

Clinical Science Model

Richard M. McFall,¹ Teresa A. Treat,²
and Robert F. Simons³

¹Indiana University & Psychological Clinical Science
Accreditation System, U.S.A., ²University of Iowa,
U.S.A., and ³University of Delaware, U.S.A.

The field of clinical psychology today is characterized by a remarkable degree of heterogeneity—in its theories, methods, applications, educational approaches, and underlying conceptual models. Conceptual models are like mental blueprints: they are invented constructions designed to organize, connect, channel, and give meaning and purpose to thought and action within their target domains. The *clinical science* (CS) model is one of the competing conceptual models within the field of clinical psychology. It was created to guide all aspects of clinical psychology, from the search for basic and applied knowledge, to the translation of such knowledge into optimal standards for professional service, to the structuring of education and training in the specialty (Baker, McFall, & Shoham, 2008; McFall, 1991, 2006).

Most clinical psychologists probably would agree that the field's overarching twin goals are (a) to increase knowledge about mental and behavioral health problems, and (b) to provide services that enhance the public's health and well being. There would be much less agreement, however, about the specifics of how best to define, measure, and achieve these abstract goals. Disagreements about such fundamental issues are at the heart of the field's heterogeneity, and the failure to resolve such differences impedes the field's progress. It is unlikely that competing conceptual models are equally plausible, reasonable, and productive. From a clinical science perspective, choosing among these conceptual models is not simply a matter of personal taste. Rather, the choice

should be guided by a systematic, critical, evidence-based analysis of their relative merits.

A comparative evaluation of the field's competing models should prove beneficial, with far-reaching implications. However, a prerequisite to any such analysis is a clear grasp of the models to be compared. Thus, the aim here is neither to compare nor to choose among models. It is to focus narrowly on explicating the tenets, rationale, and implications of one model, the CS model, referring to other models only in passing where this helps illuminate the CS model's distinctive features. The CS model is presented here from the perspective of its advocates, not only to explain the model's content, logic and rationale, but also to convey a sense of its advocates' investment in the model.

Proponents of the CS model believe that it offers clinical psychology the advantage of an objective, empirical, proven framework for making genuine and steady progress toward the field's twin goals. These proponents believe that the field's unified adoption of this model would transform clinical psychology into a more rigorous and integrative applied science capable of rapidly expanding psychological knowledge and improving public health. They also expect that a unified adoption of this model would have a positive ripple effect, promoting science-centered education and practice across the broad spectrum of mental and behavioral health disciplines, institutions, and educational levels. They believe, in turn, that this would pay significant dividends over time to the public's health and welfare.

Epistemic Foundations

The CS model is founded on the basic premise that a rigorous and uncompromising adherence to a scientific *epistemology* (i.e., to one's way of knowing, or deciding "truth") is the most productive and powerful way to

advance knowledge about the origins, nature, assessment, amelioration, and prevention of mental and behavioral health problems. This epistemology also offers the best framework for developing, evaluating, delivering, and disseminating the safest and most cost-effective clinical services. Moreover, it provides the essential foundation for rigorous, high-quality, education and training in clinical psychology.

The CS model's advocates believe that a scientific epistemology offers a systematic, disciplined, rational, quantitative, and self-correcting method of seeking valid answers to some of life's most difficult questions. This discovery process is central to the CS model. Science is not a set of facts or answers. It is a framework by which to expand knowledge incrementally, an unfolding pathway that yields successive approximations to "truth." Thus, a science-centered search for knowledge is a means to an end, and should not be confused with the end itself. It is a mistake, therefore, to equate the scientific epistemology with specific answers to specific questions, or to criticize it for having failed thus far to solve specific problems or for reporting findings that subsequently are overturned by later findings.

The model's advocates also believe that a scientific epistemology offers the best framework for comparing, evaluating, and improving the validity and utility of clinical assessments, as well as the efficacy and effectiveness of clinical interventions. Science has no monopoly on good ideas, so the creative ideas behind clinical procedures can come from anywhere, including research evidence, clinical experience, intuition, and inspiration. However, proponents of the CS model believe that the scientific method, with its strong inference approach to choosing among plausible rival ideas and claims, offers the most rigorously systematic, valid, and productive way to separate the wheat from the chaff. Through its well-established quantitative and qualitative methods of hypothesis testing and refinement, it represents a programmatic, incremental way to pursue "truth."

Finally, if the model's advocates are correct in their belief that the scientific epistemology offers the surest path to advancing knowledge and to improving clinical services, then it follows logically that this epistemology should be the centerpiece of all education and training for future generations of clinical psychologists. The goal should be to produce a cadre of integrative clinical scientists, all of whom have the knowledge and skills to function both as basic and applied researchers, on the one hand, and as independent providers and overseers of clinical services, on the other hand. This ability to bridge and integrate across domains and roles allows them to contribute to the advancement of knowledge regarding mental and behavioral health even as they are able to deliver, disseminate, supervise, and administer the most cost-effective, empirically supported mental and behavioral health-care services.

The CS model's advocates justify their commitment to the scientific epistemology by pointing to the promise they see in the historical record of scientific achievements. They believe science has proven itself—across a wide range of problem areas and disciplines—to be the most productive and reliable of all approaches to seeking "truth." It repeatedly has yielded fruitful, often unexpected, and amazingly effective and enduring solutions to previously intractable theoretical and practical problems. The CS model's advocates believe that an uncompromising commitment to a scientific epistemology will be as fruitful and beneficial for the field of clinical psychology as it has been for so many other fields of inquiry. Of course, the full payoff remains to be seen, but proponents believe that no alternative epistemology can match science's record; that there is no better epistemic choice; and that science's contributions to clinical psychology have been very encouraging thus far.

Evolution of the CS Model

For the first 30 years following clinical psychology's official birth, in the late 1940s, the field's only recognized conceptual model was

the scientist–practitioner model (Bootzin, 2007). This model proclaimed that all clinical psychologists must be trained both as scientists and as practitioners. The model's ideal of an integrated discipline, symbolized by the model's hyphenated name, actually was the by-product of a hard-won compromise between two conflicting factions of clinical psychologists, each with a very different vision for the emerging field. The scientist faction wanted clinical psychology to continue to develop as it had been (i.e., as a research specialty focused on investigating the origins, assessment, and treatment of psychopathology, but otherwise not much different than the other specialty areas within psychology). These scientists were concerned that the connections between the science and practice of clinical psychology were tenuous, at best; that the theories, assessments, and interventions of practicing clinical psychologists had little empirical support; and thus that practitioners' push to launch clinical psychology as an applied profession was premature, overreaching, and likely to have negative long-term repercussions.

Those in the practitioner faction, in contrast, wanted the field to develop as an applied profession, like medicine. They were eager to respond to their country's urgent call for psychological services in the aftermath of World War II, even if their current services were backed by little more than good intentions. Their vision of building an applied specialty was receiving financial support and encouragement from the Veterans Administration and the United States Public Health Service, so they saw this moment as a rare opportunity that must be seized. They were confident that as psychologists became more actively involved in clinical practice, the scientific evidence and knowledge would follow, that clinical practice would stimulate more applied research, and that this, in turn, would advance both psychological science and practice. Many in the scientist faction were not persuaded, however; nor were they eager to shift their research focus from the basic questions that interested them to the applied questions that interested clinical practitioners.

Consequently, at least in the beginning, the Boulder model's professed ideal of integrating science and practice was more an aspiration than a reality. The hyphen at the center of scientist–practitioner actually signified the field's divisions more than its envisioned integration. True, the scientist–practitioner model required every doctoral student to learn statistics and research methods, and to produce an independent research product for the doctoral dissertation. It also required that each student learn psychological testing and psychotherapeutic methods. But these research and practical training components were like two separate worlds. To deal with the inherent tensions between these two worlds, some students chose to specialize in one world or the other. Other students adopted a compartmentalized solution, specializing in both, but keeping these worlds separate as they moved back and forth between the laboratory and the clinic. True integration awaited the development of a translational bridge between research and application activities.

In the 1970s, the latent tension between research and practice became public with the emergence of a new, competing model that emphasized practice—the scholar–practitioner model. It was based on the rationale that doctoral students in clinical psychology who were committed to pursuing careers solely as practitioners did not need to spend time learning research methods that they never would use; they would be better served if they used this time, instead, to hone their clinical skills, which presumably would make them better practitioners. Advocates for this new model thought it should be sufficient for these students, like medical students, to receive just enough science training to prepare them to read and interpret the clinical research literature, allowing them to use such information to guide their clinical practice. Graduates from scholar–practitioner programs received a PsyD degree instead of a PhD. This scholar–practitioner model initially met with resistance from traditionalists; however, by 2012 the number of clinical training programs subscribing to this model, as well as

the number of students enrolled in such programs, had grown to the point that over half of all doctoral students in clinical psychology were being trained in scholar-practitioner programs. Moreover, some of these programs had started offering a PhD, even though their research training differed substantially from that offered by scientist-practitioner programs. Clearly, the field had undergone a significant change: research training, with its scientific epistemology, no longer was the common core of all clinical psychology. Many in the scientist-practitioner camp viewed this change as an alarming sign of the erosion of clinical psychology's scientific foundations.

Largely in response to this change, a third model emerged in the 1990s—the clinical science model. In many respects, the CS model is not really new; it essentially represents a reaffirmation of the idealized, integrative, science-centered version of the original scientist-practitioner model. Proponents of the CS model are not opposed to the scientist-practitioner model, but encourage like-minded clinical scientists to join them, under the CS banner, in calling for a renewed commitment to a scientific epistemology, along with the requirements that all clinical psychologists must be trained both as scientists and as practitioners; that this training must be integrated and reciprocally reinforcing, with clinical problems shaping the research questions, and with research evidence being translated into improved clinical procedures; and that clinical practitioners bear an ethical responsibility to be held accountable for the validity of their claims and promises, and for ensuring the cost-effectiveness of their services. Essentially, the proponents of the emergent CS model insist that science be restored to what they believe is its rightful place as the centerpiece for all of clinical psychology—in research, service, and education.

From the field's beginning, scientific clinical psychologists had argued for a stronger science-centered and unified interpretation of the scientist-practitioner model. In the 1960s, for example, academic researchers and

evidence-based practitioners had formed a society devoted to promoting clinical psychology as a scientific discipline. Initially this society was called "Section III of Division 12 of the American Psychological Association: Section for the Development of Clinical Psychology as an Experimental/Behavioral Science." The society reorganized in 1990 with a new name, "Society for a Science of Clinical Psychology" (Oltmanns & Krasner, 1993).

By 1994, many researchers, practitioners, and academics felt the need for a more substantial reform effort on behalf of psychological clinical science. They were distressed, in particular, by what they perceived to be growing tensions between good scientific training, on one hand, and the requirements doctoral programs must satisfy to receive professional accreditation. With support from NIMH and the Association for Psychological Science, a representative group of 24 educators from leading science-centered doctoral programs met to discuss the future of clinical psychology in the twenty-first century. This conference led to the founding in 1995 of the Academy of Psychological Clinical Science (APCS), which now has over 60 members, comprising doctoral programs as well as clinical internship programs. All APCS members had subscribed to the scientist-practitioner model, but were attracted to the emerging CS model, seeing it as a contemporary interpretation of the scientist-practitioner model initially envisioned by the scientist faction at the birth of clinical psychology in the 1940s. Within APCS, the CS model is viewed as a way of identifying and promoting the strongest possible science-centered approach to clinical psychology—in research, service, and education.

The CS model's advocates believe that the 1940s vision of building a science-centered discipline is a realistic possibility today, thanks to decades of basic and applied research into the causes, assessment, treatment, and prevention of mental and behavioral problems. They argue that psychological science has built a solid foundation that can unite science and practice,

and can provide sound empirical guidance to clinical practitioners. Unfortunately, these advances in psychological clinical science so far have not had the influence on clinical practice that one might have expected. When making clinical decisions, many clinicians, especially those from programs that minimize research training, give more weight to their personal clinical experiences and intuitions than to the research evidence. Some even have declared that the research findings from randomized clinical trials and other controlled studies are irrelevant to clinical practice in the “real world.” The limited translation of research findings into everyday practice has highlighted the increasingly critical role that clinical scientists can play in the implementation and dissemination of prevention and intervention science in applied settings. Thus, even though clinical psychologists increasingly are less likely to function as front-line service providers, they remain critical to the development, evaluation, implementation, and dissemination of scientifically grounded clinical services.

In 2007, APCS launched the Psychological Clinical Science Accreditation System (PCSAS; www.pcsas.org). PCSAS is an independent, nonprofit corporation created for the purpose of using the leverage of accreditation to promote superior science-centered PhD education and training in clinical psychology, to enhance the scientific knowledge base for mental and behavioral health care, and to increase the quality and quantity of clinical scientists contributing to the advancement of public health. The primary objective of PCSAS is to provide rigorous, objective, and empirically based accreditation of U.S. and Canadian PhD programs in psychological clinical science. Its longer term objective is to transform the field by encouraging psychologists—researchers, practitioners, and educators alike—to unite in establishing the scientific epistemology as the bedrock of clinical psychology. Proponents of the CS model see PCSAS as yet another significant evolutionary step toward achieving the field’s twin goals.

Implications of the CS Model

In the CS model, clinical psychology is viewed as an *integrated applied science*. Thus, the hyphen in the scientist–practitioner model always must be translated as “and,” never as “or.” This implies that all of the field’s *applied service activities* must be science-centered, that they be grounded in, governed by, and compatible with the best available scientific evidence. Likewise, this conception also requires that a common goal of all of the field’s *scientific research activities* should be to generate new knowledge that potentially can be translated into practical contributions aimed at solving “real world” clinical problems. As applied scientists, clinical researchers are obligated to pursue problems with implications for improving public health.

The CS model also considers clinical psychology to be a *transdisciplinary* and *hub* science. This means that clinical scientists must leave their silos, drain their moats, and build bridges. Clinical scientists need to draw upon the best theories, methods, and evidence from within their own specialty, of course, but also from throughout all of psychological science and beyond. They need to establish collaborative connections with such allied scientific fields as cognitive science; neuroscience; sociology and anthropology; molecular and behavioral genetics; behavioral economics; immunology; endocrinology; pharmacology; and many others. Because no individual psychologist can become an expert in all fields, collaboration across traditional disciplinary boundaries is essential. Clinical psychologists should be prepared to do whatever it takes—to go wherever the evidence leads them—to solve the pressing problems in mental and behavioral health. They must search out and adopt the very best scientific ideas and knowledge, no matter what the source, no matter how that reshapes the field. And because psychological science stands at the intersection of so many interrelated fields, this hub position gives it both an opportunity and a responsibility to

reciprocate by making scientific contributions that help advance these related fields.

Thus, to realize clinical psychology's twin goals, CS advocates assert that the field must adopt a rigorously science-centered, integrative, and transdisciplinary approach—in *every facet* of its activities, without exception. Compartmentalized clinical psychology (i.e., rigorous science in the laboratory, but intuitive art in the clinic) is not acceptable in the CS model. Clinical practitioners must think and act as scientists in all they do, including: when deciding whether to offer a service; when choosing, administering, and interpreting assessments; when diagnosing and analyzing complaints and symptoms; when weighing the costs, benefits, and risks of interventions (vs. no intervention); when measuring treatment outcomes and cost-effectiveness; when training and supervising other providers; when designing and administering health-care systems; and when informing the public of the field's (or a specific clinician's) capabilities, achievements, and limitations.

The CS model also imposes stringent requirements on the faculty members and supervisors charged with educating tomorrow's clinical psychologists. It requires that they design, implement, evaluate, and refine their programs with an eye to ensuring that they are science-centered, coherent, and up-to-date; that the students are selected to match their programs' requirements and goals; that their programs' content is selected and communicated in ways that foster scientific skepticism, intellectual curiosity, creativity, and methodological rigor; that their programs' pedagogical methods are optimally efficient and effective; that students' progress and achievements are assessed sensitively and constructively with valid measures; that their students acquire the requisite skills to conduct independent, cutting-edge research, to evaluate scientific evidence, and to test and evaluate theories and claims; and that their programs' graduates have the competence to function as independent providers of clinical services and procedures.

Another implication of the CS model is that the *sine qua non* of a successful CS training program is a clear track record of consistently producing graduates who pursue successful careers as *clinical scientists*. A program's outcomes are what count most: a CS training program is successful only when a majority of its graduates function as clinical scientists. If a program builds such a record of success, it is difficult to say that it is doing things wrong. This focus on outcomes does not mean that CS programs must produce clones of their faculties. In fact, clinical science is not a narrow domain. There are multiple career paths that require science training, many of which involve applied clinical activities, such as developing and testing new assessments and interventions; program development, administration, and evaluation; treatment outcome research; refining and elaborating current treatments; evaluating the contributions of specific factors to treatment outcomes; assessing population-specific or culture-specific treatment effects; training, supervising, and evaluating service providers; and conducting programmatic etiological research with clinical populations. As the health-care system of North America continues to evolve, and as services that traditionally have been performed by clinical psychologists continue to migrate to other disciplines, advocates of CS training contend that graduates from CS programs are best prepared to assume a leading role within this changing system.

The CS model does not require training programs to conform to a uniform list of courses, cover a fixed body of content, or employ a specific pedagogy or method. No single system of CS training has proven itself superior to all others thus far, so there is no empirical basis for being highly prescriptive. Moreover, courses, content, and methods are moving targets; they must change over time with advances in knowledge. A highly prescriptive approach to content and methods does not encourage innovation and progress—two hallmarks of the scientific enterprise. Of course, the model expects programs to ensure that

students acquire the core knowledge and skills that define the domain of clinical psychology (i.e., psychopathology and adaptation; assessment, measurement, and evaluation; intervention and prevention; research methods, design, and quantitative methods). But the model does not specify how these must be taught. Nor does it require that all graduates fit the same mold, or that they must be experts at everything. The CS model simply promotes a set of abstract principles, values, goals, and standards for CS training. Within these broad constraints, it offers flexibility, encouraging individual programs to experiment, to develop the best educational program possible, taking into account the local circumstances, available resources, scientific expertise of the faculty, and research interests and aptitudes of the individual students.

The CS model takes a similar approach toward clinical practice, promoting abstract principles, values, goals, and standards for optimal clinical practice, but within these constraints, not requiring adherence to any list of specific assessment methods, diagnostic systems, or intervention techniques. Again, as with course content or training techniques, these are expected to change over time as our scientific knowledge advances. Rather than prescribing specific procedures, the CS model simply requires that practitioners choose their procedures based on the best available research evidence. This evidence should lead practitioners to reach a general consensus regarding the most promising procedures, at any given point in time, and this naturally would lead them to converge on a limited set of procedures. But the model would not be dictating the use of these specific procedures per se; rather, it would be dictating the process and standards by which the procedures are chosen. This is consistent with the model's scientific epistemology.

The model also requires practitioners to offer and deliver empirically supported procedures themselves only if they personally are qualified and competent to use them. No one can be

an expert at everything; to be ethical, clinicians must practice within the bounds of their expertise. And because the CS model obligates clinicians to choose the most cost-effective services, this also means that if research shows that masters- or bachelor-level providers are as effective as doctoral-level psychologists at delivering a particular service, and can do this at a lower cost, and then doctoral-level psychologists should defer to these more cost-effective providers. The CS model is not intended to protect guild interests or to promote clinical psychologists into privileged positions within the health-care system. The CS model's mission is to promote psychological science in the interest of advancing knowledge, improving health care, and serving the public.

Criticisms of the CS Model

The CS model's lofty aspirations impose high standards on clinical psychologists in all they do—in research, in application, and in education. These requirements, with their call for accountability and their challenging implications, are a distinguishing feature of the CS model, and are part of the model's appeal to many psychologists. Not surprisingly, however, the model also has stirred criticisms among some clinical psychologists (e.g., Wampold, 2001; Westen, Novotny, & Thompson-Brenner, 2004). Space does not permit the coverage of all such criticisms, but some prominent examples will give a flavor of the objections to the CS model:

Most clinical psychologists agree that the scientific method—with its skeptical hypothesis testing, reliance on controlled research, and insistence on a critical and dispassionate quantitative analysis of evidence—is the best way to advance basic knowledge. At the same time, however, a number of clinical psychologists are skeptical about the contributions that the scientific method and the results from controlled scientific research can make to applied questions and to clinical practice. They worry

that the model's extensive research focus must be to the detriment of more applied activities.

Some critics have claimed that the model's uncompromising commitment to the scientific epistemology imposes unreasonable, unrealistic, and counterproductive constraints on clinical psychologists. For example, CS advocates have been criticized for granting unwarranted preferential status to certain "empirically supported" treatments, although numerous studies using randomized control designs, with large and carefully selected samples and with meticulous measurement of outcomes, have shown clear treatment differences for a wide variety of specific clinical problems. These critics also have argued that limiting clinicians' choices of intervention procedures to those with solid empirical support from scientific research precludes consideration of other factors believed to be critical to clinical success, such as personal clinical experience and judgment, commonly accepted standards of practice, client culture, training history, and nonspecific factors. This view has received support from the American Psychological Association Presidential Task Force on Evidence-Based Practice (APA Presidential Task Force on Evidence-Based Practice, 2006), which recommended that clinical psychologists base their practice equally on research evidence, clinical experience, and consideration of client culture. Clinical scientists have responded by noting that the CS model does not rule out consideration of any factors *a priori*; it simply asserts that empirical evidence from controlled research must be the gold standard for evaluating all claims about the value and relevance of any particular factor, such as clinical experience or client culture. If the research evidence supports the claimed value of a given factor, then this factor should be considered when making clinical decisions; otherwise, it should not. In the absence of such an empirically based criterion for judging the legitimacy of claims, all claims would have an equal standing, no claims could be discounted, and there could be no progress toward "truth."

The CS model has also been criticized for requiring that pedagogic content and methods be based on scientific evidence, rather than on personal preferences or commonly accepted traditions; that educators stay abreast of the literature and modify their practices as the evidence changes; that faculty mentors model the integration of research and clinical practice for their students; and that programs accept a major share of the responsibility for the achievements, competencies, and career outcomes of their students and graduates. These critics argue that such requirements impinge on academic freedom. Proponents of the CS model not only believe that such accountability to empirical methods and evidence is reasonable; they also believe it is essential to the integrity and future of the field.

Perhaps the most common criticism to confront advocates of the CS model involves its approach to doctoral training. Specifically, critics argue that doctoral training in CS focuses too narrowly on preparing students for careers as research scientists, and thus does not prepare them adequately to accept independent responsibility for the delivery of clinical services. Clinical scientists see this criticism as a misguided reflection of the outdated notion that clinical psychologists must make a dichotomous career choice between research science and clinical practice. Clinical scientists believe that first-rate science training *and* first-rate application training are essential to the kinds of roles that clinical psychologists will be expected to fill in the future. In fact, the goal of doctoral training in CS programs is to integrate the research and applied training so thoroughly that all graduates are highly competent and qualified not only to engage in scientific research but also to deliver the most cost-effective psychological services. These training goals are articulated explicitly in the accreditation criteria of the Psychological Clinical Science Accreditation System (www.pcsas.org).

In sum, proponents of the CS model encourage all clinical psychologists to adopt the CS

model's scientific epistemology and commitment to accountability for the validity of claims and the effectiveness of practices. Indeed, the model's proponents believe that the future of clinical psychology demands that the field transform itself into a *psychological clinical science*, thoroughly integrating the elements of scientific research, empirically supported clinical practice, and science-centered education. The model's proponents are convinced that this transformation is essential to clinical psychology's continuing role in the emerging mental and behavioral health-care system of the future. Health care in the United States is undergoing a dramatic change. With the advent of managed care, decisions about the structure and content of mental and behavioral health care increasingly are driven by evidence regarding cost-effectiveness, rather than by professional prerogatives and interests. Thus, if doctoral-level clinical psychologists hope to play a meaningful role in the future health-care system, they must bring something special. Advocates of the CS model believe clinical psychology's commitment to a scientific epistemology provides that special quality.

SEE ALSO: Academy of Psychological Clinical Science (APCS); American Psychological Association (APA); Association for Psychological Science (APS); Evidence-Based Practice in Psychology; Psychological Clinical Science Accreditation System (PCSAS); Scholar-Practitioner Model; Scientist-Practitioner Gap

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