

# Computer Technology and Children's Mental Health

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## Abstract

Computer technology has sparked rapid change for children's mental health, altering how treatments can be delivered (e.g., stand-alone, computer-assisted). Research has found that computerized approaches produce comparable outcomes as treatments provided face-to-face. We define terms related to computer-assisted treatment and, with a focus on anxiety in youth, we consider the outcomes of computer-based and computer-assisted interventions (programs for youth, programs for training therapists, and programs for parents). We conclude with consideration of advances in technology and benefits for service providers, consumers, and researchers, and a discussion of key issues.

## INTRODUCTION

The rapid, if not dramatic, technological advances of the past decade will likely be matched, if not surpassed, in the decades ahead. Today's youth do not know a world without cell phones or without widespread Internet access, and many are already tapping today's initial technological advances as part of their pathways to mental health. "What is available currently?" What do the current options indicate to be the emerging programs of the next decade? Visionaries are not known for their cautious statements, and that applies to technology and children's mental health as well. That said, and although we hope to offer vision, our scientific approach betrays that a dash of caution is warranted with regard to "what works" within technology to improve children's mental health.

Disproportionate anxiety is highly prevalent in youth and causes substantial impairment in school, family relationships, and social functioning. Left untreated, anxiety is associated with future anxiety disorders, depression, and substance use problems. When anxiety in youth is treated effectively, there can be benefits in reducing subsequent sequelae (Benjamin, Harrison,

Settipani, Brodman, & Kendall, 2013). Evidence supports the efficacy and durability of cognitive behavioral therapy (CBT) for anxiety in youth (for review see Hollon & Beck, 2013; Kendall, 2012). One barrier to dissemination is the lack of a CBT-trained workforce. Computer-based (stand-alone) and computer-assisted (in combination with face-to-face therapy) programs facilitate the delivery of CBT, and play an important role in broadening the availability of empirically supported treatments in the community.

Computers have practical advantages (e.g., accessibility) and can also enhance therapist training. Treatment manuals are valuable for training, but providing manuals has not yet, by itself, resulted in improved quality practice. Computer-based training offers the potential to improve training by including standardized therapy materials (e.g., practice examples), and easily accessed video clips of sessions and illustrations of preferred and nonpreferred interventions.

## FOUNDATIONAL WORK

We are amidst a growing interest in, at the global level, the development of mental health practice supported by technology and electronic communication (Myers & Turvey, 2013). In 2010, 75% of US citizens lived in families with Internet access. As of 2011, 39 states have agreed to reimbursement for telemedicine within their Medicaid (Center for Telehealth and e-Health Law, 2011). There are a few terms that merit clarification before we begin. Several names have been used for different modalities of treatment involving technology, some used interchangeably. To provide clarification, we briefly define some common terms.

*Telehealth* and *e-health* are umbrella terms used to describe delivery of health-related services via any telecommunications and computer technology including phone, smartphone (e.g., alerts, monitoring tools), and Internet. *E-therapy*, *teletherapy*, *telemental health*, or *Internet-delivered therapy* typically refers to treatment being provided directly in real time by a mental health professional through an online platform such as Skype®, Webex®, GoToMeeting®, or other videoconferencing platforms. *Internet-based treatment*, or *computer-based treatment*, typically refers to stand-alone treatments that are distributed and completed online or on the computer via DVD or downloadable content. These are akin to self-help programs, where the patient interacts with (or reads from) the program with no support, or minimal support from a professional. There are also several *computer-assisted* or *Internet-assisted* treatments that are programs designed to buttress face-to-face treatment with computer-presented interactive content.

The UK National Institute for Health and Care Excellence (NICE) has deemed computerized cognitive behavioral therapy (CCBT) an acceptable

first-line treatment option for the management of depression in primary and secondary care and for the management of anxiety (panic disorder, with or without agoraphobia, and generalized anxiety disorder (GAD)) in adults in primary, secondary, and community care (NICE, 2011). Importantly, data are currently accumulating on the feasibility of computer-assisted approaches for these conditions with children and adolescents.

#### ILLUSTRATIVE ADVANCES: COMPUTERS AND CHILD ANXIETY

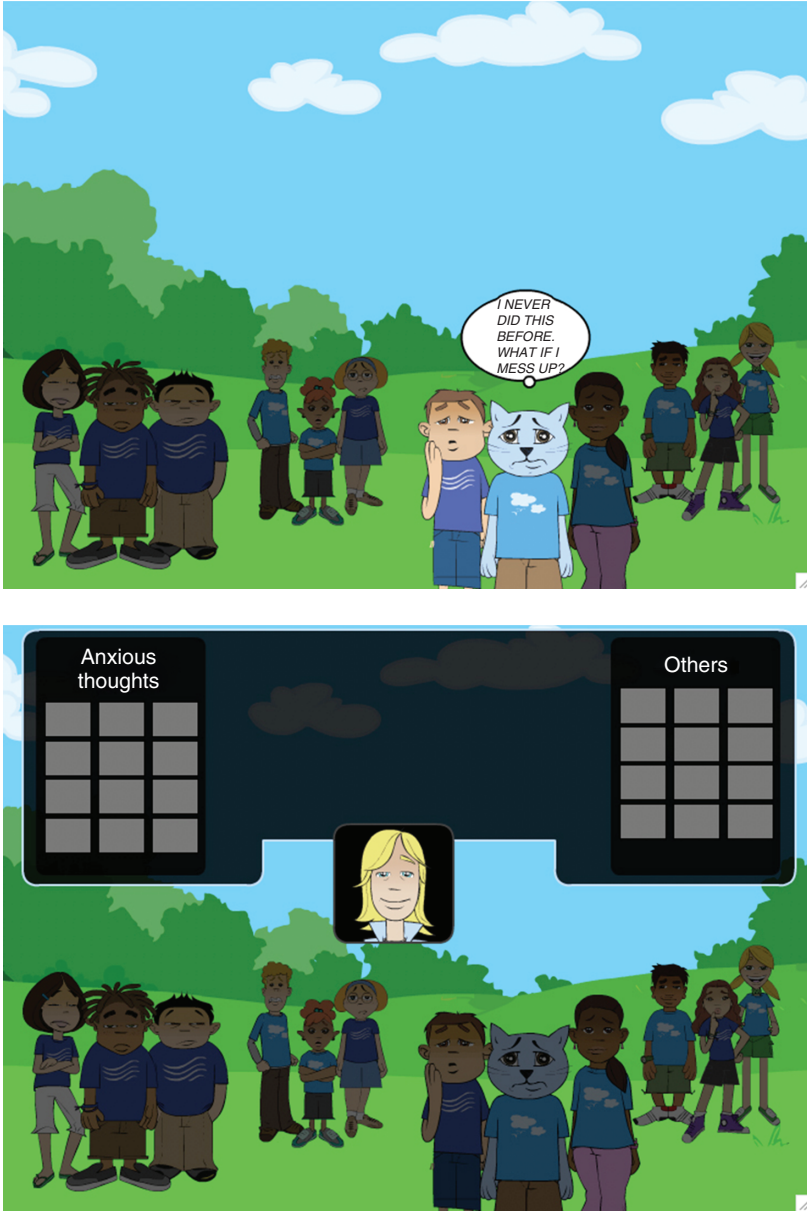
Evidence supports computer-based and computer-assisted interventions for adults—What has been done for children? Several efforts merit mention. Spence, Holmes, March, and Lipp (2006) delivered CBT partially via the Internet (a group format for 7- to 14-year-olds) and reported that the Internet-assisted program (8 of 16 sessions delivered via the Internet) resulted in significant reductions in anxiety symptoms. March, Spence and Donovan (2009) described *BRAVE*, an Internet-based treatment (minimal therapist contact via phone/email) for anxious youth. The *BRAVE-ONLINE* intervention (Spence *et al.*, 2011) resulted in improvements in anxiety symptoms for the 12- to 17-year-olds.

#### CAMP COPE-A-LOT

Camp Cope-A-Lot (CCAL; Kendall & Khanna, 2008a; see Figure 1. Sample Images), a computer-assisted intervention for anxious children aged 7 to 13, combines evidence-based CBT (Coping Cat program) with computer flash animation, audio, 2D animations, photographs, videos, schematics, a built-in reward system, self-check system, written text and a fun cartoon character, "Charlie," to guide the user through the program.

The user scrolls over each of the campers and then gets to read the thought in the thought bubbles. Some thoughts are likely to increase anxiety ("Anxious Thoughts" ... such as expecting bad things to happen), whereas other thoughts ("Others") are not. As the child reads and sorts the camper's various thoughts, the camper's face is used to identify the sorting.

CCAL is a "computer-assisted" treatment program—that is, it employs minimal, but necessary involvement of an adult "coach." Khanna and Kendall (2010) compared CCAL to CBT and to a computer-assisted education/support/attention condition (CESA). Findings indicated that, with regard to symptom reduction, children reached significantly greater treatment gains from CCAL and CBT than from CESA. Also, 75%, 88%, and 23% of principal diagnoses in CBT, CCAL, and CESA, respectively, were no longer principal at posttreatment, and gains were maintained at 3-month follow-up. In contrast to concerns voiced about computer-based interventions, the therapeutic relationship did not suffer: There were no



**Figure 1** *Camp Cope-a-Lot* sample interactivity: identifying anxious thoughts.

significant differences in the child–therapist alliance between the conditions with a face-to-face therapist and the computer-assisted program.

An effectiveness trial (Storch and colleagues) evaluating CCAL in community mental health centers (CMHCs) found that children who received CCAL as delivered by therapists with limited CBT experience showed significant reductions in anxiety severity and impairment (Crawford, Salloum,

Lewin, Andel, Murphy, & Storch, 2014). High levels of family satisfaction were also reported. CCAL was also found to significantly reduce symptoms of anxiety in youth with epilepsy and anxiety disorders (Blocher, Fujikawa, Sung, Jackson, & Jones, 2013). Preliminary studies suggest that youth with autism spectrum disorders (ASD) may find computerized treatments inherently appealing and engaging.

#### CBT4CBT: COMPUTER-BASED TRAINING IN COGNITIVE-BEHAVIORAL THERAPY FOR CHILD ANXIETY

Arguably, one of the most important components of the dissemination and implementation of empirically supported treatments to real-world settings is the training of the therapists. Computer-based therapist training programs may be ideal tools. Advantages include (i) self-paced learning, (ii) increased accessibility, (iii) cost-efficiency, (iv) standardization of training, and (v) consistency in quality. Internet and computer-based training programs can increase the accessibility of empirically supported procedures and can accelerate learning.

Studies evaluating computer-based training compare computer-based training to traditional class instruction, with tests of knowledge and ratings of student satisfaction as outcome measures. A meta-analysis (Kulik, 1994) reported a medium effect size favoring computer-based training to traditional instruction, with students learning more in less time with the computer-based approaches. Along with data on training effectiveness, there is a need for research examining the impact of computer-based training on the quality of therapy outcomes.

*CBT4CBT* (computer-based training in cognitive-behavioral therapy for anxious youth; Kendall & Khanna, 2008b) is a DVD program based on *CBT for anxious children* (Kendall & Hedtke, 2006). The *CBT4CBT* program provides step-by-step instructions to guide the therapist and allows the user to pause and reverse (self-paced learning), to print session materials, and to run portions of the program in session. The program adds audiovisual examples that aid in communicating the treatment strategies and includes built-in trainee competency checks. An initial evaluation of *CBT4CBT* compared the program to a manual and a wait list.

Knowledge significantly improved following training for both *CBT4CBT* and manual-based methods, with trainees in the *CBT4CBT* group scoring higher at posttraining than the manual group. Future research needs to assess the effect of the training program on therapist behavior (competence, treatment integrity) and child outcomes.

## CHILD ANXIETY TALES: COMPUTER-BASED PARENT-TRAINING FOR CHILD ANXIETY

Parents/guardians are often unsure of when it is time to help, or how best to help their children, and they often turn to self-help printed materials (bibliotherapy). However, many available resources lack empirical support. Computer-based programs offer an accessible, equally private and convenient, but engaging resource for parents who would like to help their child better manage anxiety. *Child Anxiety Tales* is a 10-module web-based program ([www.copingcatparents.com](http://www.copingcatparents.com)) to guide parents. Preliminary findings indicate that web-based parent training is acceptable and feasible, and that it has the potential to enhance child outcomes and improve family functioning (Khanna, Aschenbr, & Kendall, 2007).

## EXPANDING AREAS FOR APPLICATION

As evident in our overview of work done to date, technological innovations for children's mental health, using youth anxiety as the exemplar, have been developed and have been found to be useful. Although technology is being used in a variety of ways to improve access to quality mental health care for children and their families, few clinicians and patients know about these types of interventions (Carper, McHugh, & Barlow, 2013). Efforts to "spread the word" about existing programs are needed. We next consider some recent works, organized by type of intervention, that offer additional areas for application.

## ADJUNCTS TO TREATMENT AND MOBILE TECHNOLOGY

Smartphone applications (apps) are everywhere, and the encouragement to develop an app is reminiscent of the tip "plastics" in the film "*The Graduate*." Numerous phone apps that are available to the public are aimed at improving the assessment and treatment of mental health concerns. These apps function in a variety of ways, including symptom assessment, psychoeducation, resource location, and tracking of treatment progress. Used as an adjunct to mental health services, smartphone apps allow patients access to information regarding their care at any time of day, and allow service providers to monitor their patients' progress in real time without retrospective recall bias. For example, a depressed adult, when asked about a previous week, might reply "I did not do much." However, a daily record of activities recorded in real time would indicate that the patient had been active. The data from the app, not an argument with the service provider, would correct the inaccuracy of a depressive retrospective report.

Currently, with only a few apps available for children's mental health needs, the majority of mental health apps are for adults. Given that 78% of

American teenagers have a cell phone and half of those are smartphones, this generation may be particularly amenable to the use of apps for mental health care.

Apps have been developed for other uses. For example, given the importance of homework in CBT, apps aimed at increasing homework compliance may be particularly helpful to clinicians and youth clients. *Anxiety Coach* (Mayo Clinic, 2012) is an iPhone app designed to encourage clients to engage in exposure tasks, provide support to clients during exposure tasks, provide information about anxiety to clients, assess symptoms in real time, and provide easily accessible communication with therapists. These functions are ultimately aimed at improving outcomes through support outside of session.

One feature of these apps that is particularly helpful and may improve our understanding of the treatment of mental health issues among youth is a focus on real-time assessment of symptoms. Ecological momentary assessment (EMA) is a technique that is being increasingly used in research to collect real-time data in participants' natural environments, allowing for the assessment of changes over time and across situations (Shiffman, Stone, & Hufford, 2008). Indeed, EMA has been used successfully among depressed youth (e.g., Silk *et al.*, 2011) to assess daily fluctuations in symptoms. Use of EMA in clinical settings could allow clinicians to monitor between-session changes in symptoms, which could prompt discussion with clients during session about particular symptom triggers.

Smartphone apps represent an emerging technology for use in mental health services and, for example, a smartphone app is being developed for the *Coping Cat* program (Pramana, Parmanto, Kendall, & Silk, 2013). But service providers often do not have the programming expertise to develop apps specific to their needs, and hiring outside developers is often restricted by cost. In an attempt to bridge the gap between smartphone technology, research, and clinical care, a nonprofit organization, Open mHealth (<http://openmhealth.org>), was developed to build an open software architecture to increase the sharing of data, software applications, and study metadata (Estrin & Sim, 2010). Open mHealth is in its infancy, but current collaborations include the US Department of Veterans Affairs on the PTSDCoach app (discussed earlier).

#### STANDALONE TREATMENTS

Examples of standalone treatment programs have already been mentioned. Indeed, a recent meta-analysis of standalone treatments found that computer-based and computer-assisted approaches demonstrated outcomes comparable to face-to-face treatments (Andrews, Cuijpers, Craske, McEvoy, & Titov, 2010). The computer-assisted modality offers an accessible and

potentially cost-effective alternative to traditional face-to-face therapy that improves access to evidence-based care.

Computers allow for the development of skills in a highly standardized, predictable, and controlled manner, which may be particularly beneficial for youth with ASD, given the discomfort this population experiences with unpredictable environments. Youth with ASD often experience comorbid anxiety, which can be targeted with computer-assisted interventions. A recent review of technology for improving social communication among individuals with ASD concluded that computer technology is a promising strategy for delivering interventions to ASD individuals (Wainer & Ingersoll, 2011). This topic is a likely focus for increased research in the coming years.

#### TECHNOLOGY TO EMPOWER CONSUMERS

How much more effective might health care be with continuous, real-time data from users (i.e., patients)? Patients interacting with and contributing to real-time health data—their own, their child's, their parents'—so that assessments are real time, not retrospective, and continuous, not just at well-visits and/or physicals. *konciergeMD* ([www.konciergemd.com](http://www.konciergemd.com)) is such a portal. Patients track symptoms and treatment plans. With *konciergeMD*, the parent engages with the pediatrician before, during, and after the visit. As more patients engage with the platform, the sensitivity and specificity of the tracking tools increase—leading to even more accurate diagnoses, earlier interventions, and better health outcomes—across medical conditions, and across the lifespan, globally.

#### TECHNOLOGY FOR SERVICE PROVIDERS

There are numerous tools available to service providers for a variety of clinical tasks, including training and making referrals. The proliferation of these strategies is highlighted by best practice guidelines for telepsychiatry with children and adolescents (Myers *et al.*, 2008), and the current development of best practice guidelines for the remote delivery of mental health services by Association of State and Provincial Psychology Boards' Telepsychology Task Force (<http://tinyurl.com/d779z54>).

One strategy that has gained attention in the media is the use of webcams to deliver treatment. The advent of webcams has allowed service providers to reach clients without the barrier of distance. Treatment-seeking clients appear to prefer webcam-based interventions at a higher rate than alternative forms of technological interventions (Carper *et al.*, 2013). Studies have evaluated the efficacy of webcams for treating a wide range of problems. However, there have been few randomized controlled trials evaluating this



modality (Pesamaa, Ebeling, Kuusimaki, Winblad, Isohanni, & Moilanen, 2003; Richardson, Frueh, Grubaugh, Egede, & Elhai, 2009). A recent study of webcam-delivered CBT for early-onset OCD found improvements in OCD symptoms among all participants who received the intervention and high levels of client acceptability (Comer *et al.*, 2014). Among depressed children, Nelson, Barnard, and Cain (2003) found improvements in depressive symptoms among participants receiving face-to-face and webcam-based CBT. However, participants in the webcam condition demonstrated a faster rate of decline in self-reported depressive symptoms relative to the face-to-face condition.

Not unlike CBT4CBT, webcam technology has been used to train clinicians in face-to-face CBT. Rees and Gillam (2001) used webcams to train service providers in CBT and found increases in knowledge of CBT principles from pre- to post-training. The authors also found that the majority of participants were satisfied with the training and believed it gave them greater confidence in their ability to use CBT with their clients. These findings offer initial support for the use of webcams in training CBT therapists.

#### TECHNOLOGY FOR RESEARCHERS

Technological innovations for the management and storage of data internally and across sites and for the analysis of study data have been developed and are being used worldwide. For example, the Research Electronic Data Capture (REDCap) Consortium (<http://project-redcap.org>) is a secure web application to capture and store data for research studies. REDCap, in 2013, was being used for more than 66,000 studies by over 85,000 researchers at 622 institutions in 55 countries. The program is available to all consortium partners and is designed to allow users to build secure surveys and databases online to house study data.

Open-access statistical programs are proliferating, with researchers switching from expensive software to open-access alternatives such as R ([www.r-project.org](http://www.r-project.org)). The base R program functions through an object-oriented language and offers similar tools to many commercial statistical software programs. However, one advantage of R over commercial alternatives is that it allows for "add-on packages" to keep current with the statistical literature. Thus, analyses that typically would have required more expensive specialty programs or new versions of existing programs to conduct are now available for free. Although analyses using most of the add-on packages must be programmed using syntax, R does have several point-and-click graphical user interfaces (GUIs) such as R Commander ([www.rcommander.com](http://www.rcommander.com)) and RStudio ([www.rstudio.org](http://www.rstudio.org)) that allow users to use basic functions in R without learning R's programming language. Researchers have begun using

R because of its open source platform and increased statistical functionality, a trend that is likely to continue.

Another tool for researchers is being developed for dissemination and implementation science (DIS) as a database of free instruments to improve consistency in measurement across studies (Lewis, Krimer, Comtois, Landes, Lyon, & Borntrager, 2011). Such a database allows researchers to quickly see what instruments are available for measuring variables of interest. The DIS instrument database will rate each instrument on its degree of empirical validation, allowing researchers to quickly view psychometric data. Such a database, if extended to include outcome instruments for use in treatments for youth, could greatly decrease the time required by researchers when planning projects and could improve consistency in the reporting of outcomes from treatment trials.

#### KEY ISSUES FOR THE FUTURE

Technology is quickly changing the quality and methods for delivering children's mental health care. Smartphone apps, computer-assisted, and web-based interventions are being developed for a variety of disorders, a desirable trend that is likely to continue in future years. However, as technology takes on an increasing role, novel and unforeseen ethical issues are likely to arise. There are some guidelines available to individuals interested in incorporating technology into their practice, and guidelines have been developed for conducting research on Internet interventions. However, these are preliminary and likely to require frequent revision as technology advances. It is crucial that future work identify and address the ethical challenges that arise, revise guidelines accordingly, and quickly disseminate them to practitioners.

Electronic medical records (EMRs) should become the standard in the years to come, improving the quality and efficiency of large-scale epidemiological research and clinical care. For example, researchers could query EMRs from a variety of institutions and receive deidentified data that could provide information on prevalence and incidence rates of a variety of conditions. In addition, information could be integrated into one EMR from a variety of providers, affording patients more comprehensive and informed care. Of course, there may be security challenges, but these can be addressed.

The future of technology and children's mental health will likely see an increased number of professional organizations dedicated to this topic. Professional organizations allow service providers, researchers, and policy makers to share information with the goal of providing better care. For example,

there are currently several organizations dedicated to the intersection of technology and mental health such, as the International Society for Mental Health Online ([www.ismho.org](http://www.ismho.org)), the International Society for Research on Internet Interventions ([www.isrii.org](http://www.isrii.org)), and the Society for Computers in Psychology (<http://www.scip.com>).

The future of technology in children's mental health will have to address the ability of program developers and service providers to be able to adapt and branch programs according to client needs. One way of meeting this need is through technology interventions that include assessments capable of identifying areas of distress and adapting intervention content to the results. Adaptive computer-assisted interventions allow youth to access individualized mental health care.

## REFERENCES

- Andrews, G., Cuijpers, P., Craske, M. G., McEvoy, P., & Titov, N. (2010). Computer therapy for the anxiety and depressive disorders is effective, acceptable, and practical health care: A meta-analysis. *PLoS ONE*, *5*, e13196.
- Benjamin, C., Harrison, J., Settiani, C., Brodman, D., & Kendall, P. C. (2013). Anxiety and related outcomes in young adults 7 to 19 years after receiving treatment for child anxiety. *Journal of Consulting and Clinical Psychology*, *81*, 865–876.
- Blocher, J. B., Fujikawa, M., Sung, C., Jackson, D. C., & Jones, J. E. (2013). Computer-assisted cognitive behavioral therapy for children with epilepsy and anxiety: A pilot study. *Epilepsy & Behavior*, *27*, 70–76.
- Carper, M. M., McHugh, R. K., & Barlow, D. H. (2013). The dissemination of computer-based psychological treatment: A preliminary analysis of patient and clinician perceptions. *Administration and Policy in Mental Health and Mental Health Services Research*, *40*, 87–95.
- Center for Telehealth and e-Health Law. (2011). *Medicaid reimbursement*. Retrieved from [http://www.nrel.gov/learning/re\\_biofuels.html](http://www.nrel.gov/learning/re_biofuels.html)
- Comer, J. S., Furr, J. M., Cooper-Vince, C. E., Kerns, C. E., Chan, P. T., Edson, A. L. ... Freeman, J. B. (2014). Internet-delivered, family-based treatment for early-onset OCD: A preliminary case series. *Journal of Clinical Child and Adolescent Psychology*, *43*, 74–87.
- Crawford, E. A., Salloum, A., Lewin, A. B., Andel, R., Murphy, T. K., & Storch, E. A. (2014). A pilot study of computer-assisted cognitive-behavioral therapy for childhood anxiety in community mental health centers. *Journal of Cognitive Psychotherapy*, *27*, 221.
- Estrin, D. E., & Sim, I. (2010). Open mHealth architecture: An engine for health care innovation. *Science*, *330*, 759–760.
- Hollon, S. D., & Beck, A. T. (2013). Cognitive and cognitive-behavioral therapies. In M. J. Lambert (Ed.), *Handbook of psychotherapy and behavior change* (6th ed., pp. 393–442). Hoboken, NJ: John Wiley & Sons, Inc.

- Kendall, P. C. (2012). Treating anxiety disorders in youth. In P. C. Kendall (Ed.), *Child and adolescent therapy: Cognitive-behavioral procedures* (4th ed.). New York, NY: Guilford Press.
- Kendall, P. C., & Hedtke, K. (2006). *Cognitive-behavioral therapy for anxious children: Therapist manual* (3rd ed.). Ardmore, PA: Workbook Publishing Inc [www.WorkbookPublishing.com](http://www.WorkbookPublishing.com).
- Kendall, P. C., & Khanna, M. S. (2008a). *Camp Cope-A-Lot: The coping cat DVD [DVD]*. Ardmore, PA: Workbook Publishing Inc. ISBN: 978-1-888805-32-1
- Kendall, P. C., & Khanna, M. S. (2008b). *CBT4CBT: Computer-based training to become a cognitive-behavioral therapist [DVD]*. Ardmore, PA: Workbook Publishing Inc. ISBN: 978-1-888805-34-5
- Khanna, M. S., Aschenbrand, S. G., & Kendall, P. C. (2007). New Frontiers: Computer technology in the assessment and treatment of anxious youth. *Behav Therapist*, 30, 22–25.
- Khanna, M., & Kendall, P. C. (2010). Computer-assisted cognitive behavioral therapy for child anxiety: Results of a randomized clinical trial. *Journal of Consulting and Clinical Psychology*, 78, 737–745.
- Kulik, J. A. (1994). Meta-analytic studies of findings on computer-based instruction. In E. L. Baker & H. F. O'Neil (Eds.), *Technology assessment in education and training* (pp. 9–33). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Lewis, C., Krimer, Y., Comtois, K., Landes, S., Lyon, A., & Borntreger, C. (2011). *A comprehensive review of dissemination and implementation science instruments*. Paper presented at the Global Implementation Conference, Washington, DC.
- March, S., Spence, S. H., & Donovan, C. L. (2009). The efficacy of an internet-based cognitive-behavioral therapy intervention for child anxiety disorders. *Journal of Pediatric Psychology*, 34, 474–487.
- Mayo Clinic (2012). *Anxiety coach*. Retrieved from <https://itunes.apple.com/us/app/anxietycoach/id565943257?mt=8>
- Myers, K., Cain, S., Work Group on Quality Issues, & American Academy of Child and Adolescent Psychiatry Staff (2008). Practice parameter for telepsychiatry with children and adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry*, 47, 1468–1483.
- Myers, K., & Turvey, C. L. (Eds.) (2013). *Telemental health: Clinical, technical, and administrative foundations for evidence-based practice*. Waltham, MA: Elsevier.
- National Institute for Health and Care Excellence. (2011). *Generalised anxiety disorder and panic disorder (with or without agoraphobia) in adults: Management in primary, secondary and community care*. NICE clinical guideline 113. Retrieved from <http://www.nice.org.uk/nicemedia/live/13314/52599/52599.pdf>
- Nelson, E. L., Barnard, M., & Cain, S. (2003). Treating childhood depression over videoconferencing. *Telemedicine Journal and e-Health*, 9, 49–55.
- Pesamaa, L., Ebeling, H., Kuusimäki, M. L., Winblad, I., Isohanni, M., & Moilanen, I. (2003). Videoconferencing in child and adolescent telepsychiatry: A systematic review of the literature. *Journal of Telemedicine and Telecare*, 10, 197–192.

- Pramana, G., Parmanto, B., Kendall, P. C., & Silk, J. S. (2013). The SmartCAT: An mHealth platform for ecological momentary intervention (EMI) in child anxiety treatment. *Telemedicine and e-Health*, 20(5), 419–427.
- Rees, C. S., & Gillam, D. (2001). Training in cognitive-behavioural therapy for mental health professionals: A pilot study of videoconferencing. *Journal of Telemedicine and Telecare*, 7, 300–303.
- Richardson, L. K., Frueh, B. C., Grubaugh, A. L., Egede, L., & Elhai, J. D. (2009). Current directions in videoconferencing tele-mental health research. *Clinical Psychology: Science and Practice*, 16, 323–338.
- Shiffman, S., Stone, A. A., & Hufford, M. R. (2008). Ecological momentary assessment. *Annual Review of Clinical Psychology*, 4, 1–32.
- Silk, J. S., Forbes, E. E., Whalen, D. J., Jakubcak, J. L., Thompson, W. K., Ryan, N. D., ... , Dahl, R. E. (2011). Daily emotional dynamics in depressed youth: A cell-phone ecological momentary assessment study. *Journal of Experimental Child Psychology*, 110, 241–257.
- Spence, S. H., Donovan, C. L., March, S., Gamble, A., Anderson, R. E., Prosser, S., & Kenardy, J. (2011). A randomized controlled trial of online versus clinic-based CBT for adolescent anxiety. *Journal of Consulting and Clinical Psychology*, 79, 629–642.
- Spence, S. H., Holmes, J. M., March, S., & Lipp, O. V. (2006). The feasibility and outcome of clinic plus internet delivery of cognitive-behavior therapy for childhood anxiety. *Journal of Consulting and Clinical Psychology*, 74, 614–621.
- Wainer, A. L., & Ingersoll, B. R. (2011). The use of innovative computer technology for teaching social communication to individuals with autism spectrum disorders. *Research in Autism Spectrum Disorders*, 5, 96–107.

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**Philip C. Kendall**, Ph.D., ABPP is Distinguished University Professor at Temple University. His treatment programs have been translated into dozens of languages and he has had 30 years of uninterrupted grant support. He is among the most “Highly-Cited” individuals in the social/medical sciences and placed fifth in a quantitative analysis of the citations to the faculty in psychology in the United States. A Fellow at the Center for Advanced Study in the Behavioral Sciences and award winner (e.g., Research Recognition Award from the Anxiety Disorders Association of America; “Great Teacher” award from Temple University; “Outstanding Contribution in Training” from ABCT), his contributions include developing the Coping Cat program for the treatment of anxiety disorders in youth.

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Dr. Khanna has served as Assistant Professor of Psychiatry and Clinical Director of the Child and Adolescent OCD, Tic, Trich, and Anxiety Group in the University Of Pennsylvania School Of Medicine. She is author of numerous research articles and chapters, and co-author with Dr. Philip Kendall of: *The CAT Project*, a therapist manual for the cognitive behavioral treatment of anxious adolescents, *Camp Cope-A-Lot*, the first empirically supported computer-based treatment for anxious youth, and *CBT4CBT: Computer-based training in cognitive behavioral therapy for anxious youth*, a computer-based training program for professionals interested in becoming proficient in CBT for childhood anxiety disorders, and *Child Anxiety Tales*, a web-based training program for parents of anxious youth.

Among her professional activities, she is active on the boards of APA Division 53 and ABCT as well as national and international scientific review boards and editorial boards. Dr. Khanna completed her doctoral degree at Temple University, clinical internship at UCLA, and NIH-sponsored fellowship at Columbia University.

#### M. SUE HARRIS SHORT BIOGRAPHY

**M. Sue Harris** PhD's initial graduate work was in psychology, but her doctoral degree is in American Studies. Her first book, about post-depression American art, was entitled "Rethinking regionalism." She maintained an interest in psychology and eventually started Workbook Publishing, Inc., a company dedicated to the mission of bringing well-researched, empirically supported, and practical books, software, and audiovisual programs to mental health professionals, school counselors, research professionals, or those seeking information and programs to help youth with emotional,

cognitive, and behavioral problems. To date, the company focus has been on helping youth.

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