

Odd Couple? Reenvisioning the Relation Between Science and Practice in the Dissemination-Implementation Era

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John R. Weisz¹, Mei Yi Ng¹, and Sarah Kate Bearman²

¹Department of Psychology, Harvard University, and ²Department of School-Clinical Child Psychology, Ferkauf Graduate School of Psychology, Yeshiva University

Abstract

Decades of clinical psychological science have produced empirically supported treatments that are now undergoing dissemination and implementation (DI) but with little guidance from a science that is just taking shape. Charting a future for DI science (DIS) and DI practice (DIP), and their complex relationship, will be complicated by significant challenges—the implementation cliff (intervention benefit drops when tested practices are scaled up), low relevance of most clinical research to actual practice, and differing timetables and goals for DIP versus DIS. To address the challenges, and prepare the next generation of clinical psychological scientists, we propose the following: making intervention research look more like practice, solving the “too many empirically supported treatments” problem, addressing mismatches between interventions and their users (e.g., clients, therapists), broadening the array of intervention delivery systems, sharpening outcome monitoring and feedback, incentivizing high-risk/high-gain innovations, designing new professional tracks, and synchronizing and linking the often-insular practice and science of DI.

Keywords

dissemination, implementation, empirically supported treatment, training

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An emerging challenge in clinical psychological science is the tension between rigorous testing of interventions—an ongoing task that is never really finished—and deploying those interventions within practice settings. Moving too quickly from science to practice can make clinical scientists marketers with products not yet ready for prime time. Moving too slowly can mean clinical scientists lose opportunities to take their work to scale and improve clinical care for those who need it. In this article, we focus both on the tension between science and practice—which some members of the field regard as an odd couple—in the development and diffusion of interventions and on the implications of the science-practice relationship for training the next generation of clinical psychological scientists. These tensions have come into focus in part because interventions have created such a buzz in science, practice, and public policy. Consider the following:

- The remarkable growth of the randomized controlled trial (RCT) database encompassing diverse mental-health problems across age groups (see,

e.g., Nathan & Gorman, 2007; Weisz & Kazdin, 2010);

- The creation of criteria to identify interventions as empirically supported and reports identifying interventions that meet those criteria (e.g., Chambless et al., 1998; Silverman & Hinshaw, 2008);
- Numerous initiatives by government entities and advocacy groups stressing the importance of using empirically supported treatments (ESTs) in mental-health care (see, e.g., National Alliance on Mental Illness, 2003);
- Large-scale government-promoted identification and use of ESTs, in the United States and beyond (see, e.g., McHugh & Barlow, 2010);

Corresponding Author:

John R. Weisz, Department of Psychology, Harvard University, William James Hall, 33 Kirkland St., Cambridge, MA 02138
E-mail: john_weisz@harvard.edu

- Calls for a broad array of methods to make ESTs more accessible to those who need them (see, e.g., Kazdin & Blase, 2011); and
- The emergence of businesses devoted to marketing intervention materials, trainings, consultations, and assessments of fidelity and outcome—often headed by individuals who are concurrently producing evidence bearing on their marketed products.

Dissemination and Implementation, Practice, and Science

These developments have fueled the spread of tested interventions far beyond research labs, with concomitant attention to the tasks of dissemination and implementation (DI). *Dissemination* has been defined as “the targeted distribution of information and intervention materials to a specific public health or clinical practice audience. The intent is to spread knowledge and the associated evidence-based interventions” (National Institute of Mental Health, 2009, Research Objectives section, para. 2). *Implementation* has been defined as “the use of strategies to adopt and integrate evidence-based health interventions and change practice patterns within specific settings” (National Institute of Mental Health, 2009, Research Objectives section, para. 2). Carrying out these two processes is DI practice (DIP). The study of methods for DI, and the effects of those methods, is DI science (DIS). A case can be made for including DIP and DIS in the training agenda for clinical scientists because there is much to learn about which DIPs are effective with which interventions in which contexts. Expanding the field’s research and training agenda in this way will require addressing at least four challenges.

Challenge I: The implementation cliff

One significant challenge is the implementation cliff, a drop in benefit that often occurs when interventions leave laboratory settings. Meta-analyses reveal substantial falloff in effect size when interventions move from research to practice contexts and when ESTs are tested against usual clinical care (UC; e.g., Wampold et al., 2011; Weisz, Jensen-Doss, & Hawley, 2006). In fact, one recent meta-analysis (Weisz, Kuppens, et al., 2013) showed that ESTs did not significantly outperform UC among studies using clinically referred youths or youths meeting formal diagnostic criteria. A related finding revealed that intervention effects drop, often markedly, as studies move away from the developer’s control (e.g., graduate student therapists supervised by intervention developers) and toward clinically representative conditions (e.g., local therapists and supervisors; Curtis, Ronan, & Borduin,

2004). In general, interventions suffer voltage drop with successive generations beyond the developer’s original implementation (McGrew, Bond, Dietzen, & Salyers, 1994; but there are exceptions—see, e.g., Foa et al., 2005). In addition, when EST components appear spontaneously in routine clinical practice, intensity and potency are often especially weak (Garland et al., 2010).

Challenge II: (Ir)relevance of research to practice

A second challenge for DIP and DIS is that most treatment-outcome research (unlike the small subset of studies just noted) tells us very little about how ESTs will fare in clinical practice. To understand the scope of the problem, we periodically code youth RCTs for clinical representativeness (see, e.g., Weisz, Jensen-Doss, & Hawley, 2005). In a recent update, we examined 461 youth psychotherapy RCTs from the 1960s through 2009 encompassing 1,160 treatment and control groups; we found that the great majority of trials used recruited samples, therapists who were not practitioners, and non-clinical practice settings. Across all the decades, only 2.1% of all intervention and control groups focused on clinically referred clients, treated by practitioners, in practice settings; even for studies in the most recent decade, the figure is only 4.5%. A similar problem is evident in the research base on intervention integrity—the extent to which interventions are delivered as intended. Perepletchikova, Treat, and Kazdin (2007) examined 147 articles evaluating 202 interventions and found adequate assessment and reporting of intervention integrity for only 3.5% of interventions. Evaluation of intervention integrity is essential to understanding whether attenuation of effects in real-world implementation reflects a problem with the interventions themselves or, rather, with their delivery.

Challenge III: Timeline mismatch

A third challenge is the fact that DIS and DIP operate on very different timelines. In DIS, knowledge advances incrementally with deliberate steps taken to identify critical questions, develop study plans, obtain funding, complete the study, conduct the analyses, interpret findings, and publish. The published findings may stimulate other studies, then others, but this process may consume decades. By contrast, the timetable for DIP is often tight; implementation opportunities may depend on a fleeting convergence of interest, policy, and funding. The resulting pressure to move quickly contrasts sharply with the deliberate pace of DIS, and the contrast poses the risk that DIP may proceed without the science needed to

ensure effective implementation—in which case the intervention, despite great effort and expense, may not improve outcomes for those who seek help.

Challenge IV: Goal tensions and the “implementation limbo”

That risk may be heightened by the tension between core objectives of DIS (increased understanding of what works, and through what processes) and DIP (action that gets interventions into practice settings). Time and financial pressures faced by those charged with bringing the interventions into their settings (e.g., government and agency leaders) can lead to implementation limbo—the “How low can you go?” approach to DIP. In the absence of good evidence on what is required for truly effective DI, a completely understandable impulse is to manage costs. If there is no evidence that 4 days of expert-led training, and subsequent individual clinician supervision, are required to maintain fidelity and benefit, then why not reduce cost with a 2-day training and group supervision and have local clinical staff conduct the training and supervision? Such implementation limbo, combined with pressure to act quickly, may lead to DIP uninformed by DIS and a potential loss of benefit (see McHugh & Barlow, 2010).

In the next sections, we characterize some current approaches and significant issues for DIP and DIS within the context of these four challenges. We also offer suggestions for training the next generation of clinical scientists and present proposals for improving DIP, DIS, and the connection between them. Although we emphasize treatment research (thus, ESTs), much of the discussion is relevant to prevention science as well.

Current Directions in DIP

In this section, we provide examples of current DI approaches, some emerging directions, and issues related to professional training.

Research publications

Mentoring in clinical science has traditionally emphasized publishing original research in peer-reviewed journals. This venerable dissemination approach still reaches researchers, but clinicians—not so much (Stewart & Chambless, 2007). Many doctoral-level practitioners have reported that intervention-outcome research does not generalize to their populations and settings and, thus, is not pertinent to their practice (Stewart, Stirman, & Chambless, 2012). Indeed, even clinicians actively engaged in research believe empirical findings have less value for clinical

decision making than do their own clinical experiences and the supervision and consultation they receive (Safran, Abreu, Ogilvie, & DeMaria, 2011).

In contrast to original research reports, expert summaries may come closer to what practitioners need for their clinical decision making (Raine et al., 2004; Stewart & Chambless, 2007). In fact, the *Journal of Consulting and Clinical Psychology*, which publishes mainly original research reports, has less than half the circulation of *Professional Psychology: Research and Practice*, and *Clinician's Research Digest* is also widely read; these two latter journals have the mission of publishing and summarizing research findings for practitioners.

Web-based resources

The Internet has emerged in recent decades as a dominant method of disseminating information worldwide. Leveraging the speed and ease of online publishing, several organizations have established Web-based resources that are continually updated to disseminate information about interventions and implementation methods to students, researchers, practitioners, policymakers, public agencies, and the general public. Table 1 notes some of these Web sites and their main features.

Continuing education programs

For many practitioners, continuing education (CE) programs represent a primary source of training in new practices (Addis, 2002). Most states require from 10 to 40 hr of CE annually for maintaining professional licensure in psychology (American Psychological Association, 2006). In principle, CE programs could boost practitioners' awareness and use of ESTs. In practice, though, CE content is often unrelated to the evidence base on effective intervention; evidence has suggested that identifying a workshop as covering EST content might lessen its appeal to private practitioners (Stewart et al., 2012). Indeed, most practitioners choose CE programs based mainly on cost, convenience, topic, and location (Sharkin & Plageman, 2003). Even EST-focused CE programs that do attract practitioners might not have a major impact on practice. Reviews have indicated that training workshops alone typically fail to change clinician behavior or increase proficiency (Beidas & Kendall, 2010; Herschell, Kolko, Baumann, & Davis, 2010). Conversely, training workshops do appear to increase declarative knowledge about ESTs (Beidas, Edmunds, Marcus, & Kendall, 2012; Beidas & Kendall, 2010). Perhaps CE—at least in the form of didactic workshops—is better suited to dissemination than to implementation goals.

Table 1. Web-Based Resources for Dissemination and Implementation of Evidence-Based Practices

Organization and homepage	Key feature
Division 12 (Society of Clinical Psychology), American Psychological Association (http://psychologicaltreatments.org/)	List and description of psychotherapies for adult psychological disorders designated as having strong, modest, no, or controversial research support; key research references; information on or links to treatment manuals, centers/workshops providing training opportunities, training DVDs, and developers
Division 53 (Society of Clinical Child and Adolescent Psychology), American Psychological Association; and Association of Behavioral and Cognitive Therapies (http://effectivechildtherapy.com)	List and description of psychotherapies for youth psychological disorders designated as well established, probably efficacious, possibly efficacious, or experimental; key research references; links to treatment manuals, self-help materials, relevant articles, developer/publisher Web sites
National Registry of Evidence-Based Programs and Practices, Substance Abuse and Mental Health Services Administration, U.S. Department of Health and Human Services (http://www.nrepp.samhsa.gov/)	Searchable online database of programs designed to prevent or treat psychological disorders or to promote mental health; numerical ratings for research quality and dissemination readiness; summaries of evidence; information on implementation history, costs, contacting developer
Blueprints for Healthy Youth Development, Center for the Study and Prevention of Violence, University of Colorado Boulder (http://www.blueprintsprograms.com)	Searchable online database of programs targeting youth psychological and physical health, education, and positive relationships; designates programs as model or promising based on research quality, dissemination readiness, and intervention impact and specificity; summaries of evidence; information on training and assistance by developer, costs, and funding strategies
What Works Clearinghouse, Institute of Education Sciences, U.S. Department of Education (http://ies.ed.gov/ncee/wwc/)	Systematic reviews of interventions in education, including school-based, school staff–delivered, or school-directed psychotherapies for children classified as having an emotional disturbance or that support early childhood education for children with disabilities
The Cochrane Collaboration, international network of researchers, multiple centers and branches worldwide, secretariat based in Oxford, England (http://www.cochrane.org/)	Systematic reviews and meta-analyses of health-care practices and research methodology, including psychotherapies; some reviews include cost-effectiveness outcomes
The Campbell Collaboration, international network of researchers, secretariat hosted by the Norwegian Knowledge Center for the Health Services (http://www.campbellcollaboration.org/)	Systematic reviews and meta-analyses of interventions in the areas of crime and justice, education, international development, and social welfare
National Implementation Research Network, Frank Porter Graham Child Development Institute, University of North Carolina at Chapel Hill (http://nirn.fpg.unc.edu/)	Descriptions of implementation concepts and models, recommendations of implementation science and practice, and sample materials used in the actual implementation of several interventions
Community Engagement Program, Clinical Translational Science Institute, University of California, San Francisco (http://accelerate.ucsf.edu/research/community)	Downloadable manuals for researchers, community organizations, and community clinicians and frequently asked question pages on how to participate in community-engaged research, including implementing an intervention and evaluating intervention and implementation outcomes

Government and foundation initiatives

DIP is also carried out through government- and foundation-sponsored initiatives designed to spread tested interventions into routine clinical practice (see, e.g., McHugh & Barlow, 2010). The Veterans Health Administration (Ruzek, Karlin, & Zeiss, 2012), for example, has trained thousands of its therapists to use ESTs, particularly for

trauma (Karlin et al., 2010) and depression (Karlin et al., 2012). At the state level, New York has one of several ambitious DI programs (Hoagwood, Olin, & Cleek, 2013). In the United Kingdom, a government-funded DI initiative, Improving Access to Psychological Therapies (Clark et al., 2009), is implementing ESTs for adult anxiety and depression nationwide, and the National Academy for Parenting Practitioners (Scott, 2010) has been active in implementing and studying parent-mediated ESTs for

youth conduct problems. Private foundations, including Annie E. Casey and Robert Wood Johnson, have also supported initiatives to improve mental health (see Chambers, Ringeisen, & Hickman, 2005).

Some (but definitely not all) of these initiatives include explicit efforts to build DIS in the context of DIP. Examples include a National Institute of Mental Health (2002) program announcement (PA) calling for research to “build knowledge on methods, structures, and processes to disseminate and implement mental health information and treatments into practice settings” (Purpose of This PA section, para. 2), and a Center for Mental Health Services (CMHS) PA encouraging research on implementation of ESTs within CMHS grant communities (Chambers et al., 2005). CMHS also funds a \$30 million National Child Traumatic Stress Network focused on developing, implementing, evaluating, and disseminating interventions for trauma throughout the United States (Chambers et al., 2005).

Current Directions in DIS

A painful truth for the clinical psychological science field is that effective implementation of ESTs in practice settings will require evidence on which DIP approaches work, and that evidence has barely begun to take shape. Greenhalgh, Macfarlane, Bate, and Kyriakidou (2004) reviewed 495 studies of diffusion of service innovations and concluded that lack of knowledge about mechanisms that promote successful implementation is the “most serious gap in the literature” (p. 620). Here we offer a sampler of efforts to address this gap.

Effectiveness studies

In effectiveness trials, interventions that may have been tested previously under a high level of experimenter control are tested under conditions resembling naturally occurring clinical care, including clients referred through usual community pathways and intervention provided by clinical practitioners, in service settings such as community clinics. In addition, we have argued for random assignment of clients to the intervention being tested versus representative UC to address the critical question whether that intervention outperforms the care that is normally provided (Weisz et al., 2006; Weisz & Gray, 2008). Although most effectiveness trials aim to measure the impact of ESTs under clinically representative conditions, the trials can also be a rich source of hypotheses for DIS. We recently drew from our effectiveness research to identify several elements of the mental-health ecosystem (e.g., characteristics of practice organizations, social service systems, reimbursement regulations) that can

affect EST implementation in practice contexts and some testable ideas for addressing and studying them during treatment (Weisz, Ugueto, Cheron, & Herren, 2013). Beyond their outcome-evaluation objectives, effectiveness trials can have genuine heuristic value.

Meta-analyses and systematic reviews of DI studies

There is also heuristic potential in meta-analyses and systematic reviews of DI projects; they can help characterize the state of the field and identify gaps. For example, Manuel, Hagedorn, and Finney (2011) found that few studies of EST implementation for substance use disorders used a conceptual model to inform implementation strategies or measured potential predictors, moderators, or mediators of EST implementation. Similarly, Landsverk, Brown, Reutz, Palinkas, and Horwitz (2011) found that only 9 of 329 studies tested specific strategies for implementing ESTs in child welfare and mental-health settings. The findings of both reviews point to DIP that is uninformed by DIS and not designed to effectively build DIS. This result underscores the need to include a theoretical perspective that generates testable hypotheses, which can in turn inform the development of study questions and measurement models needed for an incremental science. Fortunately, some researchers have pursued these goals.

Testing alternate strategies for DI

One example of such research is the work on Multidimensional Treatment Foster Care (MTFC) for youths in the child welfare system, including those who have very significant conduct problems. MTFC has demonstrated benefit over usual group and residential care in RCTs with delinquent boys and girls, youths leaving a state hospital setting, and youths in state-supported foster care (D. K. Smith & Chamberlain, 2010). Chamberlain et al. (2012) recently compared three alternate strategies for scaling up, to clarify processes that facilitate effective DI. In the rolling-cohort strategy, MTFC is established in a few sites, which help implement MTFC in other sites, and lessons learned are integrated into the model in successive sites. In the cascading-dissemination strategy, the intervention developers train and supervise the initial cohort of interventionists, and this cohort—after meeting competence criteria—trains and supervises the next. Finally, in the community development team strategy, consultants connect potential adopters with developers and provide technical assistance.

To support and evaluate these strategies, MTFC developers constructed a Web-based system for monitoring implementation fidelity, which can then be examined as

a mediator of intervention outcome (Feil, Sprengelmeyer, Davis, & Chamberlain, 2012). The work of the MTFC team illustrates how different implementation strategies can be compared using randomized designs. Other examples include research on therapist training in dialectical behavior therapy (Dimeff, Woodcock, Harned, & Beadnell, 2011), teleconferencing supervision in motivational interviewing for substance abuse (J. L. Smith et al., 2012), and DI methods for prolonged exposure therapy for posttraumatic stress disorder (McLean & Foa, 2011).

Testing specific DI elements

Other researchers have tested separable DI elements (e.g., training, supervision) rather than entire DI models. For example, some RCTs have shown that providers who received training plus supervision were more proficient in the targeted skills than were those providers who received only training (Miller, Yahne, Moyers, Martinez, & Pirritano, 2004; Sholomskas et al., 2005). An important next step will be learning which specific supervision practices increase EST competence and client outcomes. Green and Seifert (2005) argued that newly learned declarative knowledge must be translated into well-rehearsed, automatized procedures, perhaps through supervision emphasizing role-play and feedback (Bearman et al., 2013)—features which may not be common in supervision as usual (Accurso, Taylor, & Garland, 2011). DIS clearly needs studies in which researchers manipulate supervision variables and examine changes in both clinician behavior and client outcomes.

Testing sustainability models

Those who promote and practice DIP are concerned about evidence suggesting that the everyday practice of ESTs is not very well sustained after initial implementation (Stirman et al., 2012). As one possible remedy, some developers have explored train-the-trainer models in which local staff are trained to help sustain an EST by providing in-house training or supervision after outside teams have gone. Investigating this approach with MTFC, Buchanan, Chamberlain, Price and Sprengelmeyer (2013) found that first-generation interventionists (trained and supervised by the intervention developers) and second-generation interventionists (trained by the first generation) achieved similar fidelity and client outcomes. Other intervention developers have had less positive experiences with train-the-trainer models and, thus, have retained prolonged involvement of the intervention developers (e.g., Curtis et al., 2004). It is clear that an important agenda item for DIS will be distinguishing the conditions under which responsibility for training and skill building in ESTs can and cannot be effectively transferred away from the developer's team.

Studying organization-level variables

Glisson, Landsverk, et al. (2008), using data from 1,154 therapists in a sample of 100 U.S. mental-health clinics, found support for an organizational social context (OSC) model comprising three factors—climate (i.e., employees' perceptions of how the work environment affects their well-being and job performance), culture (i.e., employees' expectations of how work is done), and attitudes (i.e., employees' job satisfaction and commitment to the organization). Differences in OSC have been linked to DI-related outcomes: Favorable climate has been associated with low therapist turnover, and favorable culture has been associated with great success sustaining new interventions and services (Glisson, Schoenwald, et al., 2008). It is interesting that clinicians whose organizations have more favorable characteristics also have more positive attitudes toward ESTs (Aarons et al., 2012). Glisson et al. (2010) and Glisson et al. (2012) have demonstrated in two RCTs that an organizational intervention can improve the OSC of community mental-health organizations and the effectiveness and efficiency of multisystemic therapy for delinquent youths.

Research on the nature of usual practice

The essence of implementation is changing current practice. Hoagwood and Kolko (2009) argued that efforts to change practices that are not fully understood may be "difficult and perhaps foolhardy" (p. 35). This sentiment has prompted a movement to gather practice-based evidence (Margison et al., 2000), including data to characterize current practices. The need for such information is illustrated by the data in Figure 1, which shows mean effect sizes of 52 RCTs comparing youth ESTs with UC that we reported in a recent meta-analysis (Weisz, Kuppens, et al., 2013); 13 of the RCTs showed either a negligible outcome difference or a superior outcome for UC. Unfortunately, UC was generally undocumented in the studies; thus, it is unclear which forms of UC were successful, perhaps warranting testing in their own right, and which forms of UC were convincingly outperformed by ESTs. To address this UC-unknown problem, investigators have developed detailed systems for coding session content and have begun to document UC contents (Bearman et al., 2011; Garland et al., 2010; McLeod & Weisz, 2005, 2010).

Research on the subjective experience of end users

Because DIP requires engagement of key stakeholders, including clinicians, administrators, and clients, it is

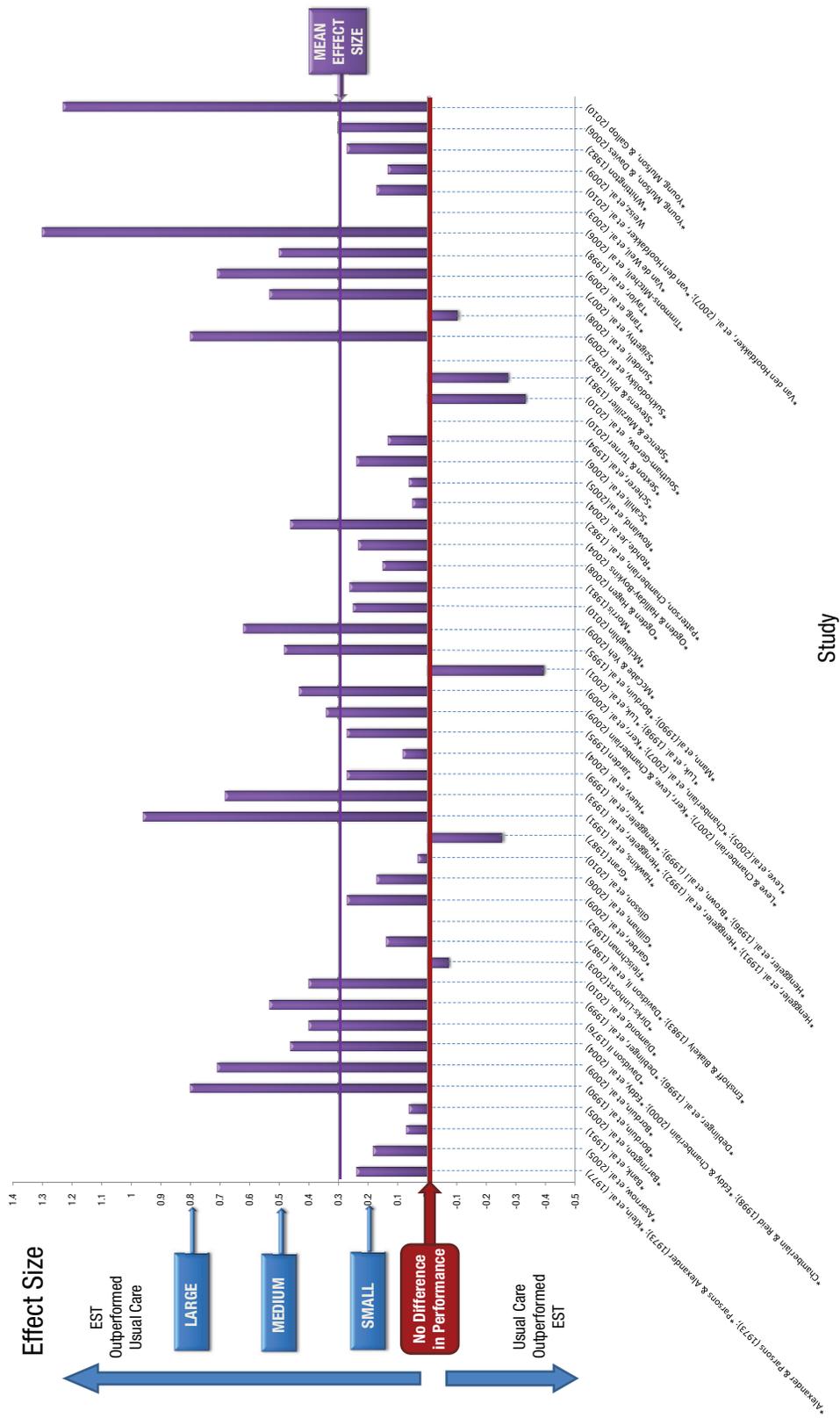


Fig. 1. Effect sizes of 52 individual studies comparing empirically supported treatments (ESTs) for children and adolescents with usual care. Horizontal bar at .29 shows mean effect size across the full study set. Note the number of studies for which usual care showed effects similar to or superior to ESTs. Citations marked with an asterisk can be found in the Supplemental Material available online. Adapted from data presented in Weisz, Kuppens, et al. (2013).

Table 2. Training a New Generation in Dissemination and Implementation (DI) Science and Practice: 10 Radical (?) Ideas**1. Integrate DI theories and findings into the standard clinical science curriculum**

The DI strength of programs can be boosted through curricula that combine theories and established findings in traditional clinical science with theories and findings on innovation adoption and diffusion. Gaps in faculty expertise can be addressed through courses in other departments or universities, and online courses can be developed—and publicized, perhaps, via the Delaware Project Web site.

2. Balance the emphasis on internal and external validity

Many research methods courses focus on identifying and addressing threats to internal validity. Building DI science (DIS) expertise may require equal attention to external validity, including strategies for designing research that fairly represents actual clinical practice while retaining all the rigor of traditional randomized controlled trials.

3. Redefine the community practicum and internship

Clinical practica and internships can be structured to emphasize not only assessment and treatment experience but also hands-on experience with organizational facets of service settings. One recent model rotates trainees through various clinic roles (e.g., intake clinician, case manager, records manager, institutional review board member) to build understanding of day-to-day clinic operation and relationships between clinic staff and researchers.

4. Provide direct training in DIS research designs and methods

Students pursuing a career in DIS will need a distinctive set of skills—for example, designing an effectiveness trial, using multilevel modeling to compare trajectories of change in empirically supported treatments (ESTs) with usual care groups, and implementing a coding system for treatment session content—not included in most clinical science curricula. Some of the skills may be combined with more traditional content, and some may require specialty tracks (see No. 9).

5. Convert traditional training clinics to DI laboratories

In addition to offering students traditional office-based clinical care experience, the training clinic, repurposed as a DI laboratory or implementation center, could involve students in training community clinicians in ESTs, assisting clinics and agencies in designing clinical monitoring and feedback systems, creating new treatment delivery systems à la Kazdin and Blase (2011), and engaging in diverse ventures as collaborators with community agencies and centers in support of DIP and DIS.

6. Find launch funding for DI-focused training

In years past, the Boulder model was implemented in part through federal dollars. Clinical programs competed for National Institute of Mental Health training grants to cover costs of program change and draw promising students into careers as scientist-practitioners. Similarly, a new emphasis on DI training can be empowered by funding the costs of program change, and funding can persuade students that this new direction is real. The impact of such support would be magnified in today's lean funding climate.

7. Target funding for DI research, with support for student involvement

The best training in DIS arguably is hands-on participation in relevant research by one's faculty mentor. This participation can occur only if faculty are themselves doing DIS, and this can be encouraged by targeted program announcements. Making grant supplements available for student involvement can help ensure that the mentoring connections are formed. Funding agencies could also offer DI fellowships to graduate students and postdoctoral fellows using mechanisms similar to the current National Research Service Award program.

8. Learn from disciplines outside of clinical psychological science

DI is not the sole province of clinical psychology. Indeed, our DI lags well behind that of such fields as medicine, dentistry, public health, pharmacy, business administration, and organizational behavior. Our students (and we, their mentors) can learn a lot from collaborative courses and research projects with experts from these diverse specialty areas. Methods used successfully in other fields may suggest new strategies for DIS in clinical psychological science, sparking innovation by our students (and maybe even us).

9. Offer specialty tracks for DI training

To build critical mass in a specialty area (e.g., clinical child and adolescent, clinical neuroscience), graduate programs often create specialty tracks, encompassing dedicated faculty, a core curriculum, and tailored research and clinical placements. A DI specialty track could provide the structure and guidance needed to ensure that interested students access the most appropriate skills and experiences. These tracks could mesh nicely with the DI-focused training grants and student research support proposed earlier.

10. Affirm and sustain the connection to basic psychological science

DIS is derived from basic psychological science: The ESTs being implemented grew out of learning theory, cognitive psychology, and developmental psychology; the processes underlying intervention effects will be understood in part through behavioral and brain science; and DI methods owe much to social and organizational psychology. Whatever we do to strengthen student training in DI, we should preserve the vital grounding these students receive in the basics that have made our discipline so vital.

important to understand their subjective responses to DI efforts. Building this understanding may require qualitative methods to generate testable hypotheses about facilitators of DI in service settings (Palinkas et al., 2011). For example, in an ethnographic study of community clinic therapists participating in an effectiveness trial, Palinkas et al. (2008) found that short lag time between training in the study treatment protocol and assignment of the first study case significantly enhanced clinician motivation to use the treatment. This result suggests the hypothesis that having appropriate cases ready immediately after training could enhance implementation success. Broadening the focus to include major stakeholders will further enrich the picture of end users as key players in DIP.

Clinical Science Training: Venues for Advancing DIP and DIS

How will students learn the skills needed for the multiple approaches to DIP and DIS discussed thus far? Graduate training programs, clinical practica and internships, and postdoctoral fellowships can all be venues for relevant skill building.

Graduate training programs

As the DI era builds, and diverse other changes (e.g., the neuroscience revolution) reshape the clinical psychological science field, it is fair to ask whether the list of requirements in most graduate training programs is better suited to the future the field is aspiring to create or the past it is leaving behind. We sought to learn the extent to which DIP and DIS are included in clinical science training but found no relevant literature; so, we conducted our own search of department Web sites and university online course catalogues associated with the 51 graduate program members of the Academy of Psychological Clinical Science (see <http://acadpsychclinicalscience.org/members/>). Of these, 21 are accredited under the Psychological Clinical Science Accreditation System (see <http://www.pcsas.org/accredited-programs.php>). We included courses that mentioned dissemination to specific populations, or implementation in specific settings, of some innovation, intervention, curriculum, program, or practice or DIS theories or concepts (e.g., sustainability, scaling up, community-based participatory research). We were able to identify DI courses in only 3 programs; an additional 15 programs were in universities that offered DI-related courses in another department (e.g., public health). We very likely missed some relevant courses, and we were unable to count nonclassroom approaches to DI education (e.g., DI training within clinical practica or in research labs), but our survey does

suggest that DI courses are not common in Academy of Psychological Clinical Science clinical training programs.

If the goal is to see students build the DIS skills described earlier, plus the DIP skills needed to spread effective practices, some significant restructuring of graduate program options may be warranted. Clinical science students who finish graduate school without learning how to build a study with clinic partners, how to design an effectiveness trial, how to assess organizational characteristics, how to code intervention session content, how to use multilevel modeling to measure trajectories of change during intervention, or how to use qualitative methods to study therapy process may not be well equipped to contribute to the world of DIS toward which the clinical psychological science field is moving. Accreditation requirements have already made the field's clinical graduate programs top-heavy with course requirements—far beyond requirements in other psychological specialties—so, recommending further expansion makes little sense (see Baker, McFall, & Shoham, 2009). However, we offer some coursework alternatives in Table 2. In addition, graduate mentors may create research opportunities in practice settings by steering students to training in DI-relevant quantitative (and even qualitative) research methods, including stats camps; by helping students discern which of their burning questions is most likely to lead to real advances; and by modeling a career guided by the objectives and ideals of DIS.

Clinical practica and internships

Because practica and internships place graduate trainees in the middle of clinical care settings, they offer opportunities to nurture such DI-relevant skills as learning and adapting to a clinical organizational culture, collaborating with multidisciplinary teams, and pursuing goals within a professional bureaucracy shaped in part by external regulations and reimbursement requirements. A challenge can arise, however, in that practica and internships often take place in external sites over which doctoral program administrators have little control and from which ESTs may be absent (see Lewis, Hatcher, & Pate, 2005; Woody, Weisz, McLean, 2005). In placements in which ESTs are neither practiced nor valued, the trainee may learn a lot about the organization but little about DIP or DIS because neither is under way. To reduce this risk, some clinical science program administrators are playing an increasingly active role in selection and oversight of practica and internship placements; this result can help ensure that the settings offer genuine opportunities for students to learn about the interplay between research evidence, organizational characteristics, and individual client and clinician factors (Leffler, Jackson, West, McCarty, & Atkins, 2012).

Postdoctoral fellowships

A carefully selected postdoc position can offer specialty immersion in DIS but with some distinctive characteristics. One such characteristic is that DIS tends to involve complex projects conducted by teams; thus, the postdoc's role may involve learning to lead the team and coordinate all moving parts, building the skills needed for a later role as principal investigator. Another characteristic is that the 2- to 3-year time frame of many postdoctoral fellowships is adequate for designing, conducting, and even publishing multiple projects in some fields, but the pace may be quite different for DIS, with intervention trials often running 5 years or longer. Thus, the postdoc and mentor need to identify research and products that fit the postdoc's tenure. Early stages of a study may offer important questions answerable through baseline assessments or data on initial clinician uptake of an intervention. Later stages may offer intervention process and outcome-related questions,

including analyses of moderation and mediation. Existing databases from completed studies, and from ongoing meta-analyses, may also be available, as part of the shared common good on which DIS can be built. Postdoctoral positions in DIS can be valuable but need to be designed with special care.

Ultimately, the challenge will be to integrate graduate training, practicum, and internship placements, and potentially postdoctoral positions, to create the steps needed for a DIS career. We offer several ideas in Table 2.

Agenda for a Clinical Psychological Science of DI

Of course, expanding training in DIS makes sense only if the underlying science is rigorous, vital, and advancing. We suggest the following agenda to support all three goals (see Table 3).

Table 3. Agenda for a Clinical Psychological Science of Dissemination and Implementation (DI)

Making Intervention Research Look More Like Practice

Building the knowledge base needed for DI by making studies more clinically representative

Solving the “Too Many Empirically Supported Treatments” Problem

Applying more rigorous standards to determine which of the empirically supported treatments (ESTs) outperform the usual care options currently available and, thus, warrant implementation

Addressing the Mismatch Between Interventions and Users

Designing interventions to address comorbidity, flux, diverse caseloads, and other characteristics of the clients and therapists who use them

Building Efficient and Accessible Delivery Methods and Models

Expanding population impact by using self-help books, Internet and computer technology, videoconferencing, paraprofessional outreach, and other complements to individual sessions with a professional therapist

Solving the “How’m I Doing?” Problem

Building systems to monitor client response to intervention and providing ongoing feedback to clinicians to guide decision making throughout episodes of care

Embracing High-Risk/High-Gain Innovation and Learning From Failure

Recognizing and incentivizing research on innovative implementation strategies that may fail; addressing the training and career challenges associated with high-risk/high-gain approaches

Contemplating New Rules and Professional Tracks

Thinking through new rules, ethical principles, and professional tracks (e.g., trialists, evidence brokers) that may be needed in the increasingly entrepreneurial and proprietary world of clinical psychological science as conflict of interest concerns expand

Deciding Who Owns the Cure

Launching a discussion about the intellectual property associated with successful interventions, focusing in part on which ownership arrangements will best serve those who need effective mental-health care

Building Community-Research Partnerships

Giving priority—in research and training—to the creation of the community-research partnerships that will be essential in studies of EST DI

Courtship and Marriage of DI Practice and DI Science

Finding ways to link and synchronize the often-insular practice and science of DI—for example, by ensuring that every demonstration project is designed to answer important scientific questions about DI

Making intervention research look more like practice

We noted earlier that DIP moves on a rapid timeline, often ahead of the DIS knowledge base, and that intervention research has not been very relevant to actual clinical practice. The two problems are intertwined: The low relevance of most research to clinical practice is in fact a major reason why the DIS knowledge base lags so far behind DIP. To address this problem, we have argued for a deployment-focused model within which interventions are developed and tested, as soon as feasible, with the kinds of clients and therapists and in the kinds of settings for which the interventions are ultimately intended (e.g., Weisz, 2004; Weisz & Gray, 2008). Such research could, and should, be just as rigorous as the strategy known as efficacy testing, and it could generate more externally valid evidence on intervention effects, moderation, mediation, and mechanisms of change. If this model were adopted, efficacy testing would become only a brief initial phase in intervention development, used to establish the potential for benefit, and effectiveness testing under clinically representative conditions would be the dominant research approach, accelerating the clinical science needed to guide DI.

Solving the “too many ESTs” problem

A quick click on some of the Web-based resources noted in Table 1 reveals that many more intervention programs are now classified as empirically supported or evidence based than could be effectively implemented at a population level and studied adequately. Becoming skilled at even one intervention can take many years, even for a graduate student whose main mission is learning and certainly for a busy practitioner with a large caseload and limited time. Perhaps DIS can inform rigorous standards for which interventions warrant the considerable time, effort, and expense of DIP. A case can be made that the only interventions that should supplant UC are those that have been tested against UC and shown to produce reliably better outcomes. If this standard were applied, the findings of recent meta-analyses (Wampold et al., 2011; Weisz et al., 2006; Weisz, Kuppens, et al., 2013) suggest that a dramatically shortened list of interventions would survive. A challenge for clinical scientists will be to develop and apply fair standards for determining which of the many ESTs truly warrant DIP and, thus, should be the focus of DIS.

Addressing the mismatch between interventions and users

Many ESTs are designed in ways that may not be an ideal fit for those seeking to implement them. For example,

most ESTs are built for a single disorder or a small homogeneous cluster. In contrast, most clinicians carry diverse caseloads such that learning one EST for one disorder is relevant to only a small portion of their clientele. Single-disorder ESTs also may not be a good fit to the comorbid disorders that characterize most referred individuals or to the fact that the client's primary problems and most pressing treatment needs often shift during treatment. These mismatches can lead to frustration among therapists and clients, which undermines sustainability of new practices and discourages future DIP.

One strategy for addressing these problems is to build integrative interventions that combine components from separate ESTs for different comorbid problems. For example, Barlow et al. (2011) developed a transdiagnostic unified protocol for emotional disorders across the affective-anxiety spectrum in adults; in an initial RCT (Farchione et al., 2012), the protocol outperformed wait list controls at postintervention and 6-month follow-up. Chorpita and Weisz (2009) developed a modular protocol for youth disorders and problems involving anxiety, depression, and disruptive conduct; in a randomized effectiveness trial, this protocol outperformed both usual outpatient care and conventional single-disorder protocols (Weisz et al., 2012). Such integrative protocols may improve the fit of interventions to users and reduce the need for multiple trainings and for juggling multiple single-disorder protocols. There is room in the clinical psychological science field for an array of creative intervention designs, structured to improve the fit of interventions to users, guided by tests of whether the redesigned interventions really work in clinically representative contexts.

Building efficient and accessible delivery methods and models

Another way to repackage ESTs is to supplement current delivery methods and models with more efficient and accessible ones, thereby supplanting the traditional 50-min per week office visit. Kazdin and Blase (2011) have advocated a broad portfolio of delivery methods to increase the public-health impact of interventions (see also Rotheram-Borus, Swendeman, & Chorpita, 2012), including self-help books, interactive computerized versions of ESTs, individual intervention through teleconferencing or videoconferencing, low-intensity treatment by paraprofessionals, and interventions embedded within everyday settings (e.g., summer camps). Such approaches may increase the DI of ESTs by reducing cost, travel time, logistical barriers, and stigma and by increasing engagement. Some of these methods have demonstrated efficacy, but more research is needed to test effectiveness under everyday conditions and to identify the delivery formats that best balance cost-effectiveness and clinical benefit (see Yates, 2011). In addition, research is

necessary on mechanisms of change, to inform decisions about which components to retain and which to discard (Kazdin & Blase, 2011); also needed is research on patient attributes that moderate intervention effects, to reveal for whom these simplified interventions are effective and for whom more intensive interventions are required (Shoham & Insel, 2011).

Solving the “How’m I doing?” problem

Knowing how a client is responding to an EST can facilitate implementation by helping the therapist know whether an intervention is going well, when to change strategies, and when to stop. Thus, it is necessary to focus on designing and implementing information systems that provide feedback on client response. Such a system guided implementation of the modular protocol for youth that we described earlier (Weisz et al., 2012); the Web-based system provided weekly feedback on youth client progress throughout treatment using two brief, psychometrically sound measures (Chorpita et al., 2010; Weisz et al., 2011) displayed on a client dashboard. Recent research has shown that providing such client progress feedback to clinicians (even in the absence of ESTs) can improve intervention outcomes among adults (Shimokawa, Lambert, & Smart, 2010) and youths (Bickman, Kelley, Breda, deAndrade, & Riemer, 2011).

Embracing high-risk/high-gain innovation and learning from failure

In 2011, the *Harvard Business Review* published a “failure issue” which highlighted examples of the rich lessons learned from business flops (Ignatius, 2011). The implementation-limbo challenge noted earlier—the seemingly inevitable push to see “How low can you go?” on time, effort, and cost in bringing tested interventions to scale—may present lots of opportunities to learn from failure. In addition, a few of the high-risk/high-gain ventures testing daring new DI strategies may generate real payoff and potent new approaches. In the world of venture capital, a 20% success rate is considered excellent. Indeed, if most ventures are successful, there is a concern that not enough truly innovative ideas are being tested. A role model for this perspective is Thomas Edison, who was quoted as saying of his many unsuccessful ventures, “I have not failed; I’ve just found 10,000 ways that won’t work” (“Thomas Edison,” 2013, Disputed section, para. 2). That worked for Thomas Edison, but is it a viable career path for psychologists? Will we be respected for the high quality of our research if much of that research involves learning through failure? Will prominent journals publish null findings if the studies have pristine design? Will our students land positions at competitive universities, and be promoted and tenured, if their intervention

trials do not show a string of positive effects? How do we balance the need for innovation—and the concomitant risk of failure—with the conservatism that our incremental science has traditionally favored? These are important questions for our profession as we move into an era dominated by DIP and DIS, with limbo music in the background.

Contemplating new rules and professional tracks

With the growth of DIP, the potential costs of failed trials may now be both academic and monetary. People trained to be clinical scientists are going into business, starting implementation companies, and marketing their interventions. As the businesses grow, null or adverse study outcomes can carry serious financial implications. Some clinical scientists worry that this possibility can create pressure to design projects for success, emphasize the positive aspects of mixed findings, and market by focusing on the good news and shading the bad—that the lure of profit may swamp the rigor and caution needed for scientifically sound evaluation of intervention effects and limitations. In response, many universities now require faculty to complete financial conflict of interest forms, but these forms do not address this difficult question: Can the scientific study of interventions be done fairly by the same people who are promoting and profiting from their spread?

From one perspective, the science is best done by those who create the interventions and know them best. From another perspective, the purest science is done by those who have absolutely no stake in any particular study outcome. The second perspective might argue, for example, for career tracks for (a) trialists, investigators who intentionally forgo the developer role and implementation income and commit instead to conducting patently fair tests of interventions; or (b) evidence brokers, synthesizers who commit to conducting systematic reviews and meta-analyses with absolutely no horse in the race. Procedures used in the Cochrane and Campbell Collaborations illustrate ways of supporting evidence broker tracks in health care and social-intervention research, but their reviews usually focus on intervention efficacy, not effectiveness or implementation research. Distinctive issues related to DIS (e.g., financial conflicts of interest) require fresh thinking about whether clinical psychological science needs new rules, ethical guidelines, or career paths to ensure fairness for the benefit and protection of those who will receive the interventions being purveyed.

Deciding who owns the cure

The growing business of DIP has highlighted complex issues related to intellectual property. An array of

policies, laws, and court rulings often leave unclear who owns the products associated with ESTs. Should corporations, universities, and dissemination companies own these products and market them, or should ownership and control be vested in those who have developed the interventions and arguably know their strengths and limitations and the kinds of training and skill building needed to ensure their effective implementation? The debate could be informed by a scientific perspective on what will ultimately do the most good for those who face mental-health risks and who need care.

Building community-research partnerships

DIS will be enriched and kept relevant by increased emphasis on building community-research partnerships, and these partnerships will in turn create new opportunities for good science. One relevant model, the community-based participatory research approach (Israel, Eng, Schulz, & Parker, 2005), assumes that just as the professionals may have EST expertise, community partners have expertise in the target community's current status, goals, resources, and needs and that each area of expertise is critical for effective DI (Becker, Stice, Shaw, & Woda, 2009). Applying this community-based participatory research perspective, (a) Becker et al. (2009) adapted and implemented a prevention program for eating disorders within a large sorority; (b) Brookman-Frazer, Stahmer, Lewis, Feder, and Reed (2012) identified, implemented, and sustained an EST for infants and toddlers at risk for autism spectrum disorders in a community clinic; and (c) Bradshaw et al. (2012) used a partnership between the Maryland Department of Education, Sheppard Pratt Health System, and Johns Hopkins University to implement a program to prevent disruptive behavior in 800 public schools. As these examples illustrate, proliferating partnerships can generate diverse opportunities for DIS in real-world settings.

Courtship and marriage of DIP and DIS

Finally, we suggest that the timeline challenge noted earlier—the fact that DIP often leaps into action ahead of DIS—could be addressed in part through a marriage of DIP and DIS. Massive amounts of government and foundation funding are spent each year on demonstration projects that are essentially DIP with no hint of science. Under these circumstances, the separation between practice and science is reinforced and the gap sustained or expanded. Suppose, instead, that policy required every demonstration project to answer a useful scientific question about DI. This procedure would turn every

demonstration project into a learning opportunity. It is worth recalling that the system of care model of child and family intervention was dominant and unchallenged in the United States for many years, with claims of great success based on unevaluated demonstration projects. It was only when an evaluation component was added that Bickman and colleagues (see Bickman, 1996) discovered that system of care increased costs but not benefit. Beyond outcome comparisons alone, a variety of questions of real value to DIS—questions about moderators, mediators, and mechanisms of change—can be added to implementation projects, thus magnifying the value of the projects and often at little added cost (see Schoenwald, 2010).

Summary and Concluding Comment

In five fast-paced decades, clinical scientists have created ESTs for a broad array of psychological problems. Efforts to disseminate ESTs and implement them in practice settings are well under way but without much guidance from a science that is just beginning to take shape. Some challenges facing this emerging science of DI can be readily identified: intervention benefit fades (often markedly) when tested practices are scaled up, the evidence base from clinical research is not so relevant to the practice contexts in which implementation takes place, implementation practice and science have very different (and sometimes incompatible) goals, and implementation practice inevitably moves faster than does the science needed to guide it.

To address these challenges, we offer several proposals, some focused on building a new generation of DI specialists. Toward that end, we suggest significant changes in clinical science curricula, including research training that balances internal with external validity; reenvisioning and repurposing the traditional training clinic, community practicum, and internship to capitalize on their potential for hands-on DI training; creating DI specialty tracks and funding options to support them; learning from other DI-relevant disciplines (e.g., public health, organizational behavior); and affirming and sustaining the critical links between DI and its basic psychological science roots.

To build the science needed to inform DIP, we propose making intervention research look more like practice and identifying the subset of interventions that outperform UC, thus warranting implementation; addressing mismatches between interventions and their users by making intervention design more implementation friendly and broadening the array of intervention delivery systems to make ESTs more readily accessible to more people; expanding the use of outcome monitoring and feedback systems to guide effective, personalized use of

ESTs; and incentivizing the high-risk/high-gain innovations needed for real intervention breakthroughs. We also suggest that new ethical standards and new professional tracks (e.g., trialists, evidence brokers) may be needed to protect scientific integrity from the risks posed by DIP. We propose using science to inform policy related to DI—for example, suggesting which policies on ownership of interventions will best serve the public good. In sum, we propose an array of strategies for linking and synchronizing the often-insular practice and science of DI.

Throughout the article, we have noted risks posed by a close relationship between DIP and DIS, but we have also noted many ways the two complement, inform, and enhance one another. A clean separation of practice and science might offer advantages, including protecting the science from the influence of vested interests. However, we cannot avoid the fact that DIP is the subject matter of DIS, and a close connection is needed to ensure that practice will be evaluated and guided by science while science is informed by the questions that arise in practice. In DI, science and practice may be an odd couple but an inseparable one as well. The association between them will need to be watched closely and managed carefully in the days ahead, just like any relationship between two strong partners.

Author Contributions

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Supplemental Material

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