Commentary: Dennis D. Drotar Distinguished Research Award: Innovations in Pediatric Chronic Pain Research

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It is an honor to receive the Dennis D. Drotar Distinguished Research Award from the Society of Pediatric Psychology (SPP). It is a privilege to be recognized by my colleagues in SPP for my scholarship in the field. But, perhaps more importantly, this award has a very special personal meaning to me because it is named as a tribute to my own mentor who helped launch my career in pediatric psychology. At the 2014 SPP annual conference in Philadelphia, I presented an award address chronicling the coming of age of pediatric chronic pain research over the course of my career. In this commentary, I continue with this theme by discussing highlights from my training and early career that were influential in shaping innovation in my program of research in pediatric chronic pain over the past two decades. First, I discuss my early introduction to pediatric pain, interdisciplinary research, and intervention research that provided essential core preparation and background for my research career. Second, I focus on developing innovative research in my early career including responding to key opportunities and societal advances. Third, I provide perspective on sustaining a research program and staying innovative over the course of one’s career. Although pediatric pain is the focus of my research program, the examples can be generalized to other areas of pediatric psychology research.

Core Background and Training for a Research Program in Pediatric Pain

Introduction to Pediatric Pain

My initial education and training experiences were essential in shaping my subsequent research career. In 1990, I started my junior year of college as a transfer student to the University of California at Los Angeles (UCLA). One of the first things I did after moving was to search for employment, looking first at the UCLA Medical Center. In a stroke of serendipity, I responded to a job announcement for a research assistant position at the UCLA Pediatric Pain Program, directed by Lonnie Zeltzer, MD (a leading expert on pediatric pain management). Over the next three years, I began my training in pediatric pain research. I acquired exposure to: (1) the entire research process from grant writing to data collection and analysis, (2) a range of pain methodologies (e.g., experimental pain paradigms, observational coding of pain and distress) and pain populations (e.g., children with cancer, children undergoing medical procedures), and (3) a range of professionals (e.g., nurses, anesthesiologists, pediatricians, psychologists). It was during this time that I worked alongside Debbie Fanurik, PhD, a pediatric psychologist who introduced me to the field. Working in the UCLA Pediatric Pain Program, I developed a strong passion for the topic of pediatric pain management and made a decision to pursue doctoral training in pediatric psychology.

In 1993, I entered the clinical psychology doctoral program at Case Western Reserve University under the mentorship of Denny Drotar, PhD in his National Institutes of Health (NIH) T32 program in research training in pediatric psychology. Denny extensively supported my desire to focus on pain research. After I arrived in Cleveland, he helped me make contact with a pediatric nurse (Sally Lambert, RN, PhD) at Rainbow Babies & Children’s Hospital who was interested in pain. Building on my experiences at UCLA, which focused on individual differences in children’s responses to acute procedural pain, my initial research questions centered on individual differences in children’s experiences with postoperative pain. At that time, there had been surprisingly little research conducted on this
topic despite the large numbers of children undergoing surgery and the high rate of severe postoperative pain. Working with Sally Lambert, I designed my first-year project to study the role of presurgical expectations and beliefs about analgesics on subsequent postoperative pain (Palermo & Drotar, 1996; Palermo & Lambert, 1997). My master’s research expanded further on this idea, identifying anticipatory surgery distress as a key predictor of severe postoperative pain (Palermo, Drotar, & Lambert, 1998).

Learning to Conduct Interdisciplinary Research

Interdisciplinary research leverages the strengths and expertise of professionals trained in different fields. The concept of “team science” has been more newly coined (see commentary by Powers, 2014 for an example of team science in pediatric psychology). Scientific teams put forth a collaborative effort to address a scientific challenge and may involve a wide range of professionals as well as patients and families. As my mentor, Denny emulated, encouraged, and taught his students to conduct interdisciplinary research. Lonnie Zeltzer also taught me the value of this model in her work in the UCLA Pediatric Pain Program. As I progressed in my doctoral training, I realized that my peers in clinical psychology did not uniformly have this exposure or instruction in interdisciplinary research. Many students worked solely with mentors within the psychology department. I believe this early introduction to interdisciplinary research during my undergraduate education was essential in shaping my lifelong approach to studying children’s pain. It taught me to cultivate collaborations in the medical setting and to consider unique and complementary viewpoints on scientific questions. This was important not only to enhance the feasibility of studies with patient populations but to also incorporate the perspectives of other disciplines into my research questions and procedures. In recent training recommendations for pediatric psychologists, interdisciplinary research has been named as an important competency domain within the general area of science (Palermo et al., 2014). Recommendations have been made that students should gain exposure to other disciplines early in their predoctoral training to help develop competencies in participating and leading future interdisciplinary research, clinical, and administrative activities (Drotar, 2012; Madan-Swain et al., 2012; Palermo, 2013).

Over the course of my career, I have been fortunate to participate on many strong interdisciplinary research and clinical teams. Working within the medical school in departments of pediatrics and anesthesiology, my peers have included a range of professionals with whom I have conducted research, developed clinical programs, and shared administrative responsibilities (Palermo, 2013). Serving as T32 Program Director for an anesthesiology postdoctoral research training program has provided opportunities to mentor anesthesiologists and psychologists together to expose them to interdisciplinary training activities. These interdisciplinary activities have stimulated collaborative and innovative efforts to effectively study the complex problem of chronic pain.

Applying the Scientist-Practitioner Model: Venture Into Intervention Research

The scientist-practitioner model for graduate training has long been promoted to strengthen the connection between research and practice. This may be especially critical, as it relates to the research to evaluate intervention outcomes because students need to be trained in how to conduct applied research that can be translated into practice. Many students state that the reason that they want to become a pediatric psychologist is the desire to help children and families. That was certainly true in my case, and this interest was reinforced by excellent practicum experiences in primary care, child psychiatry, and pediatric specialty clinics during my doctoral training. While planning my dissertation research, I had a strong desire to tackle the challenge of extending descriptive findings from my master’s
thesis about the impact of anxiety on postoperative pain, to actually implementing and evaluating practical intervention strategies intended to modify children’s postoperative pain.

Thus, with input from an interdisciplinary group of mentors, including a new collaboration with a pediatric anesthesiologist (Paul Tripi, MD), I carried out my first randomized controlled trial (RCT) (Palermo & Drotar, 1999). The aim was to test the efficacy of a behavioral distraction intervention on reducing distress and pain in young children having outpatient surgery. Many mentors advise their students against intervention research in graduate school because of the many potential challenges and barriers (e.g., recruitment problems, implementation challenges) that may impede progress toward their degree. However, in reflecting back on my own experience with my dissertation research, I appreciate Denny Drotar’s support and encouragement to take on the challenge of intervention research. In a whirlwind of a summer, I managed to recruit and randomize 101 children into this RCT. I learned about performing data collection in multiple settings (operating room, postanesthesia care unit, home), the intricacies of fitting research into existing clinical flow to prevent disruptions, the high level of coordination necessary for conducting a trial, and the need for additional research staff to ensure a high-quality RCT. Importantly, I had fun; this was exciting, challenging work. Although I had null findings from my RCT (Palermo & Drotar, 1999), this research experience was truly transformative. It taught me about treatment development, design, conduct, and reporting of RCTs, and it helped me gain experience and confidence in being able to conduct intervention research in the future.

My early clinical work on internship at Columbus Children’s Hospital contributed further to fueling my commitment to treatment development and evaluation. I was providing treatment to pediatric patients with procedural pain, recurrent and chronic pain, and disease-related pain. In the 1990s, the evidence base for psychological treatments for pediatric chronic pain conditions was fairly undeveloped. Only a few RCTs had been conducted in youth with headache and abdominal pain, and there was limited published material on treatment protocols (for exceptions, see McGrath, 1990; McGrath, Cunningham, Lascelles, & Humphreys, 1990). During internship, I appreciated even more the strengths of UCLA’s Pediatric Pain Program. By being among the first outpatient pediatric pain clinics in the nation, the program was clearly blazing a trail in developing clinical services for youth with pain. This was opening new doors for pediatric psychologists to contribute to this endeavor.

Developing an Innovative Program of Research in Pediatric Chronic Pain

Jumpstarting an Early Career

Following my clinical internship year at Columbus Children’s Hospital, I returned to Cleveland to Rainbow Babies & Children’s Hospital to complete fellowship training under Denny Drotar’s mentorship. Armed with excellent consultation-liaison and rehab program experiences, I was eager to develop new clinical programs to provide services to youth with pain (e.g., sickle cell, headache). And, although I did not have a specific niche yet, I was also eager to move into a new research area focused on recurrent and chronic pain.

At the beginning of a research career, students often wonder how they will know whether they have a good or strong research idea and whether it is important and innovative. My trainees often ask me these questions. Generating research ideas is a dynamic process that starts with effectively identifying an important gap in knowledge or practice. To get to this, inquiry must start with an analysis of where the field stands, that is, an understanding of the current state of science or practice. On fellowship, I began to re-read the literature on the epidemiology of recurrent pain in childhood, which was limited in the 1990s to a few key papers (e.g., Goodman & McGrath, 1991). Beyond simple prevalence and pain frequency figures, I found limited description of the impact of pain on children or families, and this seemed like an important research gap. One notable exception was the important work of Lynn Walker, PhD on the topic of functional disability in youth with abdominal pain and the development of the Functional Disability Inventory (Walker & Greene, 1991). I became inspired and started thinking about how pain may impact multiple areas of physical, social, and emotional functioning in children and families.

The dynamic part of developing research ideas is going beyond the literature to learn from others by sharing and vetting your ideas. There are different professional forums that may provide this opportunity including internal forums such as laboratory meetings and works in progress seminars as well as external forums such as professional society special interest group meetings and early career sessions. In my own early career experience, I remember distinctly the impressions developed from my first American Pain Society annual scientific meeting. Previously I had only attended psychology conferences, and so this was my first exposure to a multidisciplinary group of pain researchers. The experience of talking to and hearing directly from investigators from multiple disciplines who treated children with pain was pivotal.
Learning what topics these pain researchers cared about and what they thought of my emerging ideas was invaluable. Through this knowledge, I developed a broad research agenda to understand the impact of pain and risk factors for poor outcomes in children with recurrent and chronic pain.

In making the transition from fellow to junior faculty, I submitted an NIH K23 career development application to obtain protected research time and support. Years later, I now encourage my own junior faculty to develop K23 applications, which remains an important potential pathway to research independence. Fortunately, I received funding for my application and began a program of research focused on three aims (taken verbatim from my application), (1) to characterize the range of functional consequences of recurrent and chronic pain in children and adolescents over a 12-month period, (2) to identify risk factors that maintain or worsen the functional impact of recurrent and chronic pain over time, and (3) to develop and evaluate methods of intervention designed to prevent the maintenance and progression of functional consequences of pain on children’s lives. Denny Drotar served as my primary sponsor and mentor on the application.

Beyond identifying a research niche, the actual process of writing an NIH grant with Denny’s guidance was an invaluable learning experience. Being pushed to think through a scientific plan for a grant application presents a unique set of learning activities. One must learn to understand the larger impact of the science (think big) but present focused aims that can be accomplished in a well-designed study to address an important gap in science. Moreover, Denny taught me the critical need to take sufficient time with a grant application, to obtain external perspective from asking smart people not involved in the project to read it, and to synthesize multiple types of feedback in strengthening an application. When I watch my own students grappling with grant writing, I try to emulate my own introduction to this process. In fact, grantsmanship is so important for launching and sustaining a research career that it is a central focus in the fellowship programs that I direct. Grantsmanship skills are now incorporated as an essential applied competency in recommendations for pediatric psychology training (Palermo et al., 2014).

**Responding to Key Opportunities: Introduction to Sleep Medicine**

Over the course of one’s career, many opportunities arise in the clinical, research, and administrative arenas. Sometimes, it is difficult to know which ones to pursue and inevitably there will be poor choices as well as excellent choices. One of the excellent choices that I made in my early career was to provide clinical services within the Rainbow Children’s Sleep Program. The program was being created by newly recruited sleep medicine physician and pediatric pulmonologist Carol Rosen, MD. Although I did not have a particular interest in children’s sleep, I recognized that being able to work with a well-regarded sleep medicine specialist was an important opportunity. Over the next five years, I learned a tremendous amount about children’s sleep and about clinical program development from the outstanding mentorship of Carol Rosen. I found that I enjoyed the clinical practice of behavioral sleep medicine, especially the ability to achieve successful outcomes with brief interventions. I discovered that pediatric sleep medicine was also a vibrant field with many key discoveries made by psychologists.

Pertinent to my research career, I read a paper by Lewin and Dahl (1999) that sparked my interest in considering how to integrate sleep into my research in pediatric pain. The basic tenet of this brief conceptual review paper was that the relationship between pain and sleep is bidirectional. Evidence supported pain as being disruptive for sleep, and experimental data demonstrated that sleep disruption caused increased pain sensitivity. Intrigued by this idea that sleep actually affects pain, I began to include sleep assessment in my clinical interviews with patients with chronic pain, learning that many of them complained of significant sleep problems. I ventured into sleep research, conducting several observational studies examining sleep problems in children and adolescents with pain conditions (Miller, Palermo, Powers, Scher, & Hershey, 2003) and the impact of sleep problems on quality of life (Palermo & Kiska, 2005). As I saw clinically, my research findings confirmed that sleep problems were prevalent in youth with chronic pain and associated with poor quality of life.

Over time, this interesting nexus of sleep and pain became a primary focus of my research program. I received NIH funding to conduct a 5-year study to characterize sleep problems, their trajectory, and impact in youth with chronic pain finding that, compared with their healthy peers, adolescents with chronic pain reported poorer sleep quality and more insomnia symptoms (Palermo, Wilson, Lewandowski, Toliver-Sokol, & Murray, 2011). Insomnia symptoms also persisted over time for youth and were associated with negative consequences including poor function, low quality of life, and high health utilization (Palermo, Law, Churchill, & Walker, 2012). Data on the daily, temporal relationship between pain and sleep showed that nighttime sleep predicted next-day pain, with poorer sleep associated with higher pain the next...
day (Lewandowski, Palermo, De la Motte, & Fu, 2010). In fact, recent reviews of the temporal relationship between sleep and pain conclude that more studies now support the direction of sleep impacting pain rather than vice versa. That is, rather than a bidirectional relationship, sleep disruption has now been shown to lead to subsequent increased pain in multiple samples across childhood and adulthood (Finan, Goodin, & Smith, 2013).

There is strong interest in the interrelationship between sleep and pain within multiple disciplines. Because sleep is a potentially modifiable target that may serve to either prevent or interrupt a cycle of persistent disabling pain, research has moved toward intervening with sleep problems in an effort to affect pain outcomes. We recently published a paper with preliminary data showing that poor sleep was a risk factor for adolescents to achieve less improvement in pain outcomes following cognitive-behavioral therapy (CBT) for chronic pain (Fales, Palermo, Law, & Wilson, 2014). Now, I am focusing on how to translate these findings into sleep interventions for this population.

**Responding to Societal Advances: The Technology Boom**

Early in my career, I experienced the turn of the new millennium and the associated major societal advances. Around us, technology expansion and growth began to transform our daily work in the hospital. Technology was being used in all facets of health care at an increasing rate and dramatically changed how we performed research and how we communicated clinical information. As technology developed and expanded around me, I wondered if there might be ways to harness technology in my research. One of the practical issues that limited self-report of symptoms, such as pain, was relying on the child’s ability to recall pain events and/or to summarize pain events over a selected period. Although prospective reporting in a daily log or diary might reduce problems with recall, it was fraught with potential compliance issues (e.g., it was common to receive back a week of pain records that appeared to have been completed at one sitting). In the literature, I found the work of Arthur Stone (Stone, Shiffman, Schwartz, Broderick, & Hufford, 2002) to be compelling, documenting the same issues and problems in diary reports made by adults, who were largely noncompliant in completing prospective written daily records. Armed with actual data from Stone et al. (2002) about the scope of the problem with written diaries, I became interested in using technology to develop an electronic diary (e-diary) to enhance the measurement of daily pain reports in children. After receiving funding with a small internal grant from the department of pediatrics, I also made a gift request to Hewlett Packard for electronic devices that I could use in my research (personal digital assistants or PDAs). To my surprise, Hewlett Packard granted my gift by sending me 10 PDAs, making my small project to compare e-diary with paper diaries feasible (Palermo, Valenzuela, & Stork, 2004). I learned that it was possible to propose innovative research even with small budgets and that creativity and resourcefulness were critical ingredients to success.

After I made a professional move to Oregon Health & Science University, this experience sparked my interest in applying technology not only to assessment of pain but also to treatment delivery. In clinic, I recognized the challenges in providing outpatient psychological treatment to my patients in Oregon who lived too far away to come to our pain program for regular visits. I was struck by how little I could offer to some of these families, and frustrated that a pediatric pain program was not necessarily a good resource for the majority of children with chronic pain. Remembering that innovation comes from tackling problems recognized by clinicians in the field and addresses a gap in current practice, I began to ponder ways to develop and evaluate remotely delivered psychological treatment for children with chronic pain.

Around this same time, Denny Drotar invited me to participate in a conference sponsored by the Genentech Foundation titled “Innovations in the use of new technologies in research and clinical care for children, adolescents, and young adults with chronic illness and special health care needs” held in Cleveland in October 2004. The timing was ideal. I was primed to consider new ways of reaching children and families using technology. I met Lee Ritterband, PhD, at this meeting and heard about his novel work on treatment of encopresis using an Internet intervention (Ritterband et al., 2003). I realized that this might be a solution to the problem that I was facing with providing psychological treatment to youth with chronic pain. Spurred by new ideas and an important new collaboration, I began to work out plans to develop an Internet cognitive-behavioral pain intervention.

In 2005, I participated in another event that had a large influence on my plans for treatment development. I was asked to participate as a member of the auspices of the Pediatric Initiative on Methods, Measurement, and Pain Assessment in Clinical Trials (Ped-IMMPACT) consensus group to define outcomes for clinical trials in pediatric pain management (McGrath et al., 2008). This was an important opportunity to help guide the field concerning critical outcome domains and measurement of children’s function, areas that were a particular focus in my research. As
I was in the midst of planning my own clinical trial, the timing of this event was also fortuitous for networking with other clinical trialists and measurement experts in pediatric pain. Building from this meeting, I submitted a grant application to develop and conduct an initial RCT of an Internet-delivered cognitive-behavioral pain intervention, which I called Web-MAP (Web-based Management of Adolescent Pain). From our introduction at IMMPACT, I asked Chris Eccleston, PhD, (expert in CBT and in clinical trial methodology) to serve as a consultant on the trial. This began an important collaboration that has continued to the present.

With funding from the Eunice Kennedy Shriver National Institute of Child Health and Human Development, I conducted an initial RCT of Web-MAP with 48 youth (ages 11–17 years) with a variety of pain conditions (e.g., headache, stomachache, musculoskeletal pain) and found that compared with a wait-list control group, the Web-MAP group had significantly greater increases in activities/daily functioning and reductions in pain intensity (Palermo, Wilson, Peters, Lewandowski, & Somhegyi, 2009). Encouraged by the promising findings and recognizing the potential reach of the Internet to broadly disseminate evidence-based interventions to children and adolescents who do not have access to treatment, I developed an interest in further understanding research using the Internet. In this rapidly growing field, there was little guidance available to researchers in addressing important practical, ethical, and pragmatic issues about the conduct of research using technology, and specifically evaluating interventions in children. Thus, these topics have been stimulating to discuss and debate with other e-Health researchers (Henderson, Law, Palermo, & Eccleston, 2012; Wu, Steele, Connelly, Palermo, & Ritterband, 2014).

Most recently, I have completed enrollment into a second RCT of Web-MAP designed to provide a stronger test of the intervention approach and a real-world application in outpatient pediatric pain clinics. We randomized 278 youth (ages 10–17 years) with chronic pain (and their parents) from pain centers around the U.S. and Canada to Web-MAP (CBT) versus Web-ED (pain education control). Outcome data are currently being collected from the sample at posttreatment, 6 months, and 12 months follow-up. There have been many lessons learned about conducting large multicenter trials using the Internet and about possible mechanisms of change and trajectories in pain-related outcomes. I have enjoyed the challenge of how to involve many providers, maintain communication, and maintain interest over time among different pain centers in referring patients to the trial. Because of the large and geographically diverse sample of youth with chronic pain, there are also unique opportunities for contributing new information about predictors of treatment response. The Internet also allowed for opportunities to build robust data collection methods including repeated assessments of outcomes during treatment to allow for understanding trajectories of change in children’s pain and functional outcomes.

Sustaining a Research Program and Staying Innovative Over Time

One of the lessons that I have learned over my career is that innovation is critically important for sustaining a research program. Successful researchers must develop impactful and innovative research questions. Although this is necessary to launch a career, it is equally important for sustaining a program of research. As knowledge shifts, develops, and expands, the innovative scientist recognizes changes in paradigms and advances in clinical care or service delivery that influence applications of the research, as well as the potential impact of contemporary societal issues on the research.

The NIH defines innovation as the extent to which a project “challenges and seeks to shift current research or clinical practice paradigms by utilizing novel theoretical concepts, approaches or methodologies, instrumentation, or interventions” (http://grants.nih.gov/grants/writing_application.htm). How do we keep pace, stay innovative, and continue to advance novel ideas over the course of our career? Reflecting on the major areas of innovation in my research in pediatric chronic pain over the past two decades, there seem to have been a core set of influences. These included responding to observations made in clinical care and service delivery, recognizing societal progress and priorities, identifying key discoveries and theoretical/conceptual advances, and maximizing professional opportunities and collaborations. Below, I briefly discuss my perspective on how to capitalize on their influences to sustain an innovative program of research in pediatric psychology.

Responding to Clinical Observations

Identifying and responding to clinical observations was the impetus behind many of my research activities. For many years, I blended clinical work and research in my faculty positions. True integration of research and practice is exciting, as providers try out discoveries made in their research with their patients, and conversely, researchers respond to clinical issues in designing studies to address
these research questions. The clinician-scientist has a distinct advantage in spending time in clinical service delivery to understand firsthand the impact of advances in care, service delivery, and treatment preferences and options. My patients with chronic pain and their parents taught me about how pain impacted their lives, helping me to focus on measuring the most relevant domains in my research. They also taught me about possible risk factors as I made observations that youth with the same pain condition could have vastly different levels of functioning and treatment outcomes. For the scientist who is not engaged in clinical activity, it is essential to spend time talking with clinicians working in the field (and children and families). Conversations with clinicians are vital to being able to respond to key advances in clinical care within any specific area of pediatric psychology.

**Keeping Pace With Societal Changes**

Changes at the societal level in health care, financial stability, values, resources, etc. cannot be ignored in science. As populations change over time, the questions that we ask need to keep pace with these changes. The boom of technology at the start of the new millennium expanded options for incorporating technology into clinical care and research. It is not a niche area. It is now mainstream. In fact, the challenge now is in understanding how to move beyond the initial growth in this field that has demonstrated that technology-delivered interventions are feasible and effective in many pediatric populations. The next level of innovation has not yet been realized. Because of the rapid advances in technology, in consumer preferences, and in the evidence base, it will be challenging to stay innovative and continue to ask important questions in this field. In my own research, I look forward to tackling these challenges in innovation as I consider how to advance my research on Internet-delivered CBT for youth with chronic pain.

**Key Scientific Discoveries**

In any area of science, key discoveries and theoretical/conceptual advances may occur that require a subtle or even dramatic shift in one’s research focus. Both identifying as well as responding to these key discoveries can be complex. Being familiar with current literature in one’s area of research may seem relatively straightforward. However, within pediatric psychology, our topics are not typically “owned” by one professional discipline. As an example, key discoveries in pain are made in many fields including the basic sciences, nursing, pharmacy, pediatrics, psychology, neurology, and anesthesiology, among others. This means that participating in only one discipline’s scientific meetings or reading only one discipline’s journals is not sufficient. For example, a psychologist may miss key discoveries that occur in the basic sciences that fundamentally shift conceptualization of a disease process. To sustain an innovative program of research, participation in interdisciplinary forums will be essential as well as learning to understand the implications of basic science. Pain research is moving toward the incorporation of biological markers; clinical researchers will need to learn how to include new methods to stay innovative in their programs of research. And, investigators may need to learn how to take bigger scientific risks. When I reflect on the areas of my research that had a high level of innovation, risks and challenges were most often present.

**Maximizing Professional Collaborations**

Science is collaborative and interactive. Science improves with exchanges that bring together researchers with complementary skills and perspectives to an area of inquiry. This is certainly true in pediatric pain management. I can recall specific conversations with anesthesiologists, rheumatologists, nurses, and physical therapists that were the impetus for novel research ideas. Interdisciplinary research is a cornerstone of pediatric psychology, and I feel fortunate to have “grown up” with interdisciplinary experiences in my own education and training. Fortunately, pediatric psychology is highly collaborative and professional ties are strong with other health professionals. Similarly, within the field of pediatric pain management, interprofessional collaboration is highly valued and supported. Throughout my career, I have experienced the benefits of explaining my research to nonpsychologists. It has pushed me toward defining the value of my science in common (nonjargon) language so that its impact is understood across disciplines. This is also an effective way of inviting new perspectives on one’s work. Other specific ways that I have focused on maximizing collaboration is to disseminate knowledge in interdisciplinary journals, in oral presentations at interdisciplinary meetings, in providing service to other disciplines (e.g., service on professional boards), and training students from other professions.

All of these interdisciplinary activities maximize collaborations, which ultimately fuels innovation in one’s research program. This is also one of the most enjoyable aspects of a scientific career—being able to find and choose collaborators who are fun, committed, and passionate about research. For me, the chance to work with people who care about children’s pain without the boundaries of my own institutional walls has made my career immensely rewarding.
Concluding Comments

Over the course of my career, substantial progress has been made in pediatric chronic pain research. There is now research describing the impact of chronic pain in children and adolescents, numerous assessment tools have been developed, and guidance exists on measurement of clinical trial outcomes. As more research attention was directed to describing the prevalence and impact of chronic pain in children and adolescents, there was a corresponding growth in the development of clinical pediatric pain services. Many pediatric pain clinics opened around the country (and globally), pain psychology training opportunities expanded, and the term “pediatric pain psychologist” became more familiar. From the handful of programs that existed in the 1990s, at present, there are at least 40 interdisciplinary pain clinics providing treatment to children with chronic pain in the United States: http://www.americanpainsociety.org/uploads/pediatric_chronic_pain_clinic_list_12_2013.pdf.

There has also been significant progress of psychological treatment research in pediatric chronic pain, with many more RCTs conducted over the past decade and a robust evidence base (Fisher et al., 2014). Psychological treatment is truly a mainstay of chronic pain management for children. Innovations in treatment delivery have been implemented in response to the barriers faced by children and families in receiving pain treatment in their communities. Being a part of the growth and expansion of the field over the course of my career has been remarkable. Although there remain enormous gaps to address in knowledge and in practice, given the trajectory of research over the past two decades, I would forecast a healthy future of continued innovation in pediatric chronic pain research.

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With sincere appreciation for the more than 20 years of mentorship, friendship, and support, I dedicate this commentary to Denny Drotar, PhD. I also want to acknowledge each of my mentors, colleagues, mentees, and friends over my career thus far who have made this journey so enjoyable and rewarding.

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References


McGrath, P. J., Walco, G. A., Turk, D. C.,
Dworkin, R. H., Brown, M. T., Davidson, K., . . .
Zeltzer, L. (2008). Core outcome domains and mea-
sures for pediatric acute and chronic/recurrent pain
clinical trials: PedIMMPACT recommendations. 
Journal of Pain, 9, 771–783. doi:S1526-
5900(08)00550-6 [pii]10.1016/j.jpain.2008.04.007
Miller, V. A., Palermo, T. M., Powers, S. W.,
headaches and sleep disturbances in children. 
Headache, 43, 362–368.
Palermo, T. M. (2013). Interprofessional collaboration
within an anesthesiology department: Implications
for the education and training of pediatric psycholo-
gists. Clinical Practice in Pediatric Psychology, 1,
10–17.
dren’s postoperative pain: The role of presurgical ex-
pectations and anticipatory emotions. Journal of 
Pediatric Psychology, 21, 683–698.
atriac ambulatory surgery: Effectiveness of parent-im-
plemented behavioral distraction strategies. Behavior 
Therapy, 30, 657.
Psychosocial predictors of children’s postoperative 
Palermo, T. M., Janicke, D. M., McQuaid, E. L.,
Recommendations for training in pediatric psychol-
ogy: Defining core competencies across training 
Palermo, T. M., & Kisika, R. (2005). Subjective sleep dis-
turbances in adolescents with chronic pain: 
Relationship to daily functioning and quality of life. 
Journal of Pain, 6, 201–207.
study of children’s beliefs concerning the use of anal-
egesics in treating postoperative pain. Children’s 
Health Care, 26, 47–59. doi:10.1207/
s15326888chc2601_4
(2012). Longitudinal course and impact of insomnia
symptoms in adolescents with and without chronic 
j.jpain.2012.08.003S1526-5900(12)00756-0 [pii]
randomized trial of electronic versus paper pain diaries in children: Impact on compliance, accuracy, 
Palermo, T. M., Wilson, A. C., Lewandowski, A. S., 
Behavioral and psychosocial factors associated with 
insomnia in adolescents with chronic pain. Pain, 
152, 89–94. doi:10.1016/j.pain.2010.09.035S0304-
3959(10)00596-8 [pii]
Palermo, T. M., Wilson, A. C., Peters, M., 
Randomized controlled trial of an Internet-delivered 
family cognitive-behavioral therapy intervention for 
children and adolescents with chronic pain. Pain, 
146, 205–213. doi:10.1016/j.pain.2009.07.034S0304-
3959(09)00419-9 [pii]
Powers, S. W. (2014). Logan Wright Award: Team sci-
ence, team care, team training, and team leadership: 
My experience. Journal of Pediatric Psychology, 39, 
Ritterband, L. M., Cox, D. J., Walker, L. S.,
Kovatchev, B., McKnight, L., Patel, K., . . .
Sutphen, J. (2003). An Internet intervention as 
adjunctive therapy for pediatric encopresis. 
Journal of Consulting and Clinical Psychology, 71, 
910–917.
Stone, A. A., Shiffman, S., Schwartz, J. E.,
non-compliance with paper diaries. British Medical 
Journal, 324, 1193–1194.
disability inventory: Measuring a neglected dimen-
sion of child health status. Journal of Pediatric 
Psychology, 16, 39–58.
Wu, Y. P., Steele, R. G., Connelly, M. A., Palermo, T. M., 
ehealth interventions: Common challenges during de-
velopment, implementation, and dissemination. 
doi:jsu022 [pii]10.1093/jpepsy/jsu022