Reflections on Developing Collaborative Research in Pediatric Psychology: Implications and Future Directions

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Objectives Collaborative research with pediatric colleagues has become increasingly important in the professional agenda of pediatric psychology, and there is a continuing need to articulate the challenges of such research. To address this need, this article describes types of collaborative research, reasons for collaboration, collaborative process, challenges, and strategies to facilitate collaborative research.

Methods Experiences and lessons learned over the course of a career in collaborative research are described. **Results** Challenges in collaborative research can be overcome by effective strategies of engagement and communication. Useful methods of training researchers in collaborative research include modeling and supervised mentored experiences in research initiated by trainees. **Conclusion** Data are needed to identify the characteristics of successful collaborative research, strategies to promote effective research, and methods of training and career development.

Key words collaborative research; interdisciplinary research; research training.

Reflections on Collaborative Research With Pediatric Colleagues

Collaborative research with pediatricians has long been a hallmark of the field of pediatric psychology (Kagan, 1965; Routh, 1982; Wright, 1967) and a topic of continuing interest (Armstrong, 2009; Armstrong & Drotar, 2000; Drotar, 1989, 1993, 1995). In recent years, the importance of collaborative research that is developed by interdisciplinary and transdisciplinary teams has become increasingly important in science in general (Bennett & Gadlin, 2012; Buscemi, Stegitz, & Spring, 2012; Wuchty, Jones, & Uzzi, 2007), as well as in the field of pediatric psychology, given expanded knowledge and the growth of large collaborative studies (Armstrong, 2009; Armstrong & Reaman, 2005). The increased emphasis on interdisciplinary team science at the National Institutes of Health (NIH) has also heightened the need to understand the process of

successful research collaboration (Croyle, 2012; Hall et al., 2012; National Institutes of Health, 2008). Moreover, current trends such as the increased emphasis on collaborative training and service provision, especially in primary care, that are anticipated in the Affordable Care Act (Rozensky & Janicke, 2012) and the growing importance of developing interprofessional competencies in a range of activities (Interprofessional Education Collaborative Expert Panel, 2011) enhance professional focus on collaboration.

These trends coupled with the complexity of collaborative research underscore the continuing need to identify and articulate the nature and process of collaborative research, key challenges, potential strategies to manage them, and implications for research in the field of pediatric psychology, including the training of researchers. The purpose of this article is to address this need by describing

lessons learned over the course of a career of collaborative research with pediatricians as primary colleagues and with teams that involved a range of professional disciplines.

Context of My Experience in Collaborative Research

Research collaboration is defined by content, context, and role. For this reason, it will be helpful for readers to understand my experience so that they can judge its potential applicability for their work. During my entire career I have been a faculty member in schools of medicine (departments of pediatrics and/or child/adolescent psychiatry). For a significant part of my career, I was also an active member of the faculty of a department of psychology, where my primary role was to direct and facilitate the training of graduate students in interdisciplinary research in pediatric psychology. As a principal and co-investigator (PI and COI), consultant, and site psychologist on large multisite studies, my experience has included 40 years of collaborative descriptive and intervention research with populations recruited from pediatric clinical settings. My collaborations are also reflected in peer-reviewed publications involving pediatricians and other disciplines and many years of NIH funding for research and graduate and postdoctoral research training that has involved interdisciplinary teams.

Definitions and Types of Collaborative Research

Table I describes the characteristics of collaborative research in several key dimensions: roles in the study, collaborative team functioning, and complexity and scope of the research. One very important dimension is one's specific collaborative role on the project (Armstrong, 2009). Each of these roles has advantages and disadvantages, depending on one's experience, perspective, time, and interest. For example, the role of PI has the advantages

of leadership and potential control of a project (though control is relative in complex clinical research) but the disadvantage of primary responsibility for the conduct of the study. The roles of COI and consultant have the advantage of the opportunity to engage in the intellectual enterprise of research without having primary responsibility for its conduct. Another potential role on a collaborative research project in large multisite studies such as the Diabetes Control and Complications Trial (DCCT Research Group, 1993) or TODAY Study (TODAY Study Group, 2012) is as a psychologist who provides intervention and consultation to the study team at a single site.

The scope and complexity of collaborative research are also important for investigators to consider. As shown in Table I, the continuum of scope and complexity ranges from small studies with two investigators (e.g., a psychologist and pediatrician) who work together in a study conducted at a single site to large multisite studies that are conducted by collaborative teams that may involve any number of different professional disciplines. In my experience, roles on both small and large projects can be rewarding. However, the scope and complexity of the project have clear implications for the specific role, time, and energy required to collaborate effectively. The level of one's experience in research will also influence decisions and capacities concerning role, scope, and complexity of collaborative research projects. For example, early in my career my research focused exclusively on single-site studies with small numbers of pediatric colleagues. I did not participate in or lead large multisite studies until I gained much more experience.

The nature of team functioning in a collaborative research project is another important dimension (see Table I). Key variables that define the functioning of a collaborative team include level of communication, integration, and synergy among the investigators (Gray, 2008; Hall et al., 2012). Armstrong (2009) distinguished among multidisciplinary (i.e., several disciplines doing their work in the same setting), interdisciplinary, which

Table I. *Characteristics of Collaborative Research*

Potential roles in research	Collaborative team functioning (level of communication, integration, and synergy)	Complexity/Scope of research	
		Low	High
Principal investigator	Limited interdisciplinary communication and integration	Low ↓ High	Two investigators, multiple disciplines, at a single site
Co-Investigator	One investigator defines aims and study design with limited help		Multiple investigators, multiple disciplines, at multiple sites
Consultant	Discipline-specific knowledge		
Other specific roles:	Collaborative participation and decision making at all phases of the project		
Interventionist, site psychologist	Unique knowledge developed that transcends single discipline		

involves the integration of knowledge among professions, and transdisciplinary, defined as a high level of integration and synergy across professions that results in a unique vision that cannot be captured by a single discipline. Bennett and Gadlin (2012) have described a continuum of interaction and integration among research teams ranging from investigator-initiated research that involves relatively minimal interdisciplinary interaction to a well-integrated team with shared leadership.

For the purpose of this discussion, the most important idea is the wide variation in the nature of collaborative team research. There is no one size fits all model that is optimal or possible for each and every research project. For this reason, pediatric psychology researchers may want to consider a flexible approach to research collaboration with pediatricians and other disciplines.

Reasons to Collaborate on Research

Research in the field of pediatric psychology, especially research that involves pediatric patient populations, requires content, methodological, and implementation expertise as well as access to patient populations. Early in my career, I learned that I needed my pediatric colleagues to provide expertise concerning the natural history and medical treatment of chronic conditions and its impact on children and families. I also needed their help to access populations of interest and encourage as high a level of participation as possible in an effort to reduce sampling bias, which threatens the validity of studies that recruit from clinical populations (Drotar & Riekert, 2000). The experience of collaborative research can also be very important in developing ideas that guide a research program, facilitating the scholarly products of research, and sustaining one's excitement and interest in research. Finally, successful research collaborations can not only expand one's career opportunities but diversify sources of salary support.

Challenges of Collaborative Research

Although collaborative research has many advantages, it is not without significant challenges (Armstrong, 2009; Bennett & Gadlin, 2012; Drotar, 1989; Gray, 2008). One of the most important challenges is the need to anticipate and manage disagreements and tensions in the collaborative process. Early in my career, I found these disagreements and tensions to be surprising and was disrupted by them. Now, I expect them. For example, in considering an intervention study to promote adherence to treatment to cystic fibrosis, one of the pediatric

subspecialists raised a significant concern that the intervention (in this case family-centered problem-solving intervention) could have a negative effect (i.e., that families who are not accustomed to discussing treatment adherence would experience increased parent-child conflict rather than lower conflict, which had been demonstrated in studies with other pediatric populations). Initially, I was frustrated with my colleagues' reaction. However, in the course of dialogue I conceded that increased conflict could happen as he suggested and noted that we would monitor and manage family stress in conducting the intervention.

Challenges Posed by Differences in Professional Training and Work Demands

Differences in professional training and work demands can create collaborative tensions (Drotar, 1993, 1995). For example, pressures on medical colleagues for patient care coupled with limited mentoring and training for research may limit our physician colleagues' enthusiasm for and interest in collaborative research. The more authoritarian hierarchical training model of professional medicine (Freidson, 1970) may also interfere with the mutual give and take needed for effective collaboration. Physician colleagues may be unfamiliar with the potential contributions of psychologists not only in research but clinical care. Understanding and management of these issues requires training and experience related to interprofessional competency (Interprofessional Education Collaborative Expert Panel, 2011).

The Process of Research Collaboration *Process of Invitation and Continuing Engagement in Collaborative Research*

Collaborative research always begins with an invitation. For example, a physician colleague finds out that you have experience and expertise that are potentially relevant to the study he or she is planning and invites you to work on the study. In another example, you are new to a setting but have some preliminary data and an idea about a new research project. You invite your pediatric colleagues to discuss the research to engage their participation in hopes of recruiting their patients for your research.

As shown in the above examples, effective research collaborations can develop based on mutual need, especially if the invitation and subsequent dialogue are sufficiently attractive to encourage engagement. In deciding whether to develop a collaborative research project with colleagues, I've learned to ask myself some pertinent questions that relate to the collaborative potential of the

research going forward. These are as follows: (1) What are the professional benefits of this research for me in my career and/or my colleague's career? (2) How important is the research? (3) Do I and my colleague have sufficient time and energy to devote to the project? (4) What is the long-term potential of this research to result in meaningful science?

It is often difficult to know how a collaborative research project and relationship with a specific colleague (pediatric or otherwise) will develop. For this reason, I have found that it is critical to learn from one's experience in working together throughout the course of the project. Mid-course corrections to enhance the management of the study and the quality of collaborative interaction may be necessary. For example, one may identify a need to have discussions with colleagues to try to improve or resolve issues in communication, work style, or study organization and implementation (see section on challenges).

Following the completion of a research project, one may have the opportunity to decide whether to continue research with the same colleague or colleagues. Table II describes some benchmarks of collaborative success for both process and outcome that may be useful to consider in making this decision.

In my experience, the quality of the collaboration, especially the synergism and productivity that have developed (or not) in developing ideas, published manuscripts, and/or research grants can play an important role in the decision about whether to continue the work. However, other factors can also affect the decision. For example, colleagues may have the interest but not enough time to continue because their workloads and responsibilities have changed. In other situations, changes in one's research interests or that of one's colleagues may make continuing the research less compelling. Resources such as available

funding and the prospects for future funding also play a role in decisions about future collaborations.

Facilitating Collaborative Research With Pediatric Colleagues

Table II summarizes factors that facilitate success in collaborative research based on my experience. Perhaps the most essential ingredient is the prospect for mutual benefit. For example, colleagues may offer one another a different perspective on a research problem, expertise in a specific content area, or with a specific pediatric population. Although having expertise to offer one's pediatric colleagues is a necessary ingredient in collaborative research, it is not sufficient for success. One's expertise should be visible, accessible, and perceived as useful by pediatric colleagues. For this reason, making the time to meet with colleagues and having the abilities to translate psychological methods and research findings into clear and concrete language, and to listen and integrate colleagues' perspectives in study design and implementation can all go a long way toward promoting effective collaboration.

However, even considerable expertise and skills will not result in effective collaborative research unless your colleagues know about you, your research expertise, and interests. Multiple strategies can be useful in promoting research collaboration: For example, in some situations, colleagues may find out about your interests by working with you in patient care. My early research on clinical conditions such as cystic fibrosis and failure to thrive developed from collaborations with pediatric colleagues in patient care (Drotar, 1995, 2001). However, it is not always possible or necessarily desirable for research to develop from collaborative clinical care. Other strategies that I've found useful and still use to further collaborative

Table II. Factors That Facilitate Collaborative Research and Benchmarks of Success

Benchmarks of collaborative success		
Facilitators of collaborative research	Process indicators	Relevant outcomes
Resources:	Establish collaboration	Successful completion of collaborative project
Time	Sustain collaborative relationship	Scientific advances
Energy	Develop effective working relationship	Peer-reviewed publications
Compelling, interesting, research question	Mutual excitement and intellectual satisfaction	Research grants
Funding		
Skills/expertise:		
Communication skills		
Content expertise		
Population expertise		
Interest in learning from collaborators		
Initiative		

research are presenting information about my research at grand rounds, getting my research on the agenda for colleagues' division meetings, attending and speaking up in teaching, research, and case conferences organized by pediatric colleagues, and arranging meetings with colleagues to discuss prospects for new research projects.

Honesty about the limits of one's expertise coupled with an interest in learning from one's colleagues can also facilitate research collaboration. For example, admitting that you do not know the answer to a question posed by a colleague, especially if it is a question that has not been addressed in the field, can open the door to fruitful collaborative dialogue about areas of research. Moreover, recognitions of the limits of collaborative expertise can also lead to decisions to contact and recruit colleagues with areas of expertise that complement and extend those that are not represented in the research team (e.g., biostatistics, anthropology, nursing, pharmacology, etc.).

Involving a Range of Professional Disciplines in Collaborative Research

Relationships between pediatricians and pediatric psychologists can be a cornerstone of collaborative research in many cases. However, the complexity of many studies and areas of science necessitates the expertise of other professional disciplines for optimal development of the research. Pediatric psychologists can be influential in enhancing such involvement. I have found that one important role that I have had in research with pediatric colleagues was to facilitate connections and collaborations with other researchers from other professional disciplines and/or psychologists with complementary specialized expertise. Examples from my own experience include involving an anthropologist to help understand the complex family context of failure to thrive and economic disadvantage (Drotar, 1991), engaging child development expertise to measure the information processing of young children with HIV infection (Drotar et al., 1999), or helping to facilitate interdisciplinary teams that included oncology, nursing, anthropology, bioethics, and biostatistics (Kodish et al., 2004).

Implications for Training Researchers in Collaborative Research

Research training in pediatric psychology takes place in a larger context of skill development that forms the foundation for collaborative research (Drotar, Palermo, & Landis, 2003a, 2003b; Madan-Swain et al., 2012). That said, what

are the special ingredients of training in collaborative research? First, I have found that it is important for mentors to model the experience of successful interdisciplinary collaborative research as well as the challenges of such work for their trainees. There are a number of ways to do this: For example, joint presentations by mentors and pediatric colleagues that address not only the content and outcomes of collaborative research but the process, especially the challenges that were encountered, can be helpful to trainees. Mentors can also engage their students and fellows in discussions of their experiences in collaborative research with specific case examples to illustrate challenges and strategies. Finally, wherever possible, it has been very helpful for trainees to have the experience of observing the interdisciplinary collaborative process in action (e.g., planning and implementing research with pediatric populations, discussing data analyses and manuscripts based on collaborative research, etc.). For maximal learning, such observations might include opportunity to discuss and process the challenges and lessons learned (e.g., What did you observe? What was effective? What was not? What would you have done differently?).

To my mind, the most critical training opportunities involve supervised mentored experiences in collaborative research that is initiated by trainees. Although the prospect of initiating or leading a research study conducted with faculty colleagues, including pediatricians, can be daunting, it is an essential context in which leadership skills for interdisciplinary research can be developed. In developing such training experiences, mentors might wish to consider the match among the collaborative team, the nature of the research project, and the trainees' research interest, level of skill development, and initiative. For example, in some situations it has been productive to involve students or fellows in specific roles in already existing collaborative teams such as in helping to implement an intervention protocol or in taking the lead on a manuscript based on an existing data set. At a more ambitious level, some advanced graduate students have facilitated the design and implementation of studies by adding their own ideas and energies (Walders et al., 2006). In such situations, a trainee joined an already formed interdisciplinary team that included the mentor. Ideally, the mentor needs to be an integral part of the team's structure and readily available to give guidance to the mentee concerning the research, the team's process, and management of any collaborative tensions that may arise.

Another approach that has been successful with advanced graduate students and fellows has involved mentoring them in taking a leadership role in developing and implementing a research project in collaboration with

physician colleagues and other disciplines as relevant (Hart, Drotar, & Levin, 2007; Palermo & Drotar, 1999; Robinson, Drotar, & Boutry, 2001). In this model, the trainee designs and implements a study with a specific patient population working closely with the mentor and pediatric collaborators. Several key factors are necessary to make this approach work such as a highly competent trainee who is comfortable in taking the initiative in leading and managing research; a good working relationship (though not necessary a history of collaborative research) between the mentor and pediatric faculty members who are involved in the research; and the availability of the mentor for support and problem solving to address any challenges in collaboration and implementation that may arise.

Future Directions

My career-long experience in collaborative research has taught me a great deal and also underscored important unanswered questions that I hope will be addressed in future work. For example, one unanswered question is: What are the characteristics of successful collaborative research that distinguish it from an unsuccessful collaboration? In my experience, successful collaborative research depended on mutual need, availability of time, trust, and developing momentum and initial success in the research. However, the primary data I have to support this is personal experience. Data based on the experiences of other researchers working in collaborative teams and direct observations of successful versus unsuccessful collaborative teams would be especially instructive (Hall et al., 2012).

A second important but as yet unanswered question is: How does one promote the development of a successful collaborative research team? My experience underscores the importance of factors such as initiative in identifying collaborations and promoting collaboration, demonstrating interest in colleagues' work, communicating clearly, and contributing to the scientific impact of the work. However, the perspectives of other researchers and observational data pertaining to this question are very much needed. For example, Hall et al. (2012) described a four-phase model of collaborative team-based research: development, conceptualization, implementation, and translation, as a potential model. Observational research is needed to describe variations in team process and then link it to relevant outcomes.

Another important area for future research concerns the application of specific strategies and tools to improve the efficacy of collaborative research teams. For example, Buscemi Steglitz, and Spring (2012) described

interventions to promote team development in clinical care that might be useful to apply with research teams. Bietz et al. (2012) described case studies of the application of an online evaluation and reflection tool to enhance collaborative research: the Collaborative Success Wizard, which has potential for application in collaborative teams in pediatric psychology.

Research is also needed on models of training for leadership of collaborative research to address the question: What training experiences are the most helpful and influential in training future researchers? My experience has underscored the importance of trainees' involvement in collaborative research in multiple roles in the context of multiple studies. However, developing such training opportunities can be a tall order to accomplish, especially in academic psychology settings that may not have ready access to pediatric hospitals and pediatric collaborators. For this reason, description of training models and experiences that have been successful in diverse settings would be very helpful.

Research on the career development of researchers who have been trained in collaborative research would be instructive. There are many questions to be addressed: How many of our trainees are currently involved in such research? To what extent are they meeting objective benchmarks of success in collaborative research (e.g., collaborative publication, research grants)? What do former trainees regard as the experiences and skills that are most critical in developing their careers? What are the characteristics of training programs and opportunities that have all associated with greater versus lesser success in collaborative based on objective benchmarks?

Finally, my experience does not address the range of potential career trajectories by which psychologists can become successful collaborators in interdisciplinary research. For example, other options include extending formal training via the K award mechanism at NIH or other sources with an interdisciplinary team of mentors who provide expertise in a broad range of areas that are relevant to the faculty members' interest. Moreover, ongoing guidance, consultation, and mentorship by senior investigators concerning tactics, strategies, and decisions concerning collaborative research can facilitate career development.

Pediatric psychologists have critical roles to play in leading and participating in collaborative interdisciplinary and transdisciplinary research (Armstrong, 2009). For this reason, it is important that we continue to assume leadership roles in developing successful collaborative team research and mentoring researchers to assume such roles. In this spirit, the contribution of pediatric psychologists to

collaborative research should be featured in scientific presentations and publications, including the Society of Pediatric Psychology's newsletter.

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