

Supplement Article

Practice-Based Research: Another Pathway for Closing the Research–Practice Gap

Pamela J. Crooke^a and Lesley B. Olswang^b

Purpose: Practice-based research is proposed as an additional way to bridge the divide between research and practice.

Method: The article compares the traditional, laboratory-based research with research that is generated from practice: practice-based research. The defining features of each are described, with an emphasis on contrasting internal and external validity. Retrospective and prospective practice-based studies are described. Guidelines for designing a retrospective study are provided along with a specific example from practice focusing on social communication learning. Last, the authors discuss the value of information generated from practice-based

research for contributing to the knowledge base of not only a practice, but also a discipline.

Conclusion: The argument is made that approaching research from more than one perspective is necessary for ultimately improving the quality of client and patient care. Practice-based research acknowledges the value of understanding clinical decision making in everyday contexts as an important complement to evidence generated in laboratories. This article is intended to invigorate interest in the uniqueness of practice-based research as a way of encouraging the talents of researchers and practitioners as they work together to gather evidence for improving the lives of individuals with communication disorders.

In recent years, considerable interest has surfaced regarding the research-to-practice gap in communication sciences and disorders and, most importantly, ways to reduce it (as exhibited by the American Speech-Language-Hearing Foundation, 2014, and this supplement). Ideas for bringing evidence-based knowledge into practice include making research findings more accessible to practitioners through practice portals, systematic reviews, and practice guidelines. Recent emphasis on “implementation science” acknowledges the challenges of moving evidence through the research pipeline from bench to practice. Although this approach is an argument for the need to address practice needs and emphasizes the importance of research–practitioner collaboration, it too is based on a “one-way path” or “push” approach of moving research findings into practice. One can argue that prevailing wisdom has been that if evidence-based knowledge via controlled research studies is brought to bear on practice, the result

will be more effective and efficient care for patients (Grol & Wensing, 2013). Perhaps, however, those making efforts to improve practice would do well to consider supplementing and complementing customary sources of evidence with other sources of evidence, namely, from practice-based research (PBR).

Bidirectional Research Approach for Closing the Research–Practice Gap

This article examines the prevailing wisdom of moving evidence into practice as defined by the traditional research pipeline that has been viewed as the gold standard in health care. In comparison, evidence that comes from practice is explored as an alternative research-based paradigm that complements the traditional approach. Research originating within the research and practice setting is explored as a way to more effectively close the research–practice gap. PBR is defined, including principles and methodological guidelines. To illustrate PBR, retrospective data from an existing, highly utilized methodology for teaching social knowledge and behaviors to individuals diagnosed with social learning challenges, including autism spectrum disorders (ASD), is

^aSocial Thinking, San Jose, CA

^bUniversity of Washington, Seattle

Correspondence to Pamela J. Crooke: pcrooke@socialthinking.com

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presented. The value of these data is discussed from the perspective of not only informing the individual practice, but also the broader application to intervention for individuals diagnosed with social learning challenges and the impact of that knowledge across the discipline of communication sciences and disorders (CSD). We conclude with an appeal for multiple approaches to clinical research, particularly recognizing the value of PBR as another important way of closing the research–practice gap for speech-language pathologists (SLPs) and audiologists.

Traditional Research Pipeline

During the last 20 years, considerable gains have been made in research investigating causal relationships between scientific breakthroughs supporting treatments and behavioral change in individuals with communication disorders (American Speech-Language-Hearing Association, 2015). The accomplishments in science have by and large been products of the traditional health care research pipeline, which has been described as a continuum from basic science discoveries to clinical application in research settings under controlled conditions (efficacy research) to testing in applied settings under more natural conditions (effectiveness research) and, last, to the broader application in the population at large (implementation research; Mittman, 2014; Robey, 2004). The research paradigm that moves along this continuum follows several agreed-upon principles, including that the research should be theory and hypothesis driven; seek causal relationships on the basis of experimental designs (with the randomized control trial being the ultimate, gold standard); be prospective in data gathering; give priority to standardized, quantitative research instruments; and be summative in nature (Dodd & Epstein, 2012; Epstein, 2001). In this paradigm, researchers may acknowledge and seek input from clinical stakeholders (practitioners, administrators, parents); however, decisions are primarily driven by research requirements rather than clinical preferences.

Over the years, scientific rigor for enhancing the ability to claim causal relationships has been emphasized by a number of entities that have focused on improving the quality of the design, evaluation, and reporting of health-related research. Consider for example the Cochrane reviews (Cochrane Library, 2015) and the CONSORT (Schultz, Altman, & Moher, 2010), which have provided standards that have impressively boosted the internal validity of applied research. By controlling as many threats to validity as possible, through randomization and blinding for example, the researcher is optimizing his or her chances of “proving” the relationship between independent and dependent variables. The problem, of course, is that the emphasis on internal validity runs the risk of compromising external validity—that is, the relevance, generalization, and applicability to other individuals and settings. This disruption of balance between internal and external validity has been well articulated by Lawrence Green and Russell Glasgow (Glasgow et al., 2006; Green, 2008; Green & Glasgow, 2006; Green & Nasser, 2012). Green offers suggestions for

improving external validity in traditional health care research (Green, 2008; Green & Nasser, 2012) but concludes, “The most promising lines of remedy have been in bringing the research (or even better, producing the research) closer to the actual circumstances of practice” (Green, 2008, p. i23). Inherent in this paradigm shift is that research generated from practice can not only address circumstances particular to patients, but also provide more immediate feedback to the practitioners themselves. “The promise of this ‘pull’ approach has led to the suggestion that if we want more evidence-based practice, we need more practice-based evidence” (Green, 2008, p. i23).

PBR

Importantly, the arguments being made are not that research should neglect internal validity, but rather that the focus on efficacy should be supplemented with different kinds of research (Kazdin, 2008). The value of PBR is its (a) identification of problems that arise in daily practice, (b) perceived relevance by practitioners, (c) utilization of a “real-world laboratory” for testing whether system improvements in care are truly effective and sustainable, and (d) full engagement of clinical stakeholders (Green & Nasser, 2012; Westfall, Mold, & Fagnan, 2007).

What exactly is PBR? Epstein (2001) has defined PBR as “the use of research-inspired principles, designs and information gathering techniques within existing forms of practice to answer questions that emerge from practice in ways that inform practice” (p. 17). This is to be contrasted with practice-based evidence that is generated by clinicians who are actively posing questions and collecting data to evaluate management decisions for individual clients (Appel, 1999). For example, clinicians raise questions such as, “Is my client responding to the treatment program?”, “Is significant, important change occurring?”, and “Is treatment responsible for change?”. To answer such questions, clinicians are urged to collect appropriate quantitative and/or qualitative treatment, generalization probe, and control data for making informed decisions about service delivery for their clients (Olswang & Bain, 1994). We wish to reiterate the importance of this type of evidence generated by clinicians as a critical part of evidence-based practice but contrast it with evidence that comes from research that is generated from a broader context, that of the practice. PBR is just that: research. It is designed to systematically investigate a question that goes beyond a specific client but is capable of contributing generalizable knowledge to a larger audience as a practice and a discipline. Researchers and practitioners interested in PBR uniquely address clinical questions that focus on intervention protocols used in everyday settings. In many parts of the country, groups of practitioners have joined together with academic researchers to ask and systematically answer clinical and organizational questions central to primary health care; the term *practice-based research networks* (PBRNs) is used to describe such groups.

PBR and the evolution of PBRNs have a strong history in the United States, with their origin in medicine and the primary care physician (see Green & Hickner, 2006; Westfall et al., 2007). Indeed, this was one of the initiatives that originated with the NIH Roadmap launched in 2004 to transform the way biomedical research was conducted, such that findings would better translate to practice (adapted from NIH Roadmap, <http://www.niehs.nih.gov/funding/grants/announcements/roadmap/>). PBR and PBRN reflect the growing commitment of practitioners to work with academic or organizational researchers to expand the science base of evidence and investigate questions of importance to clinical practice. Today, the Agency for Healthcare Research and Quality is a leader in funding a large number of PBRNs across the United States.

The orientation of most clinical scientists in CSD, not unlike many other disciplines, is not in the direction of PBR. This is not to say that clinical researchers in CSD have not investigated interventions and service delivery in practice settings (see, for example, Tambyraja, Schmitt, Farquharson, & Justice, 2015; Wilson, Rochon, Mihailidis, & Leonard, 2012; and discussion in Olswang & Bain, 2013). What has not been present to a significant degree is research that investigates questions that arise from practice and follow the practitioner's lead. This promising approach to closing the research-to-practice gap clearly deserves earnest consideration. To start this conversation, we turn now to discussing the PBR paradigm.

Defining Characteristics of PBR

PBR uses the elements of any scientific study: research questions that addresses a specific problem and rigorous methods, including collection, reduction, and analysis of data that will appropriately answer the research question. PBR research follows several agreed-upon principles (adopted from Dodd & Epstein, 2012; Epstein, 2001). First, the research should be driven by practice wisdom on the basis of respected theoretical constructs from a discipline. The research questions should most importantly be significant to the practitioner and emerge from practice. These questions explore the population being served, the needs of that group, the intervention protocols being used, and the outcomes achieved (particularly functional outcomes). Second, the research questions are primarily seeking descriptive or correlational knowledge (rather than causal relationships); therefore, the research utilizes a variety of designs, including nonexperimental or quasiexperimental. Further, the designs may be retrospective (using existing data) or prospective (using original data). Third, data gathering is accomplished through routine practice and includes both qualitative and quantitative measures that are tailored to practice needs (rather than primarily standardized instruments). Fourth, PBR is formative in nature. Practitioners use the results of PBR to inform routine practice, to assist in planning, and to provide a continual examination of the impact of intervention. Yet the results often have broader application and serve to inform a discipline. Last, PBR by definition utilizes a collaborative research

model and, as such, requires that practitioners be a part of the scientific process. PBR is seen as an ideal two-way interaction between individuals who identify themselves as clinical researchers and individuals who identify themselves as practitioners. Together, they address questions of interest in clinical practice. The researcher's consultation role is to emphasize the scientific rigor of the investigation, but the research is always driven by practice routine and priorities. To summarize the value of PBR in a climate in which evidence-informed practice is demanded, Westfall et al. (2007) argued the following in regard to research in health care and in response to the NIH Roadmap,

Practice-based research may be the best setting for studying the process of care and the manner in which diseases are diagnosed, treatments initiated, and chronic conditions managed. It is in practice-based research where effectiveness can be measured, where new clinical questions may arise, where readiness to change and adopt new treatments can be studied and addressed, where patient knowledge and preferences are encountered and managed, and where the interface between patients and their physicians can be explored and medical care improved. Practice-based research is the final common pathway for improving individual patient care and outcomes. (p. 405)

Value of Retrospective and Prospective Studies

As can be appreciated from the discussion thus far, PBR, as with other forms of research, can address a wide range of questions, studying a variety of participants and using different designs and measures. Retrospective and prospective studies are both valued in PBR for the information they can provide to practitioners and the discipline. Epstein and Tripodi (1977) identified three types of studies that PBR address: *needs studies* (identifying the practice needs for a particular clientele in different settings), *monitoring studies* (identifying if particular clientele are receiving services that are needed and what these services look like), and *outcome studies* (determining short- and long-term outcomes for services being received). Retrospective research involves looking back in time for data that can inform each of the three types of studies. For needs studies, existing data from charts can provide a picture of what practitioners view as important in their practices. Data may be available to examine variations across geographic areas or settings. For monitoring studies, existing data can reveal what types of clients (i.e., according to diagnoses) are getting particular services and at what frequency. These data would suggest what aspects of a disorder are primarily treated and how, informing practice trends in a discipline. Last, for outcome studies, accessible data can suggest what factors predict success in a treatment (e.g., socioeconomic status) and the nature of that success (e.g., dismissal rates). These factors tend to be described as suspected risk or protection factors in relation to the observed outcomes. Retrospective research is often appropriately open to criticism because of a variety of confounding and bias sources. The true weakness of

the retrospective study is that the question and the patient, intervention, and outcome variables are restricted by the data that have been collected. Thus, questions grow out of the data rather than drive the data. However, the data can also be perceived as strengths, in that they uniquely capture routine practice without interfering with it. As such, much can be learned about practice priorities and preferences, particularly in the context of perceived needs in a community.

In contrast, prospective research involves looking forward in time, again including needs, monitoring, and outcome studies. The value of a prospective study is that the question can be original, driven by what the practitioner wishes to learn, not by data that have previously been collected. As such, the data that are valuable for answering a particular question can be created, vetted, and collected over time. Data about the patients, the administration of the intervention, and outcomes can be tailored to the research questions that address the clinical needs of a population, monitor services that are routinely implemented in practice, and examine outcomes of services. For example, data collection can be designed to survey practitioners' challenges in delivering treatment to individuals with degenerative disease (a needs question). Or data can be collected to capture caseload size and service delivery dosage patterns (monitoring question). Last, data can be collected on client change outcomes, such as clients' school detention rates post social-communication intervention. In addition to designing well-controlled prospective data-collection methods, information regarding possible confounding variables and biases can also be collected, thus supporting more reliable and valid data and results. Prospective PBR requires thoughtful planning by the researcher and practitioner as they develop research questions and design methodology. Prospective PBR research can and should meet rigorous scientific standards. As with any PBR study, the results not only inform the practice that originated the research, but will have broader, generalizable application to the discipline. For guidelines in planning prospective PBR, readers are urged to access Dodd and Epstein (2012) and Horn and Gassaway (2007) for guidance.

Roles of Practitioner and Researcher in the Collaboration

A unique aspect of PBR is the relationship between the practitioner and the researcher. PBR relies on understanding that a true partnership must exist between the two professionals. Understanding the partnership begins with appreciating that "in settings such as education, social work, and child welfare, the practitioner *is* the intervention" (Fixen, Blasé, Naoom, & Wallace, 2009, p. 532). The expertise of the practitioner lies in applying and translating evidence within the parameters of practice. The practitioner, therefore, is responsible for deciding "what works, for whom, and in which contexts" (Robson, 2002, p. 120). Researchers go about the business of systematically investigating questions that will increase the evidence for a particular discipline. The strength of PBR is the recognition that the practitioner-researcher collaboration is a symbiotic partnership. In essence, there is an unspoken understanding that

one's contribution or participation in discovering evidence potentially benefits the other.

Because of their different roles, the researcher and practitioner must recognize what each can bring to the process. A very simple example is in regards to time. PBR is as time consuming as any type of research. For the practitioner, time for research is typically a new phenomenon and must be conceived in light of other duties. The practitioner's role involves generating the research idea, obtaining agency support, fielding policy regulations, and providing data. Most importantly, the practitioner contributes to the motivational drive for completing the research, including generating buy-in by practice colleagues. The researcher serves as consultant to guide the science and ensure its rigor. He or she understands the time demands and contributes in a variety of ways to the smooth running of the research. This can include offering resources, such as providing student help for various aspects of the methodology and leading the publication efforts.

Communication between the researcher and practitioner ultimately must consist of a two-way feedback loop in which the issues of the practice are addressed throughout the research process. Importantly, the team needs to constantly strive for a rigorous process that results in trustworthy evidence. Both the researcher and practitioner must be willing to educate one another about the limitations and needs of the research (fidelity and internal validity) and the real-world application (adaptation, external validity, and feasibility).

Clinical Data Mining in Retrospective PBR

To further explain PBR, we explore one type in detail—the retrospective study that utilizes a clinical data mining (CDM) strategy—and provide an example relevant to CSD. Details about the purpose and value of this type of retrospective study are provided along with a basic guide for conducting such research. This is followed by a specific example to illustrate the PBR retrospective CDM process. In 2001, Irwin Epstein wrote a seminal article addressing the value of available clinical data for use in PBR (i.e., the retrospective study). He referred to this strategy as CDM. His motivation for pursuing this line of research was in response to the criticism that social work treatment lacked evidence, even though practitioners typically had collected an abundance of nonintrusive data. He argued that these unexplored data had potential for answering PBR questions and contributing to the evidence in social work. Thus began a series of research studies and publications describing and supporting CDM in health care (Dodd & Epstein, 2012; Epstein, 2001, 2009, 2011; Sainz & Epstein, 2002). "Simply stated, CDM is the extraction, analysis, and interpretation of available clinical data for practice-knowledge building, clinical decision making, and practitioner reflection" (Epstein, 2011, p. 4). Epstein (2001) argued that available clinical data can reveal rich accounts of patient needs, the interventions that are routinely delivered, and patient outcomes. Further, with appropriate statistical analyses, these data can yield approximate effects of the interventions (Epstein, 2001).

Methodological Steps in a Retrospective PBR Study

The description that follows, which is based on guidelines by Epstein (2009, 2011), is meant as an outline for conducting a retrospective PBR study that utilizes a CDM strategy. It provides a framework for understanding the general structure of this type of research and decisions. Importantly, the research decisions should appear familiar in that they mirror any rigorous scientific inquiry. The research planning described below is oriented around practitioner and researcher collaboration, hereafter called the *research team*; it unfolds in steps that are illustrated in Figure 1.

Step 1: Consider the Research Questions

PBR research questions evolve from a practice issue or challenge rather than theory alone. To narrow the questions, the research team must have a solid understanding of the practice. The process starts by the practitioner explaining what the practice/intervention is trying to achieve, including who is being served, the nature of the intervention, forms of evaluation, and potential barriers to success. The focus of the research needs to be defined: Is it about the needs of a particular population or monitoring services currently being implemented or outcomes of a particular treatment? The focus is dependent upon practitioner interest and the data that are available in the practice/agency. Importantly, Epstein (2009) noted that PBR is not about justifying a program and proving that an intervention works. Rather, the research questions are designed to generate interesting findings that not only inform the practice, but also can expand knowledge in a discipline.

As with any social/behavioral research, the questions drive the PBR methods. Methods are anchored around the primary independent and dependent variables, namely, participants, intervention, and outcomes, and the data that corresponds to each. The steps that follow outline data categories, followed by consideration of their availability, extraction, reduction, and final analysis.

Step 2: Determine the Independent and Dependent Variables Data Categories

Participants refers to the individuals who are the focus of the research, whether they are practitioners, clients, family of clients, and so forth. For example, research could focus on describing the various practitioners who serve a particular population, and data would include demographic information. *Intervention* refers to the treatment that is administered by a practitioner to a client. *Outcomes* refers to expected change as a result of the intervention. Table 1 provides a summary of the types of data under each category that may be of interest in PBR research.

Step 2a: Determine availability of raw data. The unique part of a retrospective PBR study is that the methods start by considering the raw data that are available per category and in what form they exist. Thus, Epstein's (2001) concept of CDM applies. Most research teams first explore quantitative data that the practice has been routinely collecting, typically for accountability or monitoring purposes. For example, charts may contain raw data about the diagnoses of clients. The team should consider how these data could be valuable in the context of a research question, for example, regarding caseloads. Second, qualitative data that can be converted to quantitative data are considered. For example, charts may contain notes in a log regarding interventions that have been administered; such information could be translated to quantitative service delivery information (e.g., 70% of a clinician's caseload received individual treatment, and 30% participated in group treatment). Last, the team might consider qualitative data that have been collected, which can be coded and examined for themes. For example, detailed notes collected during practitioner planning meetings might yield valuable data about practitioner beliefs or client preferences for intervention.

Determining what raw data are available includes identifying the form in which the data exist (i.e., as computerized data entries, handwritten notes/charts, surveys, questionnaires, phone records, etc.). Importantly, determining available data will be affected by agency/organization

Figure 1. Retrospective practice-based research planning steps (original figure based on Epstein, 2009).

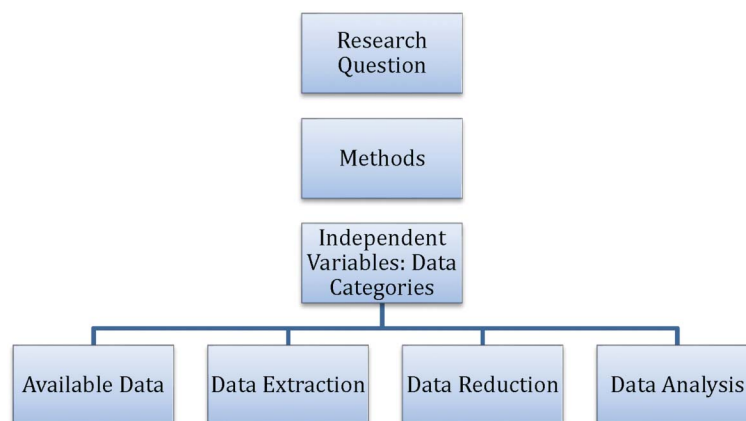


Table 1. Summary of retrospective practice-based research data categories and examples.

Category	Examples of data
Participants: Who is the focus of the intervention (can be clients/patients or practitioners, depending upon the questions)	Demographics (gender, age) Psychosocial factors (education, experience) For clients/patients: Diagnoses Service needs Service recommendations Service requests Family involvement
Interventions: What has been administered	Type of intervention (1:1, group) Frequency Intensity Multidisciplinary Setting/context Objectives
Outcomes: What are the changes that appear related to intervention	Short term Long term Near–far transfer Quality of life

access policies. Epstein (2009) offers a full description of concerns, cautions, and politics for accessing data.

Step 2b: Consider data extraction. Data availability and accessibility lead to data extraction decisions. Epstein (2009) advises determining the unit of analysis and time frame for analysis, both of which are decided on the basis of the research question. *Unit of analysis* refers to the cohort of study. For example, is the research about a group of practitioners in one practice, two practices? Or, if the research is about clients, are they grouped by age, diagnosis, or gender? *Time frame* refers to the sampling window for the cohort of interest in the context of the research question. Is the best window for analysis 1 month, 1 year, or a school term? Epstein (2009) also suggests typical development may serve as a guide for determining the window of analysis (e.g., what is the window for typical development of a particular linguistic structure, such as *ing*). Or perhaps the extant literature can help determine the sampling window? Importantly, when determining the window for examining a particular aspect of a practice, the practitioner should verify that nothing unique was occurring in the practice that might influence the results (e.g., major changes in staff or structure of the practice). As in any sampling, the researcher should consider sample size; power analyses can be valuable (see Epstein's 2009 discussion in regards to CDM).

Step 2c: Determine data reduction. As with any research, data need to be converted to a form suitable for analysis. Behavioral information that has been tallied to yield quantitative data will need to be further reduced for analysis (e.g., totals, percentages, averages, etc.). Qualitative data need to be coded so that they can ultimately be grouped into themes for interpretation (see for example, thematic analysis, Braun & Clarke, 2006). These procedures are no different for PBR than for conventional applied research in

the social sciences. Reliability for coding and collecting quantitative data and credibility for interpreting qualitative data need to be addressed. Epstein (2009) noted that available data often appear to be quite easily reduced because the actual data should be transparent in their coded form. Consider, for example, the data that are collected via questionnaires about caseload size, on which practitioners have made daily entries about numbers of clients treated. These data should be straightforwardly collected and reliable. Consider another example, in which practitioners have noted length of sessions. Although these data appear as though they should be easily collected, one might question whether all practitioners used the same data-entry guidelines. Did they all define time to the exact minute, or did some round? These challenges are numerous in PBR and require close attention during data reduction. Of course, these issues are magnified when the research cuts across several practice settings. Epstein (2009) urged practitioners to be actively involved in this aspect of data reduction, to demonstrate the importance of clear instructions for data collection, and to amplify what are potential concerns for the believability of the data. At this point in the methods, the team needs to consider missing data, ambiguous data, and incorrect entries and how they will be influenced and handled in data analysis. Importantly, data extraction and reduction are terribly time consuming, a point discussed earlier in regards to the practitioner–researcher roles.

Step 2d: Decide data analysis. Advice for the research team is to start simple. For quantitative data, descriptive information will prove to be valuable, including frequency, percentages, and measures of central tendency for groups. The research questions, of course, drive the analyses, and these descriptive measures will be particularly revealing in regards to predictive variables, intervening variables, and dependent variables. Starting simple and letting the complexity unfold is the responsibility of the researcher on the team, but always in the context of what is important to the practitioner.

PBR Exemplar

To illustrate PBR as guided by Epstein (2009), we report on a portion of a retrospective study examining a widely utilized methodology (Social Thinking [ST]) that addresses the social communication and social learning challenges in individuals with ASD and similar disabilities. These data were obtained as part of an implementation survey solicited from attendees of ST training events. The ST methodology is grounded in research-based theoretical concepts that have been shown to underlie social communication (e.g., joint attention, inferencing, theory of mind, etc.; Baron-Cohen, 2000; Charman et al., 2000; Hughes & Leekam, 2004; Landa, 2000; Mundy, Sigman, & Kasari, 1994; Norbury & Bishop, 2002; Tomasello, 1995). These theoretical concepts are then realized within frameworks for organizing the concepts and strategies for guiding intervention. These frameworks and strategies ultimately yield

lessons and activities that are delivered by a variety of consumers to individuals with social learning challenges but who have solid-to-strong language and cognitive skills. Three examples of this theory–strategy connection are as follows: *Thinking with eyes* is a strategy within the ST methodology. Lessons and activities related to this strategy are designed to teach individuals that the use of one’s eyes can yield important information about the context for interpretation as well as indicate social attention to the communicative partner or to a shared referent. The theoretical concept underlying this strategy is joint attention. *Joint attention* is a rudimentary concept that is known to be critical for the development of engaged, contingent communication between children and caregivers (Dunst, Trivette, Raab, & Masiello, 2008; Tomasello, 1995) and, ultimately, later language development (Mundy & Acra, 2006). Further, joint attention has also been shown to be challenging for individuals with social learning issues (Dawson et al., 2004; Mundy, Sigman, & Kasari, 1990). Another example is the strategy of listening with one’s whole body, or *whole-body listening* (Truesdale, 1990). Activities and lessons for whole-body listening are related to the research-based concept of developing executive functioning for self-control (Barkley, 1997; McClelland, Cameron, Wanless, & Murray, 2007). ST lessons and activities are designed to make the abstract concept of listening more concrete for individuals who are literal, a characteristic common to those with ASD (Hobson, 2012; Minshew, Meyer, & Goldstein, 2002) and other language-based disabilities (Bishop & Adams, 1992; van Kleeck, Vander Woude, & Hammett, 2006). The terms *expected* and *unexpected* represent a third example of a strategy within the ST methodology. The lessons and activities related to this strategy focus on teaching individuals to become active observers of the people and the context within a social situation. Through observation, individuals are taught to explore the hidden rules (Myles, Trautman, & Schelven, 2004) and ultimately determine which social behaviors are expected or unexpected on the basis of that knowledge (Winner & Croke, 2009). The theoretical concepts underlying this strategy are inferencing and theory of mind: two challenges commonly reported in the literature related to individuals with ASD and similar disabilities (Baron-Cohen, 2000; Bishop & Adams, 1992; Nokes, 2008; Norbury & Bishop, 2002; Robinson & Westby, 2009).

The retrospective study was designed as a combination needs and monitoring study. The example presented here concerns the portion of the retrospective study that revealed the following: Who uses the methodology? Why is the methodology appealing? What specific strategies within the methodology are of value and considered critical to all consumers? This information was desired by the practice to determine which specific aspects of the methodology are embraced by consumers and why. The findings would suggest to the practice what consumers perceive as needs and serve as a source for monitoring their current practice in regards to serving individuals with social learning problems. In a practical context, such information would allow the practice to better understand the audience in regards

to what consumers perceive as key ingredients for intervention, which in turn could help in developing and refining training materials and generating outcome measures related to those ingredients. From a broader perspective, the information would provide a glimpse into the consumers’ knowledge of social communication and social learning and their beliefs about which aspects of theory are important in practice. The latter could well be important for the discipline of CSD. The specific research questions addressing the who, why, and what were as follows:

1. Who is using the ST methodology? What proportion are SLPs versus other professional consumers?
2. Why do consumers use the ST methodology? What are the three most frequently selected reasons for adopting the ST methodology across all consumers and specifically for SLPs?
3. What are the three most frequently selected ST strategies across all consumers and specifically for SLPs?

Methods

Participants

Initial participants included 1,664 consumers who responded to implementation surveys, representing 15 different professional consumer categories (e.g., SLPs, social workers) and six nonprofessional consumer categories (e.g., parents, family members) from six countries, five Canadian provinces, and 36 states representing five regions of the United States (i.e., Northwest, Southwest, Midwest, Northeast, Southeast). For the purposes of this retrospective study, surveys from professionals only were extracted from the full data set, bringing the total sample to $N = 1,634$. Data were collected during and after 17 ST training events held at either conferences or workshops over the course of 1 year (2014–2015). Participants were recruited via one of four methods, and each training event offered only one of the following options for participation: (a) paper survey distributed at the training event combined with an announcement directing participants to the presence of a paper implementation survey included in their conference folder, (b) paper surveys distributed on tables or in folders at the training event (no announcement), (c) a PowerPoint slide at the training event showing a web-based link to an electronic version of the survey, or (d) an e-mail link sent to participants after the conclusion of a training event. All survey responses, including narrative data, were entered into an electronic survey site, <http://www.fluidsurveys.com>, for later extraction and analysis.

Data Collection

The implementation survey consisted of 14 total questions, but for the purpose of this study, four questions were extracted for examination. They focused on the who, why, and what of ST use. The “who” question asked,

“Who are you?” and provided 21 choices (e.g., special education teacher, SLP, social worker, etc.). Individuals were allowed to check one or more category given the multifaceted role of many professionals in schools or clinics. For example, SLPs can be administrators and/or behaviorists. The “why” question asked, “Why use Social Thinking?” and offered 18 choices (e.g., “It’s mandated in my job,” “It aligns with the standards,” “It makes sense,” “It is based on normal development,” etc.). Last, the “what” question presented a list of 16 strategy choices and an open-ended text response option. These 16 choices represented commonly utilized ST strategies. As described above, these language- and cognitive-based strategies were developed as a way to translate abstract theoretical concepts into concrete intervention practices for consumers. Each strategy was also designed to make abstract social expectations more concrete for individuals with social challenges. Survey respondents had the option of checking one or many strategies and then immediately ranking the value of the selected strategies on a 4-point rubric with 1 = *minimally helpful* (i.e., fewer than 50% of clients/students understand the strategy), 2 = *helpful* (i.e., at least 50% of those I teach understand the strategy), 3 = *very helpful* (i.e., at least 75% understand and use the strategies), and 4 = *critical* (i.e., the strategies support learning across the home and school). The electronic version of the survey mimicked the paper survey by offering the same choices and text response options.

Data Reduction and Analysis

The surveys extracted for this study ($N = 1,634$) were transferred using the export function within FluidSurveys (<https://fluidsurveys.com>) to Microsoft Excel for reduction and analysis. Responses yielded quantitative frequency data that could be further reduced into proportions of the total sample on the basis of consumer categories. “Who” and “why” questions provided frequency and proportion data for the total sample as well as by professional consumer category. For the “who” data, those professional consumer categories that are commonly considered to be under the umbrella of mental health (i.e., counselors, school/clinical psychologists, and social workers) were grouped together for further examination. Data were further exported to a statistical program in which a Fisher’s exact test was performed to examine whether the variables of “who” (i.e., SLPs) and “why” (top selections from the overall sample) were statistically related. Last, “what” questions yielded frequency data for the types of strategies most often selected by SLPs as well as those selected across all professional consumers. The rubric value of that strategy (i.e., 1 = *minimally helpful* to 4 = *critical*) was then used to calculate those strategies that were both selected as most often used and of highest value (i.e., designated 3 = *very helpful* and 4 = *critical*). Frequency and percentages were calculated, and the three most valued strategies were identified for SLPs and then for all professional consumers.

Results

Results of this retrospective examination of the implementation data are organized on the basis of the three research questions. First, characteristics of the study population are depicted by professional consumer category in Table 2. Although $N = 1,634$ surveys were utilized for analysis, the total number of responses to the question of “Who are you?” was 1,954. This number represents the fact that some participants identified themselves within two or three categories (e.g., SLP and administrator). The vast majority of individuals completing this survey identified themselves as SLPs ($n = 709$, 43.4%) and special educators ($n = 399$, 24.4%). As presented in Table 2, the remaining participants represented professional consumer categories that were < 10% of the total. The next largest group identified themselves within disciplines commonly considered to be within the mental health field (e.g., counselors, school/clinical psychologists, and social workers, $n = 344$, 21%). Other professional consumer categories included general education teachers (128, 7.8%), behaviorists (96, 5.9%), board-certified behavior analysts (64, 3.9%), occupational therapists (65, 4.0%), private therapists (17, 1.0%), and physical therapists (4, 0.20%). Last, professionals such as vocational educators (57, 3.5%), administrators (41, 2.5%), and other medical professionals (30, 1.8%) were a part of the full data set.

Table 3 shows the results to the second research question, “Why do you use Social Thinking?” The three most frequently selected responses from all survey respondents included (a) it makes sense ($n = 1,349$), (b) it’s helpful

Table 2. Professional consumers on the basis of self-identification.

Professional consumer	Frequency (%) ^a	Percentage of total survey respondents (N = 1,634)
Speech/language	709 (36.28)	43.4
Special ed. teacher	399 (20.42)	24.4
Counselor	130 (6.65)	8.0
Gen ed. teacher	128 (6.55)	7.8
School psychologist	116 (5.94)	7.1
Behaviorist	96 (4.91)	5.9
Social worker	86 (4.40)	5.3
Occupational therapist	65 (3.33)	4.0
Board-certified behavior analyst	64 (3.28)	3.9
Vocational educator	57 (2.92)	3.5
Administrator	41 (2.10)	2.5
Med. professional	30 (1.54)	1.8
Private therapist	17 (0.87)	1.0
Clinical psychologist	12 (0.61)	0.07
Physical therapist	4 (0.20)	0.02

Note. ed. = educator; Med. = medical.

^aBased on $n = 1,954$ responses; respondents were allowed to select more than one consumer category.

Table 3. Most frequently selected responses for “why do you use social thinking?”

Responses	All consumers (N = 1,634)		SLP (n = 709)	
	Frequency (rank)	Frequency (rank)	p	Effect size (Cramer's V)
It makes sense	1,349 (1)	603 (2)	* $p < .0213$.06
It's helpful for clients	1,252 (2)	605 (1)	*** $p < .00001$.18
It challenges me	636 (3)	334 (3)	*** $p > .0001$.15

* $p < .05$. *** $p < .001$.

for clients ($n = 1,252$), and (c) it challenges me ($n = 636$). Responses from SLPs resulted in the same top three categories with a slightly different rank order: (a) it's helpful for clients ($n = 605$), (b) it makes sense ($n = 603$), and (c) it challenges me ($n = 334$). A comparison of the frequency data for the top three SLP choices to the frequency data from the total sample yielded significance related to the responses *it's helpful for clients* ($p < .00001$) with a small effect size (0.18) and *it challenges me* ($p < .00001$) with a small effect size (0.15). The response *it makes sense* was also significant ($p < .0213$), but with minimal effect size (0.06).

The results of the data for the final question, “What Social Thinking strategies do you use most often and how helpful (or not) are they?” are provided in Table 4. For this question, only those selections from the 4-point rubric considered to be very helpful and critical were included in the analysis. Percentages were calculated by dividing the data from the very helpful and critical categories with the total number of responses across all four choices on the rubric (i.e., minimally/not helpful, helpful, very helpful, critical). Results from the total sample of respondents indicated that the top three strategies most frequently selected by SLPs were (a) thinking with eyes (87%), (b) expected and unexpected (85.2%), and (c) whole-body listening (84.8%). Although these three strategies were also the top three selected by the larger sample of professional consumers, the ranking order differed. For instance, other professionals selected expected and unexpected (85.5%) the most often, followed by whole-body listening (84.4%) and thinking with eyes (83.3%).

Interpretation

Recall that the results of PBR can be interpreted from two perspectives. First, data can be interpreted as they might apply to the practice and service delivery. Second,

data can be interpreted as they might apply more broadly to the discipline.

Implications for the ST Practice

These results provide valuable information to the ST practice. First, they suggest the range of professional consumers actively engaged with implementing social learning strategies in their workplace is sizable, representing 15 different professional categories. However, SLPs form the largest professional consumer group (43%) who use ST. This information helps the ST practice better understand the breadth of professional consumers using the methodology, which underscores the importance of promoting the methodology across disciplines. Further, understanding that the majority of consumers resonate with methodologies that first and foremost make sense within their professional framework and setting is critical information. This suggests to the ST practice that the translation of complex theories about social learning and social problems into usable protocols across professions has been successful. This reinforces the practice's efforts to interpret theoretical concepts by talking the language of professional consumers. This appears critical for obtaining buy-in and adoption of interventions, particularly ones that are complicated in origin. The second most frequently selected reason for using ST was “it is helpful for clients.” It is worth noting that this was the most robust finding in terms of both significance and effect size for SLPs. This result clearly reflects the professionals' perceptions that the ST methodology has positive practical qualities for potentially improving the lives of individuals with social learning problems. Whether these perceptions are based on data-driven observations is not known but suggests to the ST practice that prospective monitoring studies tied to this finding should follow. The third choice selected by all respondents was “it challenges me.” This suggests that

Table 4. Most frequently selected social thinking strategies by speech-language pathologists versus all consumers.

Strategies	Speech-language pathologists		All Consumers	
	Ranking (top 3)	Frequency ^a (%)	Ranking (top 3)	Frequency ^a (%)
Thinking with eyes	1	524 (87)	3	903 (83.3)
Expected/unexpected	2	602 (85.2)	1	1,151 (85.5)
Whole-body listening	3	568 (84.8)	2	1,051 (84.4)

^aIncludes top two categories on a 4-point rubric, *very helpful* and *critical*.

consumers appear to appreciate being intellectually pushed and even find it motivating. The selection of this response might imply that professional consumers value the underlying conceptual construct for ST, which is complex and theory-driven. Last, the results could reflect a motivation by professional consumers to increase their clinical competencies regardless of the complexity of the methodology.

The last question addressed what ST strategies were viewed as most helpful or critical in service delivery. Understanding the top three choices by all consumers uncovers which components of the ST methodology are the most embraced and utilized. In a practical setting, this information has implications for guiding the ST practice in regards to future development of lessons and activities. This information will also help guide the design of prospective research studies: for example, development of measures for evaluating treatment fidelity for highly utilized strategies and for examining short- and long-term outcomes.

Implications for CSD and Research

In a more broad manner, the results can contribute preliminary insight into how professional consumers, especially SLPs, might be envisioning social communication challenges. First, in regards to who uses the ST methodology, the results indicate the majority are SLPs. That SLPs are serving individuals with social learning problems implies they view this area of intervention as part of their job descriptions. However, the results also indicate that serving individuals with social learning problems by no means falls solely under the purview of the CSD discipline. Rather, social learning challenges seem to be perceived as a multi-disciplinary disorder, suggesting the need for instructive interactions and teamwork with other professionals. Second, SLPs appear to elect to use the ST methodology because it helps clients, makes sense, and is challenging. These results suggest that creators of interventions should not be afraid of developing protocols that are based on complicated theories and concepts as long as they are presented in a form that is functional for practice and are perceived as yielding positive results for the client. These three ingredients perhaps begin to define criteria for the development of interventions that are most likely to be adopted in practice. Simply stated, service providers want protocols that will feasibly transition into their own professional roles, responsibilities, and duties and still challenge them professionally.

The third question addressed the preferences for strategies found to be most helpful and critical to improving the lives of clients. Recall that the ST methodology is organized around underlying theoretical concepts as described in the extant literature and that are posited to correspond to particular ST strategies. This structure moves from abstract theory to concrete strategies for teaching. The results of this retrospective study revealed that both SLPs and the broader group of professional consumers most frequently selected the strategies of thinking with eyes, expected/unexpected, and whole-body listening as useful, although SLPs prioritized the order of selected strategies slightly differently. According to the ST conceptual framework,

these three strategies correspond to the following theoretical concepts:

- Thinking with eyes to joint attention
- Expected/unexpected to inferencing/theory of mind
- Whole-body listening to executive functioning for self-regulation

By implication, the results suggest that consumers are interested primarily in strategies that address joint attention, inferencing, theory of mind, and executive functioning related to self-regulation. The literature suggests that these concepts are particularly challenging for clients with ASD, attention deficit/hyperactivity disorder, traumatic brain injury, specific language impairment, and other disabilities affecting their social learning. Practitioners may not be able to articulate these theoretical concepts. However, we might infer from the findings that SLPs select strategies that reflect theoretical constructs that are important to them. Such an interpretation, although speculative, seems logically grounded and, at the very least, provides fodder for the design of future interventions and applied research.

Summary

This example of a PBR retrospective study, although preliminary and thus limited in scope, was meant to illustrate the types of questions and research design that can be valuable for generating knowledge for informing and improving practice. One must acknowledge that the context for the research is from the practice's perspective and, therefore, has undeniable biases. Yet those biases reflect a reality for everyday implementation of intervention. Understanding this reality is vital for understanding what practitioners say they are using with their clients and, by inference, what theories and evidence they are gravitating toward. The study attempted to ask relevant questions for the ST practice by utilizing data that were available from a survey. The results will be valuable for supporting and improving ST methodology and, we hope, informing the discipline. Further, the results will contribute to the design of future prospective PBR investigations in which more focused questions and more exact methods can be designed.

Conclusions: A New Perspective on Clinical Research

Evidence-informed practice will prevail only if multiple sources of evidence and multiple approaches to science are recognized (Haight, 2010; Kazdin, 2008). If we wish to reduce the research–practice gap and promote a form of research–practice integration, then we must embrace a variety of research perspectives, in particular those that value the practitioner in the process. The traditional research pipeline, along with its valued internal validity, is absolutely necessary for discovering mechanisms of change and documenting the efficacy and effectiveness of our assessment and treatment protocols. PBR is not meant as a replacement but rather a complement to assist in closing the

research–practice gap. What PBR brings to the discovery process is the valued input of practitioners. Practitioners need to be informed that their involvement in research can take many forms and that whatever their role (i.e., consulting early in the traditional research pipeline or initiating a PBR study), their input is important. Practitioners are hungry for interventions that recognize the challenges of their practice, make sense in their worlds, and have a solid research-based foundation. In the end, both researchers and practitioners wish to be valued for their contribution to their role in defining, generating, and using evidence.

PBR offers a unique opportunity to bring together researchers and practitioners, and by doing so more actively, increase the knowledge base that will improve service delivery for individuals with communication disorders. Understanding practitioners' needs, preferences, and routines through PBR can help academic researchers develop and investigate new interventions. Further, knowledge generated from PBR can facilitate the development of implementation strategies for interventions that have been studied via the traditional research pipeline. Expediting the closure of the research–practice gap is ultimately dependent on bringing the academic researcher and practitioner together to pursue evidence. PBR is an approach that should not be overlooked as a complement to the traditional research pipeline. We agree with Green's (2008) vision of a "future in which we would not need to ask the question of how to get more acceptance of evidence-based practice, but one in which we would ask how to sustain the engagement of practitioners, patients and communities in a participatory process of generating practice-based research and programme evaluation" (p. i24).

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