Editorial: Section on Innovations in Technology in Measurement, Assessment, and Intervention

Tonya M. Palermo, PhD
Department of Anesthesiology & Peri-Operative Medicine, Oregon Health & Science University, USA

Statement of Purpose
Technology is critical to the work of child health psychologists, impacting the methods available to measure behaviors, assess outcomes, and deliver interventions. In particular, the use of electronic and information technology, including the Internet, personal and hand held computers, cell phones, CD-ROMs, virtual reality, video conferencing, among other forms of technology, have solidified an important place in the provision of medical care. Within the realm of pediatric psychology, information and communication technologies have been used in the provision of pediatric psychology interventions to children, adolescents, and their families (Hicks, von Baeyer, & McGrath, 2006; Ritterband et al., 2003; Williamson et al., 2006). Moreover, pediatric psychologists use technology to reach broader populations of children and families allowing research participation via web surveys and computer assisted telephone interviews. Unique aspects of the technology impact the manner in which data are collected, interpreted, and analyzed. Real time visibility in data collection and compliance enhancing functions of computerized devices affords additional opportunities for understanding complex health behaviors. Innovative devices can be used to provide objective measures of a variety of health-related behaviors such as adherence-related behaviors, activity level, and sleep.

The section on Innovations in Technology in Measurement, Assessment, and Intervention will focus on the science related to technologies used in pediatric psychology research and practice. As new technologies emerge and are adopted, as a field, we will need ongoing information to not only enable understanding of the functions and applicability of the technology, but also to critically consider issues pertinent to the science of the technology. This section is intended to highlight specific innovative technologies, demonstrate their applicability to pediatric psychology research and practice, and consider specialized issues such as acceptability, confidentiality and security, and human subjects concerns. The section will include manuscripts that describe the clinical effectiveness of technologies in practice settings; and that present data concerning economic costs versus benefits of the application of technologies in research and practice. Human subjects and ethical concerns, including IRB-related issues, and solutions related to the use of new technologies in different practice settings will be featured. A separate but related topic that will be highlighted is the influence of information and communication technologies on children’s health and functioning such as their physical activity levels, mental health outcomes, and somatic symptoms.

The section on Innovations in Technology seeks manuscripts on a wide variety of topics within the content area of information and communication technologies. These include, but are not limited to, empirical research pertaining to the use of technologies for assessment, treatment, or education; review papers that advance theoretical and empirical perspectives; and brief “how to” papers and author letters that describe pertinent issues in the implementation of various technologies. Commentaries will be used to advance discussion of research and clinical implications. This section will be ongoing and will also feature special issues. For example, the first special issue relevant to this section will be on eHealth in pediatric psychology (to be co-edited with Lee Ritterband, PhD).

Background
Information and communication technology pervades many aspects of our daily lives. In the hospital setting, information technology has rapidly expanded allowing shared electronic medical records, electronic prescribing,
and electronic booking of appointments. New departments, divisions, and centers have emerged in many medical institutions devoted to medical informatics, technology development, and the Internet in medicine. There are also new international journals and societies devoted to telemedicine, eHealth, and research on Internet interventions. Similarly, consumers have also increased their usage of these technologies and, in fact, invest more time and resources in accessing health information on the Internet than for any other purpose (Powell, Lowe, Griffiths, & Thorogood, 2005).

Advances in information and communication technologies have changed how we can interact with patients, conduct research, and deliver interventions. The promise of technology is being realized among many facets of health care, and engenders excitement about how we can use different forms of technology to improve the care provided to children and families. Although information and communication technologies hold much promise in pediatric psychology, it remains an underdeveloped area that requires focused research efforts to realize its full potential. Two primary areas in which technology use are applicable to pediatric populations are briefly described subsequently including, (a) the provision of interventions, and (b) the use of technologies to improve measurement of health behaviors and outcomes.

Interventions

Information and communication technologies have been used to deliver health and behavioral interventions to children using telemedicine applications, videoconferencing, Internet interventions, and closed computer systems. Technology has connected children who live in rural areas with major medical centers allowing greater access to specialized care and reducing costs associated with transporting children to hospitals in metropolitan areas. Telemedicine has been used to provide services to children with a variety of special health care needs, and within many settings including specialty outpatient consultation, emergency department, critical care, and intensive care units. For example, telepsychiatry services are well established for the provision of mental health services to children and adolescents. Starling and Foley (2006) found a high level of satisfaction with their telepsychiatry service in a population in New South Wales. These authors concluded that videoconferencing appears to be a highly effective and well accepted method of providing mental health care to remote and rural children, adolescents, and families. The application of telemedicine by pediatric psychologists has not yet been fully developed but has potential as an important arena for the provision of focused pediatric psychology evaluation and treatment to children and their families.

Outside the medical setting, children and families can use and access information technologies within their homes or communities. Within urban community settings, computer kiosks have been used for child health promotion (Thompson, Lozano, & Christakis, 2007). Educational websites, chat rooms, and support groups are abundant on the World Wide Web, many focused on health issues. For example, web-based training has been used to teach teachers about childhood cancer (Dubowy et al., 2006). The effectiveness of cognitive behavioral treatments delivered using internet-based systems to pediatric populations have been evaluated in children and adolescents with asthma (Joseph et al., 2007), obesity (Williamson et al., 2006), encopresis (Ritterband et al., 2003), recurrent pain (Hicks et al., 2006), and traumatic brain injury (Wade, Carey, & Wolfe, 2006), finding strong support for this mode of treatment delivery.

Taking advantage of the many unique features of the World Wide Web including communication and interactivity, these interventions have largely focused on preventive efforts, health promotion, and treatment of conditions that have a large self-management component. Importantly, interventions have been tested with parents and children in urban areas and with diverse socioeconomic status demonstrating their wide applicability (Joseph et al., 2007; Safran, Pompilio-Weitzner, Emery, & Hampers, 2005; Williamson et al., 2006).

Assessment and Measurement of Health Behaviors and Outcomes

Pediatric psychologists have used new technologies over the years to better capture complex behaviors such as medication adherence and symptom monitoring. The use of electronic devices, PDAs, cell phones, and pagers has expanded options for monitoring and accessing a wide range of symptoms, behaviors, and perceptions. One example is use of electronic diaries to measure recurrent and chronic pain in children (Palermo, Valenzuela, & Stork, 2004; Stinson et al., 2006). Until recently, pain diary methodology in children relied exclusively on conventional paper and pencil measures, which have been associated with several limitations including poor compliance, missing data, and patient nonadherence to protocol (e.g., hoarding of responses).
Electronic methods of daily diary collection allow for compliance enhancing features and “real-time” data entry. In a sample of school-age children and adolescents with chronic pain (Palermo et al., 2004), the use of an electronic diary resulted in significant improvements in compliance in comparison to a paper-based format. Investigators, including many pediatric psychologists, are currently using web-enabled cell phones and other computer-based platforms to measure a variety of health behaviors. Little work has been published to date concerning issues pertinent to the science and applicability of these technologies.

Too Much of a Good Thing? Influence of Technology on Children’s Health

Despite the many advantages of information and communication technologies, there are also associated negative health effects of technology on children and adolescents. Negative health effects including increased neck, shoulder, and low back pain (Hakala, Rimpela, Saarni, & Salminen, 2006), obesity (Lajunen et al., 2007), poor sleep habits (Eggermont & Van den Bulck, 2006), and poor school achievement (Koivusilta, Lintonen, & Rimpela, 2007) have all been described in relation to increased use of information and communication technologies. In general, more intensive use of these technologies is associated with poorer health. Moreover, the reason for use of the technology is also important. Investigators have separately examined the use of information and communication technologies for information utilization versus for entertainment (e.g., digital gaming, talking on mobile phone). Mobile phone use, which is highest among adolescents with lower socioeconomic status, has been associated with the poorest health (Koivusilta et al., 2007). The influence of information and communication technologies on children’s health is an important area of inquiry.

Conclusion

In our daily work, many pediatric psychologists use electronic processes to chart, access patient information, and schedule appointments; to review grants and participate in remote investigator meetings; or to video cast grand rounds to community based hospitals. There is no doubt that technology will influence our daily work indelibly. Technology also touches the lives of children, adolescents, and their families, and offers the potential for greater access to pediatric psychology services, enhanced acquisition of information, and reduced costs. The rate of change and innovation in information technology is rapid, such that research efforts have so far lagged behind, particularly in research devoted specifically to children and families. Interventions and information continue to be available to consumers before evidence is able to be gathered on effectiveness. The purpose of this section is to contribute to the science of information and communication technologies in child health, and to bridge the gap in knowledge and use of these technologies by pediatric psychologists.

Conflict of interest: None declared.

Received August 21, 2007; revisions received August 21, 2007; accepted September 1, 2007

References


