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Rationale and Considerations for the Internet-Based Delivery of Parent-Child Interaction Therapy

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Abstract

Given the enormous individual, familial, and societal costs associated with early disruptive behavior disorders, transformative efforts are needed to develop innovative options for overcoming traditional barriers to effective care and for broadening the availability of supported interventions. This paper presents the rationale and key considerations for a promising innovation in the treatment of early-onset disruptive behavior disorders—that is, the development of an Internet-based format for the delivery of Parent-Child Interaction Therapy (PCIT) directly to

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families in their own homes. Specifically, we consider traditional barriers to effective care, and discuss how technological innovations can overcome problems of treatment availability, accessibility, and acceptability. We then detail our current Internet-delivered PCIT treatment program (I-PCIT), which is currently being evaluated across multiple randomized clinical trials relative to waitlist comparison, and to traditional in-office PCIT. Embedded video clips of children treated with I-PCIT are used to illustrate novel aspects of the treatment.

Keywords

PCIT; Internet-based treatment; disruptive behavior disorders; family

In recent years, rapidly developing computer technology, broadening Internet availability, and increasingly sophisticated capacities for live home-based broadcasting with affordable webcams have transformed how we work, learn, and communicate. In 2009, approximately three-fourths of U.S. citizens had regular Internet access, and roughly 70% had household Internet access (United States Census Bureau, 2011). These numbers are particularly striking when one considers that in 2003 only half of U.S. households had Internet access, and only 19% of households had Internet access in 1997. With the increasing ubiquity of Internet access, technological innovations are already beginning to transform health care delivery (Field & Grigsby, 2002). For mental health care, delivery methods drawing on technological innovations may overcome geographical barriers to expert services, may expand the ecological validity of care by treating patients in their natural settings, and may reduce issues of stigma over attending a mental health facility.

This paper presents the rationale and key considerations for a promising innovation in the evidence-based treatment of early-onset disruptive behavior disorders—that is, the development of an Internet-based format for the delivery of Parent-Child Interaction Therapy (PCIT; Eyberg & Funderburk, 2011; McNeil & Hembree-Kigin, 2010) directly to families in their own homes. We begin with a brief overview of the individual, family, and societal burdens of early disruptive behavior disorders, as well as a summary of the evidence supporting the efficacy of PCIT to treat these problems. We next consider traditional barriers to effective care and discuss how technological innovations can overcome problems of treatment availability, accessibility, and acceptability. We then detail our current Internet-delivered PCIT treatment program (I-PCIT), which we are currently evaluating across multiple randomized clinical trials relative to waitlist comparison, and to traditional in-office PCIT. We have included several embedded video clips of families treated with I-PCIT to illustrate novel aspects of treatment delivery.

Early Conduct Problem Behaviors: A Serious Public Health Concern

Disruptive behavior problems—characterized by problems of conduct and oppositionality—constitute one of the more prevalent classes of youth mental disorders (Bird et al., 2006; Canino et al., 2004; Costello et al., 2003; Egger & Angold, 2006; Nock et al., 2006, 2007; Shaffer et al., 1996). These problems, which begin in early childhood (Costello et al.; Egger & Angold; Keenan et al., 2007), show considerable stability (Costello et al.; Briggs-Gowan et al., 2006; Keenan et al., 1998; Lavigne et al., 1998, 2001; Shaw, Gilliom, Ingoldsby, &

Nagin, 2003; Tremblay et al., 2004; Ezpeleta et al., 2001), are linked with profound disability, and confer sizable risk for later life psychopathology, family dysfunction, and criminality (Copeland et al., 2007; Gau et al., 2007; Kim-Cohen et al., 2003; Lahey, Loeber, Burke, & Applegate, 2005). In the United States, up to 10% of individuals meet lifetime criteria for oppositional defiant disorder (ODD) (Kessler et al., 2005; Nock et al., 2007), characterized by a recurrent pattern of disobedient and hostile behavior toward authority; as many as 9% meet lifetime criteria for conduct disorder (CD) (Canino et al.; Kessler et al.; Nock et al., 2006), characterized by a persistent pattern of behavior in which the rights of others or age-appropriate norms are violated. One in 11 preschoolers meets criteria for a disruptive behavior disorder (DBD)—one in 14 meets for ODD and 1 in 30 meets for CD (Egger & Angold; Egger et al., 2006). Early onset is associated with a more intractable course, comorbid pathology, subsequent substance abuse, and life dysfunction (Broidy et al., 2003; Copeland et al.; Gau et al.; Kim-Cohen et al.; Lahey et al.; Nock et al., 2006; Nock et al., 2007).

Effective early intervention is critical. Despite increased pharmacology for preschool DBDs (Cooper et al., 2004; Olfson, Crystal, Cecilia, & Gerhard, 2010; Patel et al., 2005; Zito et al., 2007), there is at present limited evidence supporting the safety and efficacy of most psychotropic medications in preschoolers (Gleason et al., 2007). In contrast, there is strong support for psychotherapeutic interventions (Comer et al., 2013; Eyberg, Nelson, & Boggs, 2008), and consensus guidelines recommend that psychological interventions constitute first-line treatment for preschool DBDs (Gleason et al.). For young children with behavior problems, both the American Academy of Child and Adolescent Psychiatry (Gleason et al.) and the American Academy of Pediatrics (2011) recommend parent-based behavior therapy as the standard of care, and only recommend psychotropic medication intervention if an adequate trial of behavior therapy does not yield sufficient gains, or if the child dwells in an area with insufficient access to evidence-based behavioral therapy (American Academy of Pediatrics). Most supported behavioral treatments target child problems indirectly by reshaping parent practices (e.g., Forgatch & Patterson, 2010; McMahon & Forehand, 2003; Webster-Stratton & Reid, 2010; Zisser & Eyberg, 2010), with the goals to increase in-home predictability, consistency, and follow-through, and to promote effective discipline. These treatments help families disrupt negative coercive cycles by training parents to increase positive feedback for appropriate behaviors, to ignore negative attention-seeking behaviors, and to provide consistent time-outs for noncompliance.

In a recent meta-analysis pooling outcomes across studies targeting early child disruptive behavior, Comer and colleagues (2013) found a large and sustained effect for such behavioral interventions (Hedges's $g = 0.88$), with the strongest outcomes associated with problems of oppositionality and conduct (Hedges's $g = 0.76$) and general externalizing problems (Hedges's $g = 0.90$), compared to problems of inattention (Hedges' $g = 0.61$). Efficacious parent training programs generally cover similar content, but differ in how parent skills are taught and how individualized feedback is provided to parents. Meta-analytic work also finds that among parent training programs, the largest effects are associated with programs that increase parent-child interactions, that teach parents to use

time-out and parenting consistency, and that require parents to practice new skills with their children during parent training sessions (Kaminski, Valle, Filene, & Boyle, 2008).

Barriers to Care: Limitations in the Availability, Accessibility, and Acceptability of Evidence-Based Treatments

Despite advances in the development of supported treatments, a sizable gap persists between services in experimental settings and those available in community practice settings (Sandler et al., 2005; Silverman, Kurtines, & Hoagwood, 2004; Southam-Gerow, Ringeisen, & Sherrill, 2006; Weisz, Sandler, Durlak, & Anton, 2005, 2006). First, barriers interfere with the timely provision of needed care. After ODD onset, the median delay in treatment initiation is 4 years among individuals receiving care (Wang et al., 2005), and only 6% of affected individuals make initial treatment contact in the first 5 years. Only one-third of individuals with ODD will *ever* receive mental health care (Wang et al.), and among preschoolers with any DBD, only 20% *ever* actually receive treatment (Pavuluri, Luk, & McGee, 1996). Those who do receive care do not necessarily receive evidence-based treatment. For example, despite limited support for the safety and efficacy of most psychotropic medications for preschool psychopathology, preschool psychopharmacology has grown significantly in recent years, including increased use of antipsychotic medications that are associated with unfavorable side effects (Cooper et al., 2004; Olfson et al., 2010; Patel et al., 2005; Zito et al., 2007). Off-label and untested psychotropic polypharmacy involving the co-prescription of two or more psychotropic medications from across drug classes is also on the rise in youth populations (Comer, Olfson, & Mojtabai, 2010), while psychotherapy has progressively assumed a less prominent role in mental health care (Olfson & Marcus, 2010).

In the community, there are systematic limitations in the broad *availability*, *accessibility*, and *acceptability* of supported treatments. The *availability* of care is hindered by inadequate numbers of professionals trained in evidence-based treatments. Reportedly, roughly half of U.S. counties have no psychologist, psychiatrist, or social worker who can work with children (National Organization of State Offices of Rural Health, 2011). When trained providers are available, long waiting lists at poorly funded clinics slow the speed of service delivery. Although primary care physicians (PCPs) often fill this gap, they commonly lack the time and training necessary to adequately address emotional and behavioral health needs. In community practice, the most widely used approaches rarely show empirical support, while supported treatments are not widely disseminated (Sandler et al., 2005). When effective programs are broadly disseminated, they are rarely delivered with fidelity (Sandler et al.; Weisz et al., 2005), particularly when implemented by professionals with limited training working in overburdened facilities with high turnover (see Glisson et al., 2008). Large-scale dissemination and implementation programs are enormously costly, and although there have been considerable conceptual advances in the study of dissemination and implementation, even the most prominent dissemination and implementation programs have yet to achieve the gains targeted at program outset (Comer & Barlow, 2014). Sustainability poses a serious threat to implementation (see Stirman et al., 2012), and although dissemination models highlight the need for dissemination, in practice

sustainability is rarely pursued actively (Lyon et al., 2011), particularly at the organizational level (see Beidas & Kendall, 2010). Common factors that interfere with organizational sustainability include low levels of agency support, the absence of internal program champions, and fluctuating and insufficient agency resources (Atkins, Graczyk, Frazier, & Abduil-Adil, 2003; Glisson et al., 2008). Treatment complexity also influences the ongoing uptake of evidence-based practice in community mental health settings. Rogers (2003) notes how innovations across all fields that are too complex do not get routinely incorporated with fidelity into general practice (Rogers). Regrettably, busy practitioners may not have adequate time to truly master all of the nuances of a highly complex treatment protocol like PCIT. Rogers notes that practitioners across disciplines show preference for “plug-and-play,” and “user-friendly” procedures (Rogers). Indeed, programs like PCIT, with its use of a one-way mirror, a highly structured coding system, and strong emphasis on live coaching, may be too complex for broad dissemination (Comer & Barlow, 2014), seriously limiting its broad availability to families in need.

Cost and transportation issues constrain *accessibility*. Considerable numbers of families have no way to get to a clinic and many families report that children’s mental health care is too expensive or too far away (Owens et al., 2002). Children living in low-income or remote communities are particularly unlikely to receive treatments. Problems of perceived treatment *acceptability* are displayed through high rates of stigma-related beliefs; approximately 25% of families report negative attitudes regarding visiting a mental health facility (Owens et al.).

Technological Innovations Overcome Many Traditional Barriers to Effective Care

As previously noted, advances in computer technology in recent years have rapidly transformed how we work and communicate. The American Recovery and Reinvestment Act of 2009 committed several billions of dollars to expand broadband Internet access in underserved areas (111th United States Congress, 2009). Household Internet access is sharply rising, and it is conceivable that in the coming years Internet access will show similar household ubiquity to that currently seen for telephones.

These innovations are already impacting and transforming health care delivery (Field & Grigsby, 2002). *Telemedicine* refers to the use of electronic media to facilitate real-time interactions for the provision of health care traditionally delivered in person (AACAP Work Group on Quality Issues). Remote health monitoring has become increasingly common in health care (e.g., remote active heart rate monitoring, remote blood pressure recordings, remote diabetes monitoring, remote monitoring of sleep apnea), and specialty care, such as radiology consultations, are increasingly occurring remotely through the use of electronic media. The use of live videoconferencing to facilitate remote “face-to-face” medical interactions has become increasingly common, particularly in health care disciplines such as mental health care, which relies primarily on observation and verbal communication. Telemedicine methods may overcome geographical barriers to mental health care by extending the availability of expert services and overcoming regional professional shortages in care. Families living in rural or other underserved regions can participate in real-time treatment conducted by experts, regardless of their geographic proximity to a clinic.

Telemethods, relative to traditional in-office care, offer more resource-efficient care. Costs may be reduced as much as one-third in comparison to face-to-face treatments (Khanna, Aschenbrand, & Kendall, 2007; McCrone et al., 2004; Newman, 2000). Treating families in natural settings, such as homes or schools, can mitigate issues of transportation, space, and convenience that traditionally impede treatment accessibility. Receiving treatment in the home through telemethods may also increase treatment acceptability by overcoming matters of stigma and negative attitudes about attending a mental health clinic. Methods drawing on technological innovations for delivering expert mental health treatment are already being incorporated into routine care in large nonmetropolitan regions and show high parent satisfaction and preliminary evidence of efficacy, tolerability, and sustainability (Myers, Valentine, & Melzer, 2007, 2008; Nelson, Barnard, & Cain, 2003; Savin, Garry, Zuccaro, & Novins, 2006). For example, a centralized group of expert child psychiatrists and psychologists at Seattle Children's Hospital (SCH) provide a high volume of children's telepsychiatry services to seven partner sites across diverse and remote regions in the Pacific Northwest. Primary care physicians in remote regions in the states of Washington, Alaska, Montana, and Idaho refer patients for expert telepsychiatry services and the SCH telepsychiatry service provides both direct services to the referred patients, school consultations, and consultative support to the referring physicians through the use of videoteleconferencing (Myers et al., 2010). Although most published work to date has relied on descriptive methods, emerging research investigations evaluating telemethods for the delivery of behavior therapy are using increasingly rigorous designs and finding positive outcomes. In one of the more prominent and rigorous research efforts underway, the Children's Attention-Deficit Hyperactivity Disorder Telemental Health Treatment Study (CATTS) is using RCT methodology to examine a telemedicine model for delivering pharmacologic interventions with behavioral training for children with ADHD from multiple dispersed and underserved regions (Stoep & Myers, in press).

Using the Internet to Deliver PCIT to Home Settings

Live, Internet-based videoconferencing may be a particularly promising method for the delivery of supported parent training. PCIT is one such parent training program that has received considerable support (Eyberg et al., 2001; Hood & Eyberg, 2003; Nixon et al., 2003; Nixon et al., 2004; Schuhmann et al., 1998; Thomas & Zimmer-Gembeck, 2007; see Zisser & Eyberg, 2010, for a summary). PCIT is a short-term intervention drawing on attachment and social learning theories to emphasize positive attention, consistency, problem solving, and communication. A key distinguishing feature of PCIT, relative to neighboring protocols, is the systematic use of real-time, in-session parent coaching. The therapist monitors the family from an observation room and provides live, individualized, and unobtrusive coaching through a parent-worn bug-in-the-ear device. A second key distinguishing feature is that progress through the protocol is performance-based, such that treatment is not time-limited but continues until success criteria have been achieved.

Given the treatment protocol and empirical support for PCIT, an Internet-based PCIT format has the potential to deliver evidence-based care directly to families' homes in underserved communities. PCIT may be particularly amenable to a web format given that by design the therapist conducts live observation and feedback from another room via a parent-worn bug-

in-the-ear device. Using videoconferencing, webcams, and wireless Bluetooth earpieces, I-PCIT therapists can provide in-the-moment feedback to parents during parent-child interactions, regardless of a family's proximity to an expert clinic. I-PCIT can offer a comparable quantity of therapist contact to that in standard PCIT. Moreover, treating families in natural settings may even enhance the ecological validity of treatment by affording live observation and feedback in the very settings in which child behaviors are problematic. We now turn to a more detailed presentation of traditional, in-clinic PCIT, followed by a description of our Internet-delivered work.

Traditional, In-Clinic PCIT

Traditional PCIT is a short-term, empirically supported intervention for the treatment of child behavior problems in youth between the ages of 2 and 7. PCIT targets children's problematic behavior by modifying parents' behavior, drawing from both social learning theory and attachment theory, and thus incorporating components of play therapy into behavioral parent training. PCIT focuses on reshaping the primary context of child development—i.e., parent-child interactions—rather than providing individual psychotherapy to young children who have yet to develop the cognitive developmental prerequisites for individual child treatment. Parent training emphasizes effective positive attention, communication, problem solving, and consistency in parent-child interactions, relying on structured observational coding and formal mastery criteria to evaluate treatment progress.

Early sessions in PCIT focus on building or strengthening a positive and rewarding parent-child relationship (Child-Directed Interaction, or CDI). Parents learn to use differential reinforcement (e.g., ignoring problematic behavior, praising appropriate behavior) as well as incidental teaching (i.e., reinforcing children's spontaneous positive behavior to increase its frequency) to shape the child's behavior. These skills are summarized in the PRIDE acronym (see Eyberg & Funderburk, 2011): Praise (frequently praise desired child behavior; specifically state the behavior being praised); Reflect (repeat appropriate child statements); Imitate (copy appropriate child behavior); Describe (narrate aloud the child's current and ongoing behaviors); and Enjoyment (express interest in the child's behavior both verbally and nonverbally). These skills are first taught through explanation, modeling, and role-playing in a parent-only CDI Teach Session. In subsequent sessions each parent practices applying the skills during dyadic interactions with their child in the treatment/play room while the therapist monitors the interactions, tracks parents' competency using the skills, and coaches parents from an observation room in the use of these skills through a discreet bug-in-the-ear receiver (i.e., CDI Coach Sessions).

After parents demonstrate sufficient competence in CDI skills in accordance with standardized mastery criteria (see Eyberg & Funderburk, 2011), treatment teaches parents to add effective limit-setting to the interaction when needed (Parent-Directed Interaction, or PDI). As in the CDI Teach Session, the PDI skills are first taught to the parents alone during a PDI Teach Session. In PDI parents are taught how to use effective commands, and are taught well-supported time-out procedures for use when a child does not comply with commands, with an emphasis on consistency and follow-through, and positive reinforcement

for compliance. Parents practice these skills during live interactions with their child in the treatment/play room while the therapist monitors family interactions from an adjacent observation room, tracks parents' competence in the use of direct commands and appropriate follow-through procedures (labeled praise for compliance; time-out for noncompliance), and coaches parents in these skills through the bug-in-the-ear receiver (i.e., PDI Coach Sessions). When parents demonstrate mastery of both the CDI and PDI skills, rate child behavior within the normative range, and report confidence in their ability to manage their child's behavior at home and in the community, graduation planning begins.

Internet-Delivered Considerations

Below we address key considerations for I-PCIT related to hardware and equipment, videoconferencing software, privacy and liability matters, room set-up and lighting, and therapeutic process and rapport based on our extensive benchtesting and initial stages of controlled evaluations of I-PCIT.

Hardware and Equipment Considerations—The minimum technological requirements for conducting I-PCIT are presented in Table 1. Many families in need of treatment may not own a personal computer, webcam, Bluetooth earpiece, and/or broadband connectivity. As such, current disparities in Internet access and technological literacy may interfere with I-PCIT accessibility for some. However, encouraging national trends find that the demographic groups with the poorest access to and ease with personal computers and the Internet—e.g., rural-dwelling and low-income dwelling families—are currently showing the most rapid growth in adoption of household Internet (Horrihan, 2009). Large federal investments and recent trends in the expansion of broadband Internet to underserved areas suggest it is possible that broadband Internet access may come to show household ubiquity regardless of geography or income relatively soon. As we approach broadband Internet access for all U.S. homes, proof-of-concept efforts are essential to evaluate the merits of Internet-delivered PCIT. Moreover, given the cost savings inherent in Internet-delivered mental health care (Khanna et al., 2007; McCrone et al., 2004; Newman, 2000), some practitioners routinely providing treatment via telemethods, and some third-party payers, may find it feasible to purchase temporary equipment for treated families, which they can rotate to new families in need when a family completes treatment.

To standardize treatment, in our grant-funded work (which requires families to already own a personal computer for study eligibility) we provide families with a temporary equipment kit for the duration of their treatment, which costs roughly \$300. Details of the equipment provided in this kit are also presented in Table 1. The specific products presented in Table 1 that we routinely use are not essential, and providers and families can reduce equipment costs in a number of ways. We use webcams that capture video with full HD 1080p, although there are far less expensive webcams that still afford lifelike detail and motion. In addition, personal computers and laptops increasingly include built-in webcams, eliminating the need for an external webcam for many families. A considerable proportion of families also already have wireless Bluetooth earpieces that pair with computers, rendering this purchase unnecessary as well.

The optimal audio recording of the family merits comment. In our work, we have found that placement of a relatively discreet omnidirectional room microphone in the center of the family’s treatment/play space is helpful to capture the family’s sound from any direction, regardless of which direction in the room they are facing. In our original efforts we tried using the microphone on the webcam or the microphone that was built into the computer but found it difficult for the therapist to hear and understand family members unless they were sitting at the computer facing the screen. Although this can be acceptable for the delivery of more traditional face-to-face treatments through videoconferencing, the naturalistic PCIT format requires parents to follow their child’s lead, which can have them sitting on the floor with their child facing away from the therapist and moving throughout the entire room in play. In addition, we do not recommend that families use the microphone on their wireless Bluetooth earpiece to transmit audio to the therapist. The microphones on such earpieces are typically designed with noise and wind cancellation/suppression technology. As such, while they may capture the parent’s voice with exceptional clarity, it becomes almost impossible to hear the child.

For these reasons, although providers may be able to cut some equipment corners to lower costs, we find that an external omnidirectional room microphone, which families rarely own already, is an indispensable purchase for the conduct of quality I-PCIT. When all of the equipment is connected on the family’s computer, multiple microphone options exist to transmit audio to the therapist (i.e., the microphone in the wireless Bluetooth earpiece, the microphone on the webcam, the microphone built into the computer, and the omnidirectional room microphone). Details are provided in Elkins and Comer (in press) regarding the need to toggle between the various microphone and speaker options during session. Another very important consideration is that only Wi-Fi or broadband Internet connections afford the quality of real-time, fluid, and discernable communication required for I-PCIT. As such, in our work, when families present for treatment and have a home computer but do not have household broadband connectivity, we loan them a temporary mobile Wi-Fi hotspot (~\$40/month), which is then transferred forward to another participating family at the conclusion of their treatment.

Videoconferencing Considerations—Videoconferencing refers to the use of telecommunication technology that allows multiple parties to communicate in real time via the simultaneous two-way transmission of audio and video signals. Most modern videoconferencing formats will afford real-time and lifelike detail and motion sufficiently sophisticated to enable quality I-PCIT, although they differ from one another in important ways, ranging from cost and quality to encryption and privacy. In general, a good rule of thumb is that the lower the cost of the videoconferencing, the lower the quality and the weaker the encryption and privacy. At one end there is Skype, which is a free service, but offers poorer audio and video quality relative to other options, is associated with frequently disrupted or dropped connections, and raises concerns about privacy and security, which is not acceptable for I-PCIT or delivery of any other psychological treatment. Services that cost money typically come with improved quality and stronger encryption. Nothing offers higher quality and security than T1 and T3 line connections, which refer to multiplexed systems that provide point-to-point transmission rather than transmitting data from the

Internet Protocol (IP) addresses of two computers over a public network. However, such connections are quite expensive and as such are not feasible for connecting a therapist to individual families in their respective homes.

In the middle are easy-to-use web conferencing appliances designed for large and small organizations to enable “virtual” meetings (e.g., Webex, GoToMeeting). These appliances also afford desktop sharing, which can be very useful for sharing PCIT handouts or graphs depicting weekly symptom response (e.g., Eyberg Child Behavior Inventory scores, changes in parent skills assessed via weekly Dyadic Parent-Child Interaction Coding System observations) with treated families. In our work, these graphs and handouts are brought up on the therapist’s screen during appropriate points in treatment, and then the desktop sharing tool is applied to enable the family to see the therapist’s screen as he or she explains what they are looking at. Users can log on anytime, from anywhere. Pricing for such programs typically range from \$19–\$49 per month, and only the “host” (i.e., the therapist) needs an account.

Important matters of security and encryption when selecting a videoconferencing platform for I-PCIT are discussed in detail elsewhere (see Elkins & Comer, in press). Providers must be assured that they are complying with HIPAA regulatory guidelines relating to use, disclosure, and storage of confidential information. For further peace of mind, we ask all families to avoid using last names during session, and to generate access IDs that do not include their names in them. Finally, prior to obtaining informed consent for I-PCIT treatment, we make sure that all families understand that, as with all Internet-based communications, there is the potential for breach of confidentiality, either from interception of confidential information or from accessing the Internet over a public network.

As Van Allen and Roberts (2011) considered in depth elsewhere, technological innovations and opportunities for conducting psychological treatments over the Internet are advancing at a more rapid pace than the development of relevant regulatory, ethical, and legal standards. As such, we must be cautious against conducting technology-assisted treatment in the absence of guidance from the broader professional community, particularly given the unique security, privacy, and liability concerns associated with such care. Fortunately, a guiding dialogue has begun to unfold regarding the management of threats to confidentiality (Schwartz & Lonborg, 2011; Yuen et al., 2012)—addressing key issues such as privacy protection and encryption. However, we still have a long way to go. In the interim, it is essential that prior to families consenting to treatment, they must be clearly informed that currently there is no consensus on the role of technology in psychological treatment.

Safety and liability matters also need to be considered. In I-PCIT, where the provider has less control over the family’s treatment environment, it may be more difficult to ensure safety. Certain high-risk families may consequently be inappropriate for I-PCIT. In our own work, we do not offer I-PCIT to families with histories of abuse or to children engaging in self-harm behaviors. On the other hand, PCIT has indeed shown great utility in addressing the problems of families with histories of abuse (e.g., Herschell & McNeil, 2005; Timmer et al., 2005) and it is quite possible that the opportunity to broadly extend PCIT with technology to such high-risk populations can meaningfully reduce rates of child

maltreatment in remote communities. It is also important to have alternative contact information to reach family members in the event of equipment failure and a dropped connection. As in all mental health care, prior to obtaining informed consent for I-PCIT, it should be made clear to families that if there is reasonable suspicion that the child or anybody else could be in serious danger, confidentiality may be broken.

Moreover, even among children and families that are not at high risk, child behavior and aggression can escalate during PCIT sessions to the point that special playtime must end, and in such circumstances the PCIT therapist will commonly come out from the observation room to support the parents. As it is not possible for the I-PCIT therapist to directly join the family in the same room, unique I-PCIT provisions are made to prepare for and address such potential situations. For example, during the CDI Teach session, situations in which CDI should be discontinued are addressed at length and the importance of parents remaining calm when ending CDI in such situations is discussed. During CDI coaching a great emphasis is placed on active ignoring of inappropriate child behaviors, especially physically rough behavior, through turning away from the child or moving to a new space in the room to play away from the child. The larger play area in a family's home can often make such physical relocation even easier than in standard clinic-based PCIT. When such situations occur in treatment, therapists coach parents to inform the child as to why CDI is ending early and instruct the parents to clean up toys so as to remove any objects from the playroom that the child could use in an aggressive manner or that could be reinforcing. If during such a situation contact is lost with the parent, then the therapist call the home to continue coaching via telephone.

In addition, during CDI differential attention is used as the primary response to children's excessive attention towards web conferencing equipment—just as differential attention is used in standard clinic-based PCIT as the primary response to children's excessive attention towards the one-way mirror. Parents are coached in active ignoring when children make faces into the webcam or pay excessive attention to the equipment, and such ignoring is also modeled by the I-PCIT therapist, who will turn away from the camera, or shut off their video feed, so as to not reinforce the child's behavior. Moreover, whereas traditional PCIT clinics are typically constructed such that opportunities for a child to break technological equipment are minimized (e.g., stationary cameras are mounted within protective bubbles), it is highly unlikely that families treated with I-PCIT will have mounted and protected webcams in their homes. To reduce opportunities for children treated with I-PCIT to touch equipment, parents are instructed to place the computer and webcam out of the child's reach (e.g., on a high countertop, on a high shelf), only leaving the Bluetooth earpiece within the child's reach (similar to the bug-in-the-ear being within reach in clinic-based I-PCIT). In cases when the child takes a microphone or Bluetooth, parents are instructed to tell the child that if they return the item, then they can keep playing. Only in cases in which the child is attempting to break the equipment is CDI ended immediately. Additionally, later in PDI, if children continue to touch the web conferencing equipment inappropriately, a house rule for touching tech equipment can be put into practice.

Room Setup and Lighting—When delivering remote PCIT via videoconferencing, one must consider room selection and the configuration of equipment in both the therapist's

office and the treated family's play room. We have observed that within the treated family's home, rooms with doors that can be closed are best suited for I-PCIT, to reduce the frequency of environmental distractions (e.g., siblings joining the session, someone in an adjacent room serving as a distraction) and enhance parent and child engagement in session. Additionally, the use of a room that can be closed off from the remainder of the home is necessary to enhance parents' ability to keep their child in the treatment/play room and in view of the therapist during CDI and PCI coaching. For some families for which a closed door at the entrance to a room is not an option, we have encouraged them to use gates when possible, or to move furniture, such as a couch, across large open entryways, in order to encourage children to remain in the room for the duration of session. Given the unique idiosyncrasies of each family's home, arranging for a self-contained and confined treatment space typically entails an individualized discussion and novel solution for each family, just as when planning home-based practice assignments with parents in traditional PCIT. Moreover, when preparing the treated family's treatment/play room, the therapist must remind parents to remove all non-PCIT friendly toys to reduce children's temptation to select these toys in lieu of the preselected PCIT-friendly toys. Breakable and/or potentially dangerous household items also need to be removed.

In addition to preparing the treatment space, prior to beginning PDI, therapists should work with families to set up both a time-out chair and a time-out room in their home. The time-out chair should be located within the family's designated treatment room to enable parents to easily transport the child to the chair when initiating a time-out sequence. Further, the chair should be placed within the view of the camera to allow the therapist to view the child while on the time-out chair to most effectively coach parents through a time-out sequence. The chair should be placed at least an arm's length from any other toys or objects in the room, to reduce the child's contact with reinforcing or dangerous objects while in time-out and enhance the parents' ability to actively ignore attention-seeking behaviors. We have found that placing the chair against the doorframe of an empty wall has worked well to reduce access to stimulating objects and stabilize the chair. In addition to preparing a time-out chair, therapists and parents should also select a time-out room in the family's home. The time-out room should be a room located close to the treatment room to enable parents to more easily transport their children to the timeout room from the time-out chair. Preferably, the time-out room is visible to the webcam, but this is not always feasible. Smaller rooms such as a bathroom or a well-lit walk-in closet have worked well as time-out rooms, as well as the child's bedroom. Before being used as a time-out room, all items that are potentially dangerous or could be reinforcing for the child while in time-out must be removed or disconnected (e.g., remove cleaning solutions, breakable, or sharp objects; turn off water to sinks in bathrooms). It is best that the time-out room be on the same floor as the treatment room in order to avoid having to carry children on stairs, which can functionally reinforce negative behavior. In addition, carrying children on stairs, especially when a child may be fighting against the parent doing so, can present a safety concern depending on the size and strength of the child.

In addition to the setup of the treatment and time-out rooms, room lighting must be adjusted for optimal performance. Within the family's treatment/play space and within the therapist office, a light source should preferably be positioned behind the webcam, in addition to

overhead lighting, to optimally illuminate the facial features of both the therapist and patient and reduce the appearance of shadows that can mask facial expressions. Poorly lit spaces result in lower resolution video quality, which can interfere with communication. Goose-neck lamps tilted toward the family, or in the face of the therapist, can create a nice “spotlight” or vanity-mirror effect and enhance the resolution of the streaming video quality.

Therapeutic Process and Rapport—Our pilot feasibility work suggests that I-PCIT has strong treatment credibility among treated families and results in high treatment satisfaction. Anecdotal observations suggest that engagement and treatment response is comparable to that seen in traditional, in-clinic PCIT, although parents in a brief I-PCIT open pilot series took somewhat longer than our traditional PCIT cases to meet PCIT mastery criteria. Several other process matters merit comment. First, I-PCIT presents greater obstacles to limiting distractions and interruptions in the treatment environment. Family members unexpectedly enter the treatment room, telephones ring, play activities can be more difficult to manage, and despite the best room setup efforts, children elope from the treatment room with fewer opportunities for the therapist to proactively or reactively intervene. As such, whereas the therapist prepares the treatment/play room in traditional PCIT, I-PCIT requires the therapist to train parents to set up the treatment/play room to reduce the likelihood of interruptions and ensure proper play activities during sessions (e.g., removing toys/objects that are not indicated for CDI “special time,” removing objects that present potential safety concerns when coaching parents to actively ignore problem behavior, coordinating family members and child care for siblings to reduce interruptions). For the duration of each session, we routinely ask parents to turn off cellular phones or to place them on vibrate mode, and to unplug landlines or direct them to go straight to voicemail. We have asked parents to place “do not disturb” signs on their front door prior to each session to indicate that they are unable to answer the door for the following hour. For parents with multiple young children, it is important to have a childcare plan for siblings during session—whether it is leaving siblings with a neighbor during session, or, in two-parent homes, rotating off the care of the untreated sibling for half of the session at a time while the other parent is being coached. While these obstacles can present additional challenges for the family and therapist, they also give families an opportunity to receive concrete feedback on ways in which their home spaces can be better tailored to CDI and PDI. While in traditional clinic-based PCIT, the therapist attempts to provide similar feedback with only parents’ verbal descriptions of the home space, I-PCIT allows for a more thorough survey of the home environment and increased opportunities for troubleshooting.

In addition, the quantity and quality of therapist-child interactions differ between I-PCIT and traditional clinic-based PCIT. While the frequency and quality of therapist-parent interactions is roughly consistent, I-PCIT presents fewer opportunities for the therapist to interact with the child. In clinic-based PCIT, planned and unplanned transitions allow the therapist to build rapport with the child as well as model skill use and effectiveness to parents. Reduced therapist-child interactions may influence therapeutic rapport as well as the number of treatment sessions required to reach mastery (i.e., fewer modeling opportunities for parents may lengthen the learning process). Thus, I-PCIT may benefit from scheduling short therapist-child interactions, such as “shared-desktop” activities,

opportunities for the child to wear the bug-in-ear, and time for the therapist to interact with the child and parents together as a group. On the other hand, therapist-child alliance may be less important in a treatment such as PCIT. Future empirical work is needed to evaluate the extent to which therapist-child alliance differs across in-clinic and Internet-based PCIT, and importantly, the extent to which any such differences are associated with differences in treatment response.

Alternatively, the fewer opportunities for therapist-child interactions and the less controlled treatment environment of I-PCIT may actually enhance the treatment's ecological validity, although empirical work on this front is of course needed. Fewer opportunities for the therapist to intervene during severe behavioral outbursts may place increased emphasis on therapist-parent coaching and parent-child learning experiences. Generalization practice in real-world settings begins in the actual first coach session and continues throughout the treatment course and in the actual contexts in which child behavior problems occur. Accordingly, in our controlled evaluations we are empirically pursuing the possibility that I-PCIT may require a greater number of CDI and PDI coach sessions before a family reaches mastery, but that treatment gains are more durable across long-term follow-up evaluations, relative to families who receive traditional in-clinic PCIT. We are also interested in pursuing whether I-PCIT affords opportunities for shorter coaching sessions at multiple times each week, rather than relying on 1-hour sessions once each week.

Video Illustrations of I-PCIT Sessions

Having provided a rationale for the potential role of I-PCIT for expanding the reach of PCIT for families in traditionally underserved regions, and outlining several key considerations for the conduct of I-PCIT, we now offer several video illustrations to bring I-PCIT to life.

Video 1 and Video 2 illustrate typical I-PCIT parent coaching sessions during the CDI phase of treatment, and depict the typical rate and timing of coaching during parent-child interactions. Video 3 illustrates an I-PCIT therapist coaching a mother through an active ignoring sequence in response to a child's disruptive play. Video 4 illustrates an I-PCIT therapist coaching a mother during a typical PDI Coach session. The therapist coaches the mother in strong CDI skills, and directs the mother to weave in some direct commands for her child to hand her various toys. When the child does not comply with one of her mother's commands, the I-PCIT therapist coaches the mother through an appropriate time-out chair sequence, including having the mother ignore the child's yelling and related attention-seeking behavior while she sits on the time-out chair.

In these videos you can see that the family in their home play space constitutes the bulk of the video image, and the remote therapist operating from the clinic can be seen in the lower right-hand corner of the screen. The mother in these videos is wearing a wireless Bluetooth earpiece receiver during the coaching so that she, but not her child, can hear the therapist's live feedback. The viewer may notice that for this particular family, due to the home's floor plan, it was not an option to close a door at the entrance to the room. For this particular child there were no concerns about the child leaving the room—however, if there were such

concerns we would have had the family move the couch across the large open entryway in order to help the child remain in the room for the duration of the session.

Video 5 illustrates an I-PCIT therapist reviewing a family's progress across treatment with a mother using a desktop sharing function. Whereas most of I-PCIT entails the use of both audio and video communication, using the desktop sharing function in videoconferencing software allows the parties to retain audio communication while temporarily suspending video communication so that both parties can jointly review a document that is open on one party's screen. In this clip, the I-PCIT therapist is reviewing and explaining graphs that are open on his screen, and which the treated mother is able to simultaneously review. These graphs depict the treated mother's increasing use across sessions of CDI "Do skills" (e.g., behavioral descriptions, labeled praises, reflections) and her decreasing use across sessions of CDI "Don't behaviors" (e.g., questions, commands, and criticisms).

Discussion and Future Directions

Considerable gaps persist between supported treatments in experimental settings and services available in the community. Given the enormous individual, family, and societal costs associated with early disruptive behavior disorders, transformative efforts are needed to overcome traditional barriers to care and broaden the availability of supported interventions. Across psychosocial treatments, behavioral parent training programs drawing on social learning theory have demonstrated the greatest support in treating early disruptive behavior problems (Comer et al., 2013). Among the supported treatments for early disruptive behavior problems, PCIT may be particularly amenable to a web format, given that by design the therapist conducts live observation and feedback from another room via a parent-worn bug-in-the-ear device. As such, live, Internet-based videoconferencing appears to be a particularly promising method for the delivery of PCIT to families underserved by evidence-based care.

Herein, we have outlined the rationale and key considerations for the conduct of I-PCIT based on our extensive experience benchtesting and piloting these methods. Using videoconferencing, webcams, and wireless Bluetooth earpieces, I-PCIT therapists can provide in-the-moment feedback to parents during parent-child interactions, regardless of a family's proximity to an expert clinic. Moreover, I-PCIT can offer a comparable quantity of therapist contact to that in standard PCIT. Importantly, although this early work is promising, evaluations in controlled trials are necessary before I-PCIT can be considered empirically supported. As such, whenever possible, traditional in-clinic PCIT should be considered the preferred treatment option, given its tremendous empirical support, although matters of geography and treatment access may introduce constraints for many families in need.

We are currently conducting two separate randomized controlled trials formally evaluating the potential of Internet-delivered PCIT relative to control conditions. The first trial is a federally funded proof-of-concept study comparing I-PCIT to traditional in-clinic PCIT among families seeking care within 30 miles of a major metropolitan region. For this study, all families need to be relatively local in the event that they are randomized to traditional in-

clinic PCIT. As such, this study will inform the relative efficacy and satisfaction associated with I-PCIT, relative to in-clinic PCIT, but will not speak to the merits of I-PCIT for families geographically underserved by expert mental health care. In a second, foundation-funded study, we are evaluating I-PCIT relative to a waitlist control condition across an entire statewide population of families seeking care. Collectively, these two controlled evaluations will provide critical information regarding the relative efficacy of I-PCIT and its merits in broadening the accessibility of PCIT to families in traditionally underserved regions, and will afford preliminary examination of treatment moderators and mediators that can inform *for whom* and through *which mechanisms* I-PCIT is most effective.

The field is still at a relatively nascent stage in the incorporation of new technologies in treatment delivery, and as such consensus guidelines and several professional considerations are still unfolding. For example, payer issues still need to be addressed (see Comer & Barlow, 2014). A few years ago, Current Procedural Terminology (CPT) code 98969 was introduced, characterizing online services provided by a nonphysician health-care provider. However, this code does not specify the conduct of psychotherapy, and as such many third-party payers will not reimburse for CPT code 98969 for the treatment of DBDs. Currently, many of the individual and family psychotherapy CPT codes refer to face-to-face visits in an office, outpatient facility, inpatient hospital, partial hospital, or residential care facility. Accordingly, within the current health-care procedural terminology, it is not clear how I-PCIT providers are to most appropriately characterize their work. In the coming years, it will be of critical importance to clarify this matter in order to ensure that I-PCIT services are available to the full spectrum families in need, not just self-pay families. Many federal and state programs, such as Medicaid, the Department of Defense, and the Department of Veterans Affairs, have been more progressive than private health insurance programs in providing reimbursement for mental and behavioral telehealth services. For example, Medicaid programs in 80% of U.S. states already reimburse for mental health services delivered via telemethods (Center for Telehealth and eHealth Law, 2011). Several of these state Medicaid programs provide for such services by reimbursing under traditional psychotherapy CPT codes (90804–90829), as well as a separate code for a “telehealth originating site facility fee” (Q3014).

There may be a role for I-PCIT in private practice (see Glueck, 2013), but I-PCIT may offer the most promise in stepped care models for early child problems. Elsewhere, Comer and Barlow (2014) have outlined the transformative potential of a specialty behavioral telehealth care workforce, one that would transact with the generalist practitioner workforce to collectively ensure the highest quality and timely delivery of needed treatments to affected individuals. In a specialty behavioral telehealth care model, high-quality specialty services would be offered in real time via videoconferencing and related technologies, directly to patients in private locations with Internet accessibility such as PCP offices or directly to patient homes. Generalist mental health counselors confronted with client presentations in which they have not completed adequate training could identify credentialed behavioral telehealth specialists online and make a referral, regardless of geographic availability to specialty care in their region. Broader availability of quality referral options for specialty services, such as PCIT, would presumably reduce the high volume of patients that burdens

many generalist practitioner practice settings and reduce waitlists. Specialty mental health “clinics” can be housed online, rather than bound by geography, and systematically deliver specialty care for conditions requiring complex treatment methods less easily disseminated to front-line generalist practitioners. Internet-based treatment delivery options could liberate specialty providers from only practicing in academic and/or metropolitan regions, as is currently the norm.

In conclusion, applying videoconferencing technology for the delivery of PCIT is showing great promise for improving access to PCIT, and nomothetic research investigations evaluating I-PCIT in controlled evaluations are currently underway. In recent years, the proportion of very young children prescribed psychotropic medications in outpatient care has been steadily increasing (Olfson, Blanco, Liu, Moreno, Laje, 2006; Olfson, Crystal, Huang, & Gerhard, 2010; Olfson, Marcus, Weissman, & Jensen, 2002). Recent trends, particularly in the off-label prescribing of medications for early disruptive behavior problems and aggression, may be due, in part, to the relative inaccessibility of supported psychosocial options for this clinical population. Although consensus guidelines recommend behavior therapy as a first-line intervention for early child behavior problems, such guidelines also acknowledge that pharmacologic interventions (although considerably less studied and supported for early child problems) may need to constitute first-line care for children dwelling in regions with insufficient access to evidence-based behavior therapy (e.g., American Academy of Pediatrics, 2011). Continued theoretical and empirical attention to new technologies and their transformative potential for making supported interventions available on a broad scale will be critical to ensure quality care for all families in need, regardless of traditional geographical obstacles.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Highlights

- Internet-based delivery of PCIT (I-PCIT) may offer a transformative medium for overcoming traditional barriers to care.
- I-PCIT therapists provide remote, real-time coaching to parents during home-based parent-child interactions.
- PCIT may be particularly amenable to a web format given that by design the PCIT therapist is situated in another room.
- I-PCIT can offer a comparable quantity of therapist contact to that in standard PCIT.
- There is currently a randomized clinical trial evaluating the merits of I-PCIT relative to standard PCIT.

Table 1**Minimum Technological Requirements for Conducting I-PCIT**

| Technological checklist | Details of sample equipment used in our program^{1, 2} |
|--|--|
| 1. A computing device in the therapist's office (e.g., desktop PC, laptop computer, or tablet) | <ul style="list-style-type: none"> • Lenovo Work Station |
| 2. A computing device in the treated family's home | <ul style="list-style-type: none"> • The family's own computing device (e.g., desktop PC, laptop computer, or tablet) |
| 3. High-speed Internet connectivity at both sites | <ul style="list-style-type: none"> • Therapist office: Wired Ethernet access provided by the University • Family's Internet access if they have highspeed Internet. If not, we provide family a temporary mobile Wi-Fi hotspot (~\$40/month) |
| 4. Webcam, discreet microphone to sit on floor in center of family's room, and speaker at both sites to capture and deliver audio and visual information | <ul style="list-style-type: none"> • Webcams: Logitech HD Pro Webcam C920 (\$99) • Omnidirectional room microphone to capture family's sound regardless of direction in the room they are facing (MXL AC404 USB Conference Microphone, \$80) • Speakers included in computing device, but family must toggle to wireless earpiece speakers for coaching sessions so that child does not hear therapist coaching |
| 5. A wireless earpiece (typically a Bluetooth device) for parents that pairs with the computer or tablet. | <ul style="list-style-type: none"> • Jabra Extreme Bluetooth Headset for PC (\$100) |
| 6. Webconferencing appliance allowing users to log on from anywhere, with adequate encryption and security standards | <ul style="list-style-type: none"> • Cisco WebEx (\$19–49/month) |

¹The specific products mentioned are for illustration purposes, and are not essential

²In our work, equipment kits are sent to families through standard mail, with all components already connected to a 6-port USB hub. All the family has to do when they receive the equipment kit is to then connect the USB hub into their computer, which involves inserting one cord into the computer's USB port. We provide families with a diagram of how to connect this cord, and a diagram of how all of the components connect into the 6-port USB hub, in the event that one of the components unintentionally becomes disconnected. Our staff schedules a ten-minute phone or videoconferencing session with each family when they receive this equipment kit to walk them through this set-up.