model for a new population (i.e., parents of children with I/DD) and their prospective patient population (i.e., children with I/DD). Similar to data collected in other interventions using the Project ECHO model, increased in self-efficacy were demonstrated for consumers.

In this study, two standardized measures were used to measure the effects of the education program. The FES demonstrated

Table 5. Social Validity Questions and Results

Social Validity Questions	Average Rating
1. To what extent do you feel that this intervention seemed effective in increasing your knowledge to address challenging behavior at home?	4.76
2. To what extent do you feel that this intervention seemed effective in supporting consistent implementation of strategies to decrease challenging behavior at home?	4.64
3. To what extent do you feel that this intervention seemed effective in answering questions and providing expertise in regard to challenging behavior at home?	5
4. To what extent do you feel that this intervention increased your confidence addressing challenging behavior at home?	4.76
5. To what extent do you feel that this intervention increased your social relationships and community of support with other parents and providers?	4.12

Note. The scale was 1 = ineffective to 5 = effective.

statistically significant differences in parents' survey ratings before and after intervention in three of the four subscales (systems advocacy, knowledge, and competence). Statistically significant differences were not demonstrated in the subscale of self-efficacy. As first glance, it may seem contradictory that significance was demonstrated in other subscale categories, especially subscale 3 (competence) but not subscale 4 (self-efficacy). Self-efficacy, as defined by Singh et al. (1995), refers to parents' perceptions of their ability to have an impact on and utilize the mental health system that would affect them or their child personally. Competence, as defined by Singh et al. (1995), refers to parents' perceptions of their ability and competence as parents. Self-efficacy is complex and includes the additional variable of mental health supports. This added variable may contribute to the lack of statistical significance demonstrated before and after in this intervention, as parents' readiness, or orientation to supports targeting mental health, may vary as parents navigate their family's journey of having a child with I/DD.

Findings from the FES are consistent with analysis of the two subscales of the PSOC before and after intervention. Furthermore, statistically significant differences were demonstrated in the skills/knowledge subscale but not in value/comfort subscale. Parents demonstrated gains in their skills and knowledge to address CB at home, similar to changes demonstrated in knowledge and competence subscales of the FES. The value/comfort subscale examined parents' satisfaction in the parenting role. Similar to the changes seen in the self-efficacy subscale of the FES, statistically significant differences before and after intervention were not demonstrated. The subscale of value/comfort explores parents' perceptions of their own ability and feelings around parenting, including feelings around their own mental health. This subscale is complex and similar to the FES, readiness, or orientation toward mental health supports, again varies for every parent and family.

The lack of statistically significant differences in the complex constructs of self-efficacy and values and comfort in the role of parenting may be due to a lack of effect, given a relatively nonintrusive intervention, or a measurement error due to the problems with assessment tools able to detect changes in complex constructs after a relatively short intervention (i.e., 16 hr). Another hypothesis, however, may be that families did gain more information and feel more confident about parenting their child with I/DD after participating in the Project ECHO PE. Part of what they may have learned, however, is the complexity of the changing behavior, accessing necessary services, and creating the community of support necessary to support their family. They may feel competent to take on those challenges but not necessarily confident as they navigate this new terrain. Knowing what to do when a behavior occurs is different than implementing the appropriate strategies and supports, as levels of parent and caregiver stress, anxiety, and emotional response often increase when high rates of CB occur (Estes et al., 2009; Lai et al., 2015; Postorino et al., 2017). It will be interesting to continue to use Project ECHO with families with children with I/DD to see whether these constructs are malleable and sustainable over time.

These findings are important to demonstrate that a group-based, online PE and support program can improve feelings of empowerment and competence in parents of children with I/DD. These data are even more impressive in context. We collected these data in the spring and summer of 2020, during closures brought about by the COVID-19 pandemic. Families who participated in this study were navigating disruptions in special education services for their children, uncertainty about the upcoming school year, and the stress and anxiety present for many during this unprecedented time. Parents credited a relatively low-cost intervention for making observable differences in their sense of empowerment and feelings of competences even during such a stressful time.

This positive evaluation of the Project ECHO program is supported by the collected social validity data in this study. Parents rated the program to be acceptable and effective. Specifically, on the social validity survey, parents rated all five questions above 4 on a 5-point scale, and all participants identified that the program was effective in answering their questions and increasing their overall expertise about behaviorally based interventions for CB. Parents echoed this sentiment with outstanding attendance at the 16-week PE program, with an average of 81% of the participants attending every session. These findings play a critical role in the effects of intervention as a whole, as consumers must find intervention worthwhile in order to continue participation.

This study is one of the first demonstrations of using the Project ECHO service delivery model with parents. As identified, there is robust evidence for the effectiveness of this model with several other populations and disciplines including physicians, addiction counselors, and public health professionals (e.g., Katzman et al., 2014; Mazurek et al., 2019; Wood et al., 2018). Such strong outcomes facilitate introduction of this model to the field of EI and ECSE. Such strong outcomes facilitate introduction of this model to the field of early intervention and early childhood special education. Furthermore, Project ECHO incorporates many of the components of interventions that are important to EI/ECSE providers, especially when working with families. It emphasizes community building, uses a case-based learning model, and recognizes the importance of active participation in learning. In the Project ECHO sessions, parents took turns presenting a case of CB that they were experiencing at home to the group. Other parents were able to ask questions and offer suggestions. In addition, the hub team—consisting of teachers, a parent advocate, and behavior analysts—also asked questions and offered suggestions. At the end of every session, the facilitator summarized suggestions, and the presenting parent was sent an organized list of suggestions within

a few days. This case-based learning is central to the Project ECHO model and facilitated high rates of engagement from the parents and the hub team. The facilitator of this PE series always had more than enough parents volunteering to share a "case"—a CB that they were addressing at home—and often had to cut the discussion short due to time constraints. It was interesting to observe, informally, that the quantity and quality of parent suggestions improved as parents spent more time as a member of the education and support group.

The study recruited parents to participate in this Project ECHO experience from all regions of the Pacific Northwest, including rural and urban areas. Parents represented 14 different zip codes across multiple counties of this region. The Project ECHO model created an opportunity to reach families in areas where multiple barriers impede access to intervention. Some of the participants were from rural communities with minimal resources and scarce access to professionals with specific expertise on I/DD and meaningful supports. Other parents commented that although they lived in urban or suburban communities, this was the first PE program they were able to attend because it was offered online. Other parents commented that they appreciated the opportunity for both parents in the household to attend sessions together. Therefore, in addition to being effective, the Project ECHO model addressed commonly identified challenges to in-person PE activities such as issues of transportation and childcare.

Limitations and implications for further research

Despite this study's promising results, additional research is needed to address study limitations and to extend its findings. First, this study included a 16-week series of sessions focused on strategies to address CB and teach appropriate, prosocial skills and behavior; future research should explore the dosage of this intervention to understand the

appropriate frequency of sessions necessary to produce meaningful results.

Second, this study demonstrated encouraging results for parents of children with I/DD across two meaningful measures related the CB but did not report direct data indicating frequency of engagement in CB. Additional data collection measures are needed to provide a more comprehensive analysis of the effects of this intervention on factors affecting quality of life for children and families with I/DD. This study was an initial investigation and did not include direct behavioral data demonstrating child engagement in CB. Because of the inherent complexities of household management and education during a global pandemic, the ability of parents to consistently capture significant quantities of behavioral data on their children was severely diminished. Future research should explore and identify more efficient methods for parents to quickly and easily identify instances of engagement in CB to further demonstrate the comprehensive effects of this intervention as a whole.

Finally, it is important to replicate this study with families and children who have historically been marginalized by systems of public education. Although families were recruited from across the Pacific Northwest, our network and our hub members were overwhelmingly White. In addition, due to limited funds, we were not able to offer hardware or software to families who may have needed them to participate and was not offered to families who could not participate in English. Expanding this program to more diverse populations should be a focus of future research.

CONCLUSION

Results from this study support previous research on implementation of the Project ECHO model to increase knowledge and feelings of self-efficacy, as well as build an effective community of practice. This application of the Project service delivery model is novel and demonstrated generalized effectiveness across a novel population and discipline. This model is cost-efficient and resistant to numerous identified barriers accessing in-person intervention services. Through this study, parents were provided with educational services during a time in which access to such services for children with disabilities was often nonexistent due to the COVID-19 pandemic. This type of intervention can be extremely useful for practitioners to increase services in rural areas and to other consumers who are better served at home. Implementation of the Project ECHO model provided parents located in geographically diverse places with the knowledge and support to promote meaningful changes in their child's behavior, exemplifying the goal of the Project ECHO model as a whole: moving knowledge, not people.

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Appendix. Session Handout Example

Reinforcing Positive Behaviors

In this parent education session, we learned about reinforcement. Reinforcement is a stimulus that is presented immediately following a behavior that increases future engagement in this behavior. In other words, by presenting a reinforcer immediately following a behavior, we are increasing your child doing this behavior more in the future.

Example: Your child often leaves their dinner plate on the dining room table. You have been working with your child to put his plate on the kitchen counter when she is done. When she does put her plate on the kitchen counter, you immediately provide your child with tons of social praise and 2 minutes on the IPAD.

Note: In this example, we are assuming that the IPAD is reinforcing for this child.

Key Take Aways
- Reinforcement has to be used **IMMEDIATELY** following the occurrence of the target behavior.
- Reinforcement has to be **CONTINGENT** upon the occurrence of the target behavior you want to increase.
- Reinforcement can be affected by **MOTIVATION**. Example- If a child is full, an edible reinforcer may not be as reinforcing.
- Always pair reinforcers with social praise. "Awesome job taking your plate to the kitchen table!"
- Two types of Reinforcement- both **INCREASE** behavior
  - **Positive: ADDING** something to increase target behavior(s)
  - **Negative: REMOVING** something to increase target behavior(s)
- If the behavior is **not increasing**, the reinforcer is **not a true reinforcer**.
- Remember, we can't choose what is reinforcing- sometimes it may be treats or something that we may think is odd. That is okay, we can work on changing it by pairing it with other reinforcers. Start with what you know is reinforcing to your child and that is changing frequency behavior.