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Training the Next Generation of Clinical Psychological Scientists: A Data-Driven Call to Action

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Abstract

The central goal of clinical psychology is to reduce the suffering caused by mental health conditions. Anxiety, mood, psychosis, substance use, personality, and other mental disorders impose an immense burden on global public health and the economy. Tackling this burden will require the development and dissemination of intervention strategies that are more effective, sustainable, and equitable. Clinical psychology is uniquely poised to serve as a transdisciplinary hub for this work. But rising to this challenge

requires an honest reckoning with the strengths and weaknesses of current training practices. Building on new data, we identify the most important challenges to training the next generation of clinical scientists. We provide specific recommendations for the full spectrum of stakeholders—from funders, accreditors, and universities to program directors, faculty, and students—with an emphasis on sustainable solutions that promote scientific rigor and discovery and enhance the mental health of clinical scientists and the public alike.

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INTRODUCTION

The central goal of clinical psychology is to reduce the suffering caused by mental illness. Anxiety, mood, psychosis, substance use, personality, and other disorders impose a staggering burden on public health and the economy (CDC 2020, SAMHSA 2019, Vos et al. 2020; see also the interactive dashboard at **https://vizhub.healthdata.org/gbd-compare/**). Addressing this burden will require the development and dissemination of intervention strategies that are more effective, sustainable, and equitable (Mei et al. 2020, Uhlhaas et al. 2021). Clinical psychology—a field anchored on the deep integration of basic science and clinical practice—is uniquely positioned to serve as a transdisciplinary hub for this research (Baker et al. 2008, McFall et al. 2015). But rising to this challenge requires an honest reckoning with the strengths and weaknesses of current training practices.

In this review, we marshal a range of new data to identify the most important challenges to training the next generation of clinical psychological scientists. We provide specific recommendations for a broad spectrum of stakeholders with an emphasis on sustainable solutions that promote scientific rigor and discovery and enhance the mental health and well-being of clinical psychologists and the public alike.

How Did We Get Here?

The essayist James Baldwin (1998, p. 722) wrote that "the great force of history comes from the fact that we carry it within us, [and] are unconsciously controlled by it." Here we highlight the historical developments most relevant to understanding contemporary clinical psychology training practices and norms (Benjamin 2005, Levenson 2017, McFall 2006, Pickren 2007).

The Big Bang: 1945–1950

January 1945: World War II was raging and not a single American state licensed or certified clinical psychologists. There were no accredited doctoral training programs and no agreed-upon training models. By 1950, the war was over and all of these institutional fixtures were at least partially in place. Over half of all PhDs awarded in psychology were clinical, and most of these students were supported by the GI Bill or other federal training and workforce development awards.

These rapid developments were galvanized by the Public Health Service and Veterans Administration (VA). In 1946, the VA anticipated the need to care for 20 million veterans, with tens of thousands requiring psychiatric or counseling services—a demand that far exceeded existing provider capacity (Miller 1946). Addressing this looming crisis demanded the rapid training of thousands of clinicians and spurred the American Psychological Association (APA)—an organization dominated by academic researchers—into action. The APA turned to David Shakow, who had spent the war years refining a training model for clinical psychology. Shakow's vision of clinical psychologists as scientist–practitioners was endorsed by the APA in 1947 and approved with minor modifications at a 1949 conference in Boulder, Colorado (APA 1947, Raimy 1950). In 1948, the APA began accrediting doctoral programs in clinical psychology, using the Shakow and Boulder reports as a model.

Sixty Years of Debate and a Pair of Breakaways: 1951–2007

Shakow envisioned training in clinical psychology as a doctoral-level program that encompassed a heavy dose of general and technical coursework, a yearlong internship, and—unlike its closest competitor, psychiatry—an empirical dissertation (APA 1947). No special allowance was made for the dissertation requirement: Every competency in basic and applied science was to be

mastered in just four short years. Graduates were eligible for state certification following a year of supervised practice. Not surprisingly, concerns were soon raised about the feasibility of the compressed timeline and the adverse consequences of the "extra heavy requirement of courses and practicum work" for learning and rigor (APA 1950, p. 588).

As Richard McFall (2006, p. 25) later noted, the Shakow–Boulder model was a shrewd compromise that seemed to give everyone what they wanted: "For the academics. . .the model declared that the first goal of doctoral training was to prepare all graduates for roles as scientists. . . . [And] for those who wanted. . .to transform clinical psychology into a profession like medicine, the model also declared that a coequal goal. . .was to prepare graduates for roles as professional service providers." But in this amorphous compact lay the seeds for decades of vociferous debate, two major breakaways, and many contemporary grievances.

Too much science! Over the years, some have argued that the Shakow–Boulder model shortchanges clinical training, that it devotes excess attention to scientific and statistical methods that will never be used in daily practice, and that it exacerbates provider shortages (Frank 1984). Ultimately, these criticisms led to another meeting and the establishment of the more clinically oriented practitioner–scholar training model and the doctor of psychology (PsyD) degree in 1973.

Too little science! Others have argued, with equal vehemence, that contemporary training practices have drifted from Shakow's vision, that they devote far more hours than necessary to clinical training, that they stifle scientific innovation and rigor, and that they promote health care practices founded on clinical intuition rather than scientific evidence (Baker et al. 2008, Berenbaum et al. 2021, McFall et al. 2015). More generally, members of the too-little-science camp have argued that successfully addressing the immense burden of mental disorders will require the development of more sustainable and scalable intervention strategies, not training a larger cadre of traditional, doctoral-level providers. By the 1990s, frustrated by what they saw as an increasingly onerous and inflexible set of APA training requirements, the too-little-science camp initiated a series of actions that culminated in the establishment of the Academy of Psychological Clinical Science (APCS), a formal alliance of science-centered training programs; the Psychological Clinical Science Accreditation System (PCSAS), a new accreditation framework independent of APA oversight; and the clinical science training model, a "reaffirmation" of Shakow's model (McFall et al. 2015, p. 4).

Current State of Training

Today, the vast majority of PhD-granting clinical psychology programs still subscribe to the scientist–practitioner model, at least in spirit. What was originally a 4-year program—and often described as such to applicants and students—now takes 6–7 years to complete (CoA 2021b). And, unlike the postwar "golden age," most students are now supported by work-contingent teaching and graduate assistantships rather than by training and workforce development awards.

Of the 175 programs currently accredited by the APA—encompassing roughly 8,000 students and 2,000 faculty—one-quarter are now dual accredited by PCSAS. Of these, more than a dozen programs have publicly stated that they may let their APA accreditation lapse, and three—University of California, Berkeley (UC Berkeley); Stony Brook University; and Washington University in St. Louis—have announced that they will not seek APA reaccreditation and, instead, rely exclusively on PCSAS accreditation. Graduates of PCSAS-accredited programs are now fully eligible for the nationwide internship match program, for VA internships, and for licensure in seven states. Licensure lobbying efforts are ongoing in many other states.

Where Do We Go from Here?

Most mentors want their students to be happy, healthy, technically adept, scientifically rigorous—both in the laboratory and in the clinic—and professionally successful. Yet the actual degree of progress toward these shared goals is uncertain—more anchored in anecdote than in evidence (Levenson 2017). And it is clear that new challenges have emerged, from growing concerns about student mental health to hypercompetition for faculty positions and research dollars. Addressing these challenges and achieving our shared goals for the next generation of clinical psychologists demands a sober consideration of the relevant evidence. In this section, we highlight a range of new scholarship, including the results of our own anonymous national survey of nearly 600 clinical psychology PhD students and faculty at research-intensive programs. Our data collection efforts focused on research-intensive (i.e., Carnegie Research 1) institutions and clinical science–oriented listservs. Key methodological details are detailed in the **Supplemental Text**. For heuristic purposes, we have organized the data into nine major challenges. Of course, reality is more nuanced, and it is clear that many of these challenges are deeply intertwined and causally interconnected. Addressing these challenges will require an all-hands approach, and we provide specific recommendations aimed at the entire spectrum of stakeholders, from the institutional—funders, accreditors, professional organizations, and scientific societies—to the individual—program directors, faculty, and students (**Table 1**).

Supplemental Material >

CHALLENGE 1: AN INCREASINGLY TECHNICAL AND MULTIDISCIPLINARY FIELD

Clinical science has undergone a steady transformation over the past quarter century. Spurred by funders, inspired by new technologies, and motivated to better understand, predict, prevent, and treat mental disorders, the field has increasingly come to rely on complex multidisciplinary tools (Teachman et al. 2019)—for instance, using smartphone technology and machine learning to predict suicide attempts and lapses in substance use (Schultz et al. 2022, Wang et al. 2021).

Data from our national survey underscore the ascendance of multidisciplinary approaches: Nearly half of respondents (43.2%) report a multidisciplinary professional identity (see the **Supplemental Text** for survey details). Among multidisciplinary respondents, roughly half considered themselves clinical neuroscientists (47.6% of faculty, 55.1% of students), with the remainder split across a variety of blended identities. Regardless of their professional identity, many respondents said they use conceptual frameworks and specialized tools drawn from other disciplines. More than one-third reported using specialized statistical techniques (e.g., growth curve modeling) in their work, and one in five mentioned neuroimaging approaches. Other popular methods include psychophysiology, ecological momentary assessment, machine learning, network modeling, various developmental and genetic approaches, psychoneuroendocrinology, psychoneuroimmunology, data science, and computational modeling.

Cutting-edge multidisciplinary tools and concepts are challenging to master. Consider a student interested in using neuroimaging techniques to understand psychopathology. They would need to learn a modicum of neuroanatomy, behavioral neuroscience, medical physics, digital signal processing, general linear modeling, and programming, and gain practical expertise with neuroimaging-specific aspects of data acquisition, processing, and analysis. As the field continues to evolve—and today's innovations become tomorrow's norms—the training challenge becomes even more acute.

Students face several challenges in obtaining specialized training. First, technical training is difficult to obtain through existing coursework. One-quarter of survey respondents (24.5%) said that specialized technical coursework (e.g., neuroimaging) is not available at their institution.

Table 1 Challenges and recommendations for training the next generation of clinical psychological scientists

	Summary	Recommendations
Challenge 1: An increasingly technical and multidisciplinary field	■ The field has increasingly come to rely on complex multidisciplinary tools. ■ Insufficient availability of suitable coursework and a lack of time and flexibility in training requirements make it unfeasible for many students to immerse themselves in the cutting-edge techniques that lie at the center of contemporary biomedical research.	■ Increase access to relevant training opportunities (e.g., classes, workshops, informal learning groups). ■ Increase the utility of training opportunities (e.g., restructuring courses, developing tailored training platforms). ■ Increase the efficiency of training (e.g., consolidate, coordinate, and create structured flexibility in coursework). ■ Collaborate (e.g., through training consortia). ■ Invest the resources necessary to create, disseminate, and access technical training opportunities.
Challenge 2: Dual training	■ In practice, the integration of basic and applied clinical psychology is extremely difficult.	■ Foster regular opportunities for meaningful engagement between individuals involved in basic and applied training. ■ For some programs, it may be valuable to establish a practice research network.
Challenge 3: Misalignment between training and jobs	■ There is a fundamental disconnect between the way in which we train students and the jobs that many of them ultimately perform. ■ The majority of graduates provide clinical services as part of their jobs; far fewer graduates pursue careers in academia.	■ Cultivate respect for clinical training and careers. ■ Create more opportunities for staff scientists. ■ Provide more vocational scaffolding for the range of careers that graduates enter.
Challenge 4: Student financial strains	■ Graduate student pay is low, and median educational debt among students is high. ■ Financial stress represents a significant stressor among graduate students.	■ Increase student compensation. ■ Create need-based mechanisms to help defray costs that arise during training (e.g., internship applications).
Challenge 5: Systemic inequities and inadequate training	■ Systemic inequities and racism are pervasive in clinical science. ■ Graduate students who identify as BIPOC, those who identify as LGBTQ+, women, and individuals with disabilities face additional barriers in training. ■ Current training in the provision of culturally responsive care and in research practices that can target mental health disparities is inadequate.	■ Increase support for trainees from underrepresented backgrounds. ■ Enhance training in culturally responsive care and responsible research practices. ■ Increase institutional investment in diversifying clinical science and graduate training.
Challenge 6: Student health and well-being	■ Graduate students experience high rates of anxiety and depression.	■ Universities, departments, and programs should develop and implement plans to support student mental health. ■ Provide evidence-based interventions and ensure student access to care that is independent of their local training ecosystem.

(*Continued*)

Table 1 (*Continued*)

	Summary	Recommendations
Challenge 7: Heavy student workload	■ Expectations for clinical students have become increasingly unrealistic in the context of the allotted time to degree.	■ Addressing the expectations-versus-time imbalance will require creative solutions and coordination at various levels. ■ Possible solutions include a biphasic framework or a cultural shift toward a transdisciplinary focus. ■ For some programs, it may make sense to drop APA accreditation. Doing so will not solve all problems, but it would create new opportunities for reenvisioning clinical psychology training to address unsustainable student workloads and other urgent challenges.
Challenge 8: Insufficient data for recursive refinement	■ Available data streams are not sufficient for recursive refinement of training practices.	■ Develop new data streams and evaluate training practices. ■ Develop evidence-based standards for training.
Challenge 9: Systemic headwinds	■ Stretched to the limit by their existing research, instructional, service, clinical, and administrative responsibilities, many faculty lack the surplus bandwidth that will be required to reimagine and rebuild clinical psychology training.	■ A team science approach will be necessary to solve the current challenges and will require support from accreditors, professional organizations, and other institutional partners. ■ Faculty will need protected time and institutional investment to successfully enact many of the present recommendations.

Abbreviations: APA, American Psychological Association; BIPOC, Black, Indigenous, or People of Color; LGBTQ+, lesbian, gay, bisexual, transgender, or queer.

Nearly one-third of students (30.2%) said that existing classes are unhelpful or poorly suited to their needs. Students were nearly twice as likely as faculty to perceive existing classes as unhelpful (17.3%; $d = 0.27$), suggesting that faculty perceptions of course utility may be inflated relative to students' perceptions or that faculty could do more to convey the practical significance of coursework to their students. Second, more than one-third of students (39.7%) said it is not feasible for them to pursue relevant technical coursework, given their heavy load of APA-mandated coursework and practica. Students who self-identified as multidisciplinary were particularly pessimistic about the feasibility of completing coursework in programming and data science. Nearly two-thirds (68.2%) reported low feasibility. As a result, many students reported using ad hoc and unstructured training solutions, including one-on-one guidance from faculty and senior trainees (98.4%), Internet-based self-study (91.3%), and bootcamps/workshops (71.1%). In short, insufficient availability of coursework and a lack of time and flexibility in training requirements make it unfeasible for many students to immerse themselves in the cutting-edge techniques that lie at the center of contemporary biomedical research.

Recommendation: Reimagine Multidisciplinary Technical Training

Many programs have failed to systematically address the pedagogical demands created by the field's growing reliance on complex, multidisciplinary tools and concepts, leading to inadequate access to relevant training opportunities. The problem is compounded by feasibility issues; many students

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lack the time and flexibility necessary to immerse themselves in cutting-edge techniques. Here we outline several recommendations for addressing these barriers. Granular suggestions are detailed in the **Supplemental Text**. Recommendations targeting broader structural issues are described in later sections of this review.

Increase access. To develop the technical skills necessary to tackle the next generation of clinical science research, students need sufficient access to relevant training opportunities. Classes, workshops, and informal learning groups have the potential to provide greater efficiency than traditional one-on-one approaches. A rapidly expanding catalog of online courses—many developed by leading methodologists—provides additional opportunities for learning specialized skills.

Increase utility. To master cutting-edge techniques, students need access to more useful technical training platforms (e.g., coursework, workshops). This will require the restructuring of existing platforms and the development of new ones with an eye to maximizing their practical utility.

Restructure courses. Our survey respondents highlighted the value of student-driven, hands-on technical training, something that is traditionally achieved via one-on-one mentorship in the laboratory. To achieve this at scale, existing courses could be retooled to increase the amount of learning-by-doing and on-demand teaching (Lombardi et al. 2021, Millman et al. 2018). In some cases, it will be helpful to integrate classroom instruction with hackathons, design sprints, or ongoing student research projects.

Develop tailored training platforms. Training platforms originally devised for other specialties—like a coding course offered in computer science or a neuroimaging course offered in medical physics—are often a poor fit for clinical psychology students. Overcoming this barrier requires the development of platforms tailored to the expertise and goals of clinical psychology students or, perhaps more feasibly, a spectrum of graduate students with similar goals and needs (e.g., machine learning for social/biomedical scientists).

Increase efficiency. To allow sufficient time to master complex techniques, other aspects of training will need to become more efficient. In the long run, significant gains could be realized by enhancing the undergraduate curriculum (e.g., preclinical psychology track), as in medicine.

Consolidate. APA-accredited programs are required to demonstrate that students achieve a doctoral-level understanding of key areas of discipline-specific knowledge (DSK), including the history of psychology; research design; statistics; psychometrics; and affective, biological, cognitive, developmental, and social aspects of behavior (CoA 2021a). Although this traditionally meant that students completed a separate class for each DSK, we encourage programs to eliminate "checklist" coursework and, to the extent possible, develop integrative classes that satisfy multiple DSK areas (e.g., developmental affective neuroscience).

Coordinate. Absent intentional coordination, the likelihood of redundancy and overload across courses is high. Programs need to carefully monitor relevant courses and work with instructors to mitigate these barriers.

Create structured flexibility. Inconsistent course availability is another barrier to efficient training. This challenge can be mitigated by proactively identifying multiple courses that can be used to satisfy particular DSK areas. In some cases, there may be sufficient demand to warrant the

development of specialty tracks (e.g., clinical neuroscience, developmental psychopathology). In other cases, individualized development plans (IDPs)—developed in partnership with a faculty mentorship committee—might make more sense.

Collaborate. Reimagining and rebuilding the clinical psychology training model is a team, not an individual, event. It will require the creative development of new collaborations and training consortia that span programs, departments, and institutions. Technical workshops, for example, can be created or sponsored by faculty drawn from multiple areas of psychology or by campus units that serve multiple departments (e.g., neuroimaging centers, genomics centers, neuroscience or data science training programs). Some courses can be taught as a team, maximizing specialized expertise and reducing the burden on individual faculty. Faculty with expertise in a particular technique (e.g., neuroimaging) can form ad hoc work groups to devise new teaching materials or vet existing ones. To maximize rigor, efficiency, and ultimately feasibility, we urge the relevant professional organizations [e.g., APCS, Council of University Directors of Clinical Psychology (CUDCP)] and scientific societies (e.g., Association for Psychological Science) to actively foster the development of technical training platforms tailored to the needs of psychology graduate students, including clinical students. Even if modest fees are necessary—as with many existing bootcamps, workshops, and short courses—the efficiencies of scale are likely to make such a coordinated effort more feasible than individual efforts.

Invest. Successfully implementing these recommendations will require new institutional investments. Fortunately, the necessary degree of investment is relatively modest. Students need travel awards to attend workshops and bootcamps. Students and faculty need the resources to create or host them. Preparing new instructional materials, devising new on- and offline training platforms, and retooling classes all require substantial time and energy. Ideally, instead of requiring students to identify and pursue these opportunities independently, training would be structured and organized by faculty to meet the needs of students interested in pursuing particular types of multidisciplinary research (e.g., neuroimaging, digital phenotyping). This would be more feasible with targeted support for protected time. Making new instructional materials and platforms open-source and freely sharing them would maximize returns.

CHALLENGE 2: DUAL TRAINING

Integrative training in basic and applied science is the hallmark of clinical psychology (APA 1947, McFall et al. 2015). It is what distinguishes clinical from other areas of psychology (e.g., developmental affective neuroscience), which provide no training in clinical service, and from other mental health care specialties (e.g., psychiatry), which do not expect doctoral students to discover and disseminate new knowledge. Today, the APA, PCSAS, and most research-intensive programs continue to publicly tout the integrative nature of clinical psychology training. This is true even of programs that plan to drop APA accreditation. UC Berkeley, for instance, highlights its commitment to training "the field's best clinical psychologists, fully prepared for positions at the forefront of modern clinical science and practice" and emphasizes that graduates will remain licensure-eligible in California (Univ. Calif.–Berkeley 2021).

At its best, the integration of basic and applied clinical psychology provides a robust pipeline for discovery, translation, dissemination, and implementation. Clinical experience is often a critical spark for therapeutic innovation (Castonguay et al. 2015). For example, Aaron Beck's foundational work to develop cognitive behavioral therapy grew directly out of his clinical experiences (Rosner 2014). As David Barlow and others have noted, in the absence of sufficient integration, we run

the risk of focusing our scientific efforts on assays and models that are poor probes of the clinical symptoms and syndromes that we seek to understand and treat, increasing the likelihood of translation failures (Rubin 2021). Furthermore, if we really want providers to be scientifically sophisticated, data-driven, and nimble—ready to adopt new evidence-based approaches and to discard less helpful ones (Baker et al. 2008)—then we need to ensure that both aspects of training—basic and applied—receive adequate attention, respect, and support.

Yet the integration of basic and applied clinical psychology has proven exceedingly difficult (Berenbaum et al. 2021, McFall et al. 2015). Data from our survey revealed that one-quarter of faculty and students (25.8%) perceive training in basic and applied clinical science as being in high conflict. Nearly three-quarters (73.9%) said that students are forced to prioritize one aspect of their training at the expense of the other. More than half of students said that dual training promotes feelings of inadequacy (55.5%), frustration (68.6%), and anxiety (68.8%). As one wrote, "It's frustrating to have to work towards this huge number [of practicum hours] when I don't intend to pursue [service provision]. . .after graduating. . . . Research is [my] priority and. . .it takes the backseat." These challenges are significantly intensified for multidisciplinary students ($d = 0.26$–0.38).

Although both faculty and students agree that training in basic and applied clinical science is challenging, our data revealed a notable discrepancy between their perceptions. More than half of students (53.3%) feel compelled to prioritize research at the expense of clinical training (24% feel compelled to prioritize clinical training over research; 22.6% do not feel compelled to prioritize one over the other). As one student wrote, "We receive the message that we should value clinical work as a tool to help inform our research, and research as a tool to help inform our clinical work. . .but student involvement in clinical work beyond the minimum is frowned upon." Faculty perceptions were reversed. Nearly half (45.6%) believe that students feel compelled to prioritize clinical training at the expense of their research (19.5% of faculty believe that students are compelled to prioritize research over clinical training; 34.9% do not believe that students are compelled to prioritize one over the other).

What drives this student–faculty discrepancy? Unlike medical schools and other provider-focused training programs, clinical psychology is deeply rooted in traditional academic incentives, which primarily reward faculty based on indicators of knowledge generation and dissemination, including papers published, citation metrics, and grant dollars. Accordingly, new tenure-track faculty are hired based on their outstanding technical skills, scholarly productivity, and passion for scientific discovery. This bias toward basic science training and easily counted "products" is amplified by hypercompetition for research dollars (Alberts et al. 2014). In many research-oriented programs, this leads to a bifurcation, where tenure-track faculty are minimally involved in clinical training and do not regularly assess or treat clients. Clinical training is instead overseen by a separate group of specialists, including clinical-track faculty, clinic directors, adjuncts, and externship supervisors. As a consequence, the practical everyday realities and intrinsic value of clinical training are an afterthought for some science-oriented tenure-track faculty. As one student noted, "Faculty. . .forget that clinical work is an important and required part of our training that takes up time (and should take up time) and. . .I constantly feel. . .they would prefer that I neglect clinical work in favor of research."

Recommendation: Integrate Basic and Applied Clinical Psychology

Our data reveal substantial conflict between the basic and applied aspects of training. Addressing this challenge requires a deeper integration of clinical science and practice. At minimum, we recommend that all programs foster regular opportunities for meaningful engagement between basic and applied trainers—including off-site supervisors—via program meetings, colloquia, workshops,

and retreats (for additional suggestions, see the section titled Challenge 3: Misalignment Between Training and Jobs).

For some programs, it makes sense to go a step further and establish a practice research network (PRN) (Borkovec 2004, Castonguay et al. 2015, Lucock et al. 2017). PRNs consist of academic researchers and clinical practitioners who collaborate on joint research projects focused on assessment and treatment as it naturally occurs in the clinic. Aside from fostering integration, PRNs have a number of potential benefits:

- Efficiency, because students have the opportunity to integrate their clinical training, practice, and research
- Rigor, insofar as PRNs have the potential to provide larger and more diverse samples
- Strengthening the bench-to-bedside pipeline by promoting the dissemination, refinement, and implementation of evidence-based treatments and creating new opportunities for collaboration (Bickman 1999)
- Promoting camaraderie among students, faculty, and community providers and creating novel opportunities for scientific collaboration

The Hierarchical Taxonomy of Psychopathology (HiTOP) consortium has pioneered a variant of the PRN approach, in which standardized assessments are collected at multiple training sites and pooled for analysis. This has enabled the rapid development of new scales and novel digital platforms for using them (Kotov et al. 2021, Simms et al. 2022).

We recommend that professional organizations support the development of PRNs by serving as central clearinghouses for best practices and protocols. We urge funders to provide the modest resources necessary for PRNs and related kinds of clinical science collaborations to flourish.

CHALLENGE 3: MISALIGNMENT BETWEEN TRAINING AND JOBS

A key challenge for clinical psychology is the fundamental misalignment between the way in which we train students and the jobs that many of them will ultimately perform.

Service Provision

Most clinical psychologists are health care providers. Even among graduates of PCSAS programs, nearly three-quarters (73%) provide clinical services in their current job (Kraut 2021). Yet students say that clinical training receives short shrift from their tenure-track mentors, many of whom dismiss provider careers as second-rate (Benjamin 2005, Castonguay et al. 2015). As one noted, "It is extraordinarily frustrating that faculty do not seem to value clinical work, that only alumni who are now prestigious researchers are ever mentioned. . .it's like those who do any amount of clinical work failed." These data raise serious concerns about whether doctoral training in clinical science—at least in its current form—can really be expected to elevate the scientific rigor of service provision (Baker et al. 2008). It seems farfetched to think that the current training environment will foster lasting attachments to clinical science values among alumni who work as providers (Castonguay 2011).

Academic Research

> There is no more worrisome consequence of the hypercompetitive culture of biomedical science than the pall it is casting on [the] early careers of graduate students.
>
> —Alberts et al. (2014, p. 5774)

Tenure-track faculty are trained and incentivized to replicate themselves, to create more academics. Yet it has become abundantly clear that the pipeline from doctoral degree to academic position is broken (Alberts et al. 2014). Dwindling government support for research and higher education has produced a hypercompetitive job market and a decline in the proportion of tenure-track positions (AAUP 2020, APA 2019, Lin et al. 2018). The number of degrees awarded each year far exceeds the number of open faculty positions. In 2019, 1,264 PhD degrees in clinical psychology were conferred in the United States (NSF 2019), but only 50 or so faculty positions were available at research-intensive institutions, a 25-to-1 ratio (Psychology Job Wiki 2019). Consequently, less than 1 in 8 clinical psychology PhD holders (13%) work in academia, and among those, less than half (48%) have traditional tenure-track positions (APA 2019, Christidis et al. 2019). Among the small minority who obtain research-oriented faculty positions, it has become more challenging to secure research funding (Alberts et al. 2014). Adjusted for inflation, federal funding for psychological research decreased by nearly 5% over the past decade (Lin et al. 2018). Nearly 80% (77.8%) of National Institute of Mental Health (NIMH) grant proposals are rejected, and the average age of first-time National Institutes of Health (NIH) R01 grant recipients has risen to 43 years (NIH 2016, 2021). In the face of such discouraging prospects, the field risks losing some of the most talented individuals.

Beyond the Clinic and Academia

Either by choice or because of poor academic job prospects, many clinical psychology PhD holders pursue careers in government and industry as administrators, analysts, data scientists, program officers, policy experts, regulators, and managers. Yet most programs do not invest significant effort in helping students navigate the transition to such jobs. As one student emphasized, faculty should "model more career pathways than R1 academic jobs—it's not realistic that all PCSAS graduates will get those positions. . .[and] our professors. . .don't take steps to educate themselves or connect us with role models pursuing other career paths." While there are efforts to provide such scaffolding, existing mechanisms are extremely limited in scale and scope (e.g., American Association for the Advancement of Science and Society for Research in Child Development policy fellowships, NIH BEST program). As it stands, even with 6–7 years of success as a doctoral student, some graduates feel compelled to pay for still more training to secure jobs outside of academia.

In sum, the existing training model does a disservice to our students, most of whom will pursue careers in the clinic, government, and industry.

Recommendations

Addressing the misalignment between current training practices, students' branching career paths, and the brutal reality of the academic labor market requires a multipronged strategy. Here we outline a few specific recommendations. Several recommendations outlined in the section titled Challenge 2: Dual Training are also likely to be helpful. We reserve our reflections on systemic issues and hypercompetition for later in the review.

Address behaviors that signal a lack of respect for clinical careers. The onus is on faculty to drive changes in the training climate. We encourage programs and faculty to frankly acknowledge student perceptions of conflict, scorn, and perfunctory integration. We urge them to actively work to eliminate implicit and explicit signals of disrespect for clinical training and careers.

Create staff scientist opportunities. We need more career opportunities for basic clinical scientists—opportunities that would benefit from students' rigorous training and scientific passion. Creating untenured staff scientist positions and research professorships is a feasible means

of doing so, with underappreciated benefits for productivity and institutional knowledge (Alberts et al. 2014). We recommend that faculty increase the ratio of staff scientists to graduate and postdoctoral trainees, that programs cultivate inclusive environments and recognize the contributions of staff scientists, and that universities create appropriately attractive employment policies (e.g., opportunities for promotion).

Provide more vocational scaffolding. Programs should not radically revise their values or training to accommodate careers in government, public policy, and industry. Our job is to train scientifically sophisticated clinical psychologists, not administrators, data scientists, congressional staffers, or health care managers. Nevertheless, we urge departments, graduate schools, and universities to invest the effort and resources that will be required to nurture partnerships with nonacademic/nonclinical employers and build substantive bridges for graduates. In some cases, it will be useful for programs to create the kinds of alumni networks, panel discussions, and predoctoral internships that are the hallmark of vocationally oriented graduate programs (e.g., MBA) (Berenbaum et al. 2021). With appropriate partnerships, internships can facilitate training in cutting-edge technical skills (e.g., summer internship at Google or the Substance Abuse and Mental Health Services Administration), enable access to unique data sets (e.g., electronic medical records), create new partnerships with traditionally understudied and underserved communities, and provide students with experience working as part of multidisciplinary teams. A relatively modest investment at the campus level, for instance, has the potential to provide a substantial return in well-being and occupational success for trainees in multiple disciplines. We encourage accreditors and professional organizations to intellectually foster and materially support the development of such scaffolding.

CHALLENGE 4: STUDENT FINANCIAL STRAINS

Today's students are more likely to carry substantial educational debt and experience financial strains than their predecessors (e.g., Palitsky et al. 2022, Peterson Foundation 2021). Among clinical psychology students, median educational debt is now $80,000 (APPIC 2021). Graduate student pay is typically low (average annual salary/stipend = $16,035/year), making it difficult to cover basic expenses and achieve other age-appropriate financial milestones (Sampson et al. 2018). In a 2019 *Nature* survey, two-thirds of graduate students (67%) agreed that financial worries were a top stressor (Nature Research 2019). Other evidence points to financial strain as a key determinant of psychiatric distress and a barrier to health care utilization (El-Ghoroury et al. 2012, Sverdlik et al. 2018).

Recommendation: Increase Student Compensation

We urge programs and other stakeholders to create need-based mechanisms to help defray the cost of internship applications and relocation, other out-of-pocket professional expenses, and financial emergencies. We are encouraged by the recent expansion of the NIH Loan Repayment Programs and urge professional organizations, societies, and accreditors to advocate for more sustainable compensation packages, either in the form of increased salary or greater support for living expenses (e.g., housing subsidies). At minimum, we call on universities to provide compensation packages tied to the level of federal training awards (e.g., NIH F31: $25,863). Ideally, assistantships and fellowships would be tied to the local cost of living, which often varies tremendously across institutions (e.g., Boston versus Bloomington; PayScale 2021). The bottom line is that it will be impossible to attract and retain the most talented students and to address urgent challenges to student mental health, well-being, and diversity without increasing student compensation (El-Ghoroury et al. 2012, Sverdlik et al. 2018, Tilghman et al. 2021). While we recognize that increasing student

compensation creates a host of challenges for research and instruction (e.g., fewer teaching assistants), it is an ethical means of rightsizing the field and creating a more sustainable and equitable training pipeline (Alberts et al. 2014). Given vested interests in keeping student compensation low, addressing this challenge may require students to employ collective bargaining tactics.

CHALLENGE 5: SYSTEMIC INEQUITIES AND INADEQUATE TRAINING

Reducing the immense burden of mental disorders requires that trainees are equipped with both the research and clinical skills to target health disparities and provide culturally responsive care. Systemic inequities in academia—including clinical psychological science—have an adverse impact on trainees who identify as Black, Indigenous, or People of Color (BIPOC), on those who identify as lesbian, gay, bisexual, transgender, or queer (LGBTQ+), on women, and on individuals with disabilities, and such inequities disproportionally affect those who hold multiple oppressed identities (Freeman 2018, Gruber et al. 2021, Ledgerwood et al. 2022). Trainees from marginalized backgrounds face unique barriers at every career stage (Galán et al. 2021) and experience elevated mental health difficulties (e.g., Lipson et al. 2018). Ultimately, systemic barriers contribute to limited representation in the broader field in both research and clinical care. BIPOC researchers are underrepresented in psychological science (Roberts et al. 2020), and there is a dearth of BIPOC clinicians: 40% of the US population, but only 17% of the psychology workforce, identified as BIPOC in 2019 (APA 2020). Clinical science and public health both suffer when the clinical workforce does not reflect the diversity of the broader population and fails to include the most talented clinical scientists.

In addition to the systematic exclusion of trainees from marginalized backgrounds in clinical science, current training in the provision of culturally responsive clinical care and research practices is inadequate. Despite the profound impact of discrimination and racism on mental health (Pascoe & Smart Richman 2009, Williams & Mohammed 2009), few programs have allocated sufficient attention to training in assessing and treating the consequences of structural stigma and racial trauma (Galán et al. 2021; Williams et al. 2018a,b). While there is growing recognition of inequities in mental health and access to care (AHRQ 2019, Finkelhor et al. 2021, Marrast et al. 2016), additional research on disparities, barriers to service use, and potential variation in clinical presentations and treatment efficacy is essential to optimally train the next generation of clinical scientists. As one example, though many programs emphasize training in evidence-based assessment and treatment, BIPOC individuals are underrepresented in treatment research (Polo et al. 2019). As a consequence, current approaches are, in fact, often evidence-based only for White clients (Galán et al. 2021). Simply put, doing the best clinical science possible requires us to undertake a radical reexamination of what we know, how we develop knowledge, and how we disseminate it.

Recommendation: Diversify the Workforce and Target Mental Health Inequities

Existing accreditation policies mandate training in diversity and multiculturalism. Yet it is clear that we must do more. While the scope of the present review precludes detailed recommendations, several recent reports provide comprehensive guides to promoting diversity and inclusion and implementing antiracist practices in the context of clinical psychology training and service provision (Cénat 2020, Galán et al. 2021, Jordan et al. 2021, Mote & Fulford 2021). Here, we briefly highlight some of the most important elements.

Increase support for trainees from underrepresented backgrounds. To diversify the workforce in clinical science and create an environment in which marginalized individuals can thrive, we

need to reimagine the systems that govern recruitment, inclusion, retention, and success (De Los Reyes & Uddin 2021, Galán et al. 2021, Tilghman et al. 2021). Evaluation criteria must change to reduce the bias inherent in current admission practices (De Los Reyes & Uddin 2021, Dougherty et al. 2019). As one example, many doctoral programs no longer require the Graduate Record Examination (GRE) for admissions (Sealy et al. 2019). Grassroots efforts aimed at demystifying the graduate application process (e.g., Project SHORT, Application Statement Feedback Program, and informational events) and subverting the "hidden curriculum" have the potential to increase applicant diversity. But admissions is only the first step. Once admitted, programs and universities must do more to cultivate environments that support trainees from diverse backgrounds and promote inclusion and belonging (Galán et al. 2021, Singleton et al. 2021). Targeted fellowships and training awards would also have a meaningful impact (Jones-London 2020).

Enhance training in culturally responsive care and responsible research practices. Curricular reforms will be critical in areas such as clinical training and research methods. Clinical training must prepare students to practice cultural humility and to identify and treat the consequences of systemic racism and structural stigma (Galán et al. 2021; Hatzenbuehler 2016; Williams et al. 2018a,b). Education and training in research methods must prepare students to conduct research that is socially just (Galán et al. 2021). Students must learn to decenter Whiteness (i.e., recognizing and changing Whiteness as the default in research) and to appropriately conceptualize and contextualize variables related to race and racism (Shim 2021, Simmons et al. 2021). For example, it is crucial that all trainees, and especially trainees pursuing biomedical research questions and methods, understand that race is not a biological variable but rather a proxy for the biopsychosocial impacts of systemic racism.

Increase institutional investment. We urge funders and other institutional partners to invest in workforce diversity and to support the kinds of training that equips clinical scientists to tackle mental health inequities. We are encouraged by funders' recent commitments to address structural racism and call on them to prioritize research on mental health disparities (Galán et al. 2021, Taffe & Gilpin 2021). Departments and universities should engage funding agencies on these issues, provide local support and incentives for training in socially just research and culturally responsive service provision, and educate faculty on best practices for mentoring students from marginalized backgrounds (Galán et al. 2021). Professional organizations and institutional partners also have an important role to play in translating new knowledge on variation in clinical presentation, diagnosis, and treatment efficacy back into the clinical science training curriculum and disseminating refined training materials.

CHALLENGE 6: STUDENT HEALTH AND WELL-BEING

> Routinely, students in the "clinical training years". . .of our program have mental health breakdowns, divorces, and academic difficulties due to the stress of trying to balance everything. Something needs to change if we are going to build a healthy and sustainable workforce.
>
> —Survey respondent

Graduate students are at increased risk for developing internalizing disorders (CGS & Jed Foundation 2021, Hazell et al. 2020, Satinsky et al. 2021). In a recent national survey of clinical and counseling students, nearly half (49%) reported significant anxiety, and more than one-third (39%) reported significant depression (Rummell 2015). In our survey, over half of students said they feel overwhelmed (61%) and exhausted/burned out (53.8%)—significantly higher rates than faculty (26.8% and 15.5%; $d = 0.65$–0.75). Against this backdrop, it is concerning that

over one-third (35.7%) of students said they rarely have enough time for self-care, family, and other nonwork activities—more than double the faculty rate (16.7%; $d = 0.49$). Among those who do manage to find time for self-care, conflict, shame, and guilt are common. As one student emphasized, "although I do engage in self-care, I often feel like I am doing something wrong, not working hard enough, or doing things contrary to what my program would dictate." In some cases, these problems are exacerbated by a culture that is dismissive of mental health concerns. As another student wrote, "the mental health of [students]. . .is often. . .waved off as a necessary evil of graduate school." In addition to the negative impact on learning and scientific discovery, these data raise ethical concerns given students' integral role in service provision (Campoli & Cummings 2019).

Recommendation: Promote Student Health and Well-Being

The current training climate is neither healthy nor sustainable. This crisis is not specific to clinical psychology. It cuts across disciplines and degrees; has attracted the attention of journalists, policy makers, and university leaders; and threatens to undermine our shared values and goals, both for students and for public health (CGS & Jed Foundation 2021, Duffy et al. 2021, Evans et al. 2018, Forrester 2021, Hazell et al. 2020, NASEM 2021, Rummell 2015, Woolston 2019).

While the roots of graduate student distress are complex, a landmark 2021 report from the Council of Graduate Schools (CGS) highlights the role of pervasive hypercompetition, poor work–life balance, maladaptive relationships with supervisors, and financial strains (CGS & Jed Foundation 2021). The CGS report emphasizes that these and other stressors are often exacerbated for students from underrepresented and nontraditional groups, including BIPOC, LGBTQ+, and international students. Although efforts to enhance other aspects of graduate training—like carving out more time, creating more flexibility, or increasing student compensation—are likely to have positive trickle-down effects for student mental health, they are not enough. We need targeted well-being interventions (CGS & Jed Foundation 2021) with appropriate tailoring for clinical psychology students (Campoli & Cummings 2019).

Take institutional responsibility. We urge universities, departments, and programs to take greater responsibility for graduate student mental health and well-being. Institutional responsibility involves two mutually reinforcing elements: plans and leadership. We recommend the development of strategic plans and the institutionalization of task forces or officials explicitly tasked with helping graduate students thrive. We urge departments and programs to develop formal mental health policies (Victor et al. 2021b). Although committees and policies can be performative, with appropriate power and recognition, they can foster novel partnerships, increase the flow of relevant resources, reduce stigma and other barriers to care, and raise awareness (CGS & Jed Foundation 2021).

Devise and implement evidence-based interventions. We encourage the development and implementation of evidence-based interventions, including procedures for supporting students as they progress through stressful program transitions and milestones. Intervention needs to encompass both prevention and treatment and must be scaled to the needs of individual students, most of whom do not require intensive care (Victor et al. 2021a). To ensure diversity, equity, and inclusion, institutional stakeholders must remain mindful of the distinct needs of students from underrepresented and nontraditional groups (Galán et al. 2021, Satinsky et al. 2021). Education, awareness, and engagement are all crucial elements of this multilayered strategy.

Student–mentor relations are a key determinant of graduate student well-being (Duffy et al. 2021, Evans et al. 2018, Sverdlik et al. 2018). Yet some faculty lack the necessary interpersonal

skills. Providing faculty with mentorship training and incentivizing engagement would help address this concern. Of course, faculty training is necessary but not sufficient. While abuse is relatively rare, conflict and other negative experiences are not (Evans et al. 2018, Woolston 2019). We encourage universities and programs to train faculty to identify potentially problematic relationships early, devise and enforce policies for overcoming different kinds of friction, and provide structured assistance (e.g., faculty mediators).

Self-care is increasingly recognized as a core clinical competency and an important buffer against stress (Miller 2021). To ensure a healthier culture in the future, we urge programs to incorporate structured training in self-care into their curricula. As Campoli & Cummings (2019, p. 13) note, "stress and burnout clearly put psychologists at risk of violating ethics principles. . .self-care is not just an indulgence. . .but. . .essential [for] preserv[ing] the integrity of professional and ethical practice."

Ensure access to care. Clinical psychology students' professional and academic ties represent a critical barrier to care (Victor et al. 2021b). It is imperative that programs provide students with confidential access to free or low-cost providers who are independent of the local training ecosystem.

CHALLENGE 7: HEAVY STUDENT WORKLOAD

Expectations for clinical students have become increasingly unrealistic. Typically, students are expected to complete their coursework, first-year project or master's thesis, qualifying examinations, dissertation, and externship in just 4–5 years. We expect them to master complex multidisciplinary techniques, cultivate outstanding clinical skills and cultural competency, comprehend hundreds of pages of assigned reading, mentor undergraduates, present their work at seminars and conferences, teach, and work on sponsored projects (Fernandes et al. 2020, Fried 2017, McMinn et al. 2009). And, more than ever, we expect them to produce. Fueled by hypercompetition for dwindling faculty jobs and research dollars, we expect them to produce more and more papers, grant applications, and conference presentations (Alberts et al. 2014, Barrett 2019, CACTUS Found. 2020, Edwards & Roy 2017).

In the face of these pressures, students are compelled to work long hours. Data from our survey revealed that over two-thirds (70.2%) of students work >50 h/wk, and over one-third (33.6%) work >60 h ($M = 55.5$ h). This is consistent with other evidence (Rummell 2015), nearly 10% more than the average American graduate student ($M = 51.3$ h; $d = 0.34$) (Nature Research 2019), and equivalent to working an extra 4.7 months annually. Thus, it is hardly surprising that nearly half of students (45.5%) are unsatisfied by their work–life balance and that most feel overcommitted (62.6%) and find it difficult to relax (59.8%).

Aside from the damaging consequences for students' well-being and, potentially, the quality of their clinical service provision, this climate also poses a grave hazard to the quality and rigor of clinical science. As Harold Varmus—a Nobel laureate and former NIH director—and colleagues emphasized, "Hypercompetition. . .suppresses the creativity, cooperation, risk-taking, and original thinking required to make fundamental discoveries. . . . [These necessitate] time for thinking, reading, and talking with peers" (Alberts et al. 2014). Crushing workloads also threaten workforce quality and diversity, either because talented individuals pursue a different career altogether or because they choose a nonacademic path after graduation (Alberts et al. 2014, Fuhrmann et al. 2011). As one student emphasized, "I am no longer willing to consider a. . .career in academia. . .due to the near-impossibility of having work/life balance." If clinical psychology is to realize its full potential, we need to address these problems.

Boulder Revisions

Despite significant efforts to reform clinical psychology training, concerns with student workload first identified in the late 1940s have yet to disappear; if anything, they have become much worse (APA 1950). Implementing the recommendations outlined above would go a long way to creating a more rigorous, equitable, and humane training environment, but it would not be enough to solve the fundamental imbalance between ever-growing expectations for student competency and productivity and the 4–5 years traditionally allotted to the doctoral degree. This imbalance cuts across many of the challenges outlined above.

At minimum, programs and departments need to frankly acknowledge that clinical psychology students require 6–7 years to complete their degree and provide them with a concomitant duration of guaranteed support (CoA 2021b). Of course, even bolder revisions may be necessary.

Three Ways Forward

At present, the best way to address the expectations-versus-time imbalance is unclear. Different solutions have different trade-offs and require different levels of institutional change and coordination (e.g., internship and state licensure). Here, we briefly outline three potential revisions. In all likelihood, an optimal solution would encompass elements of each (Strauman 2021).

Biphasic framework. Berenbaum and colleagues (2021) recently proposed a biphasic training framework and launched a website to promote discussion and refinement of their proposal and, ultimately, grassroots advocacy for change (**https://www.caaps.co/caapsdiscussion**). Here the doctoral degree is split into two consecutive phases, each 2–3 years long. In phase 1, students would cultivate foundational competency in basic and practical aspects of clinical psychology. The amount of time devoted to practical training in assessment and intervention would be reduced to <100 h and focused on common mental disorders. Successful completion would provide a master's degree and path to licensure. In phase 2, students would cultivate advanced expertise in the subset of topics most relevant to their scientific interests and career aspirations, similar to the IDP approach outlined above. This could include training in service provision, public policy, or basic science. The internship year would be shifted to the postdoctoral period, akin to residency.

The biphasic framework has several potential benefits, including greater efficiency, reduced workload for some students, increased flexibility, and comparatively modest structural changes. But, as others have noted, it also comes with some uncertainties and potential limitations (see Palitsky et al. 2022 and **https://www.caaps.co/caapsdiscussion**).

First, it is not clear that allowing students to self-select into "light" and "heavy" clinical tracks would address student perceptions of conflict or guarantee adequate integration of clinical science and practice; indeed, it might exacerbate existing polarization.

Second, the steep reduction of practical training raises some important concerns. On the one hand, we agree with the spirit of this proposed revision. Restricting practicum hours has the potential to substantially reduce student workload. Driven by fierce competition for clinical internships and the adverse financial and professional consequences of not securing an internship ("matching"), many students accrue what could be perceived as an excessive number of hours (e.g., in comparison to master's or medical students). We also agree with the underlying argument that there is compelling evidence that extensive training and specialized credentials are not necessary to perform rudimentary assessments (e.g., using psychometric screeners) and effectively deliver simplified psychosocial protocols (e.g., behavioral activation) targeting a single sign (e.g., tobacco use), symptom (e.g., anhedonia), or syndrome of mild-to-moderate severity in patients with uncomplicated presentations (Baker et al. 2008, Berenbaum et al. 2021, Levenson 2017, McFall 2006,

Singla et al. 2017). On the other hand, it is not clear that the proposed approach (<100 predoctoral practicum hours) is sufficient to prepare future generations of clinical psychologists to take the lead in the clinic—as providers, trainers, supervisors, and managers—or in sponsored research. The existing literature precludes firm conclusions. For example, it is not known whether providers with different training credentials (e.g., MSW, PhD, MD) differ in their general effectiveness (Stein & Lambert 1995), although the absence of rigorous evidence is often treated as the absence of effect. Likewise, the degree to which less intensively trained providers require specialized supervision and consultation to be safe and effective in general practice is unknown (Singla et al. 2017). Given these considerations, we call on accreditors and other national stakeholders (e.g., APCS, CUDCP) to actively foster the rational development of evidence-based caps on practicum hours and coordinate the collective action that will be necessary to uniformly enforce caps.

Third, the proposed licensure-eligible master of clinical psychology degree would further divide an already fractionated mental health care landscape and undermine efforts to create a positive association—in the minds of consumers and managed care organizations—between doctoral degrees from PCSAS programs, on the one hand, and the highest standards of evidence-based clinical care, on the other (Baker et al. 2008, Levenson 2017, PCSAS 2021).

Finally, the biphasic framework will increase efficiency only if a sizable number of students forgo substantive practical training in phase 2. To the extent that most students see intrinsic value in the scientist–practitioner model (as our survey results suggest), are fearful of not securing an internship, or simply want to maintain a viable path to a health care job in the face of a dispiriting academic job market, it seems implausible that very many will choose to forgo practical training without additional incentives or structural reforms. To the extent that this intuition is true, it undermines one of the main attractions of the biphasic framework.

MD–PhD framework. An alternative solution is to adopt features of the MD–PhD framework (Brass & Akabas 2019). MD–PhD programs are split into three phases. In phase 1, students complete basic science coursework (2 years). In phase 2, they complete their PhD (∼4 years). In phase 3, students perform clinical rotations and apply to residency programs (2 years). Traditionally, the focus of each training phase was strictly segregated. Phase 1, for instance, was focused exclusively on coursework-based instruction with no effort devoted to either research or clinical training. Contemporary training models strive for somewhat greater integration and include elements like research-centered journal clubs and summer laboratory rotations in phase 1 and limited clinical practica (∼120 h) in phase 2 (e.g., Univ. Wisc.–Madison School Med. Public Health 2021). The MD–PhD framework has a number of strengths, including reduced conflict and code switching between basic and applied training, a heavy but more carefully managed workload, greater integration of science and practice, strong preparation for multiple careers, and decades of evidence documenting increased research success relative to MD-only graduates. The major limitation of this approach is the lengthy time to degree, which would also exacerbate student financial strains.

Back to the future: the transdisciplinary scientist framework. A third solution, which is more cultural than structural, involves changing our expectations about the degree and breadth of competency that doctoral students can realistically achieve in a reasonable time frame. As noted above (see the section titled Challenge 1: An Increasingly Technical and Multidisciplinary Field), clinical psychology research increasingly relies on approaches that are complex, technical, and multidisciplinary, from neuroimaging and molecular genetics to machine learning and digital phenotyping. In our experience, there is a temptation to expect clinical psychology students to both master core facets of clinical psychology and achieve outstanding technical competence in one or multiple methods. This expectation can be unrealistic and create disappointment when, as often happens,

students are unable to reach the level of expertise achieved by peers in other degree programs (e.g., neuroscience), who are not saddled with the double burden of basic and applied training. Our survey data suggest that this expectation may fuel perceptions of conflict between basic and applied training, contribute to unmanageable workloads, and undermine students' well-being.

Seventy-five years ago, the Shakow report offered a solution to this problem, admonishing clinical psychologists to "work closely and in cooperative fashion with those whose methods may be different but whose goals are quite similar. In these settings [s/he] learns to. . .value the 'team' approach to. . .problems. . .which, because of their difficulty and complexity, require a concentrated group attack" (APA 1947, p. 545). McFall and colleagues (2015, p. 5) recently made a similar recommendation, urging students and faculty to "leave their silos, drain their moats, and build bridges" and arguing that "because no individual psychologist can become an expert in all fields, collaboration across traditional disciplinary boundaries is essential." In short, students should not be expected to develop deep expertise in multiple fields during the doctoral training phase. Instead, they should cultivate strong transdisciplinary science skills, as detailed below.

Clinical psychology is often cast as a transdisciplinary science (Baker et al. 2008, McFall et al. 2015). Indeed, most of the authors of this review have played precisely this kind of hub role on team science projects. Successful transdisciplinary scientists are not masters of every project-relevant domain and technique. They are innovative team leaders with two key skills (Gilliland et al. 2019). First, armed with sufficiently broad foundational knowledge, they are able to fluently communicate and productively work with experts from other disciplines. Second, they are subject matter experts with deep expertise in their primary discipline. To achieve this scientific skill set, it is essential that all clinical psychology students cultivate deep expertise in the nature, nurture, and biological bases of psychopathology; rigorous grounding in core aspects of contemporary psychometrics, statistics, and research design; and practical expertise in clinical assessment and diagnosis. This is crucial if they are to successfully perform the role of clinical psychologist on sponsored projects and other kinds of team science. In addition, students must develop foundational-level expertise in the concepts, language, and techniques of the relevant other discipline(s) and have the opportunity to practice working with expert teammates from that discipline(s). The development of more advanced technical skills would be shifted to the postdoctoral phase, as is typical of physician–scientists. Naturally, for this approach to succeed, faculty will need to communicate clearly and transparently with applicants and students about training goals.

The transdisciplinary framework has several strengths, not the least of which is that it does not require major institutional reforms. It promises to strengthen the features that make clinical psychologists desirable science teammates while maintaining a shorter time to degree than the MD–PhD approach. Whether a change in culture—alone or in combination with other revisions—is enough to address the expectation–time imbalance is unknown.

Next Steps

We encourage programs to creatively experiment and empirically examine the consequences of revising local training models. For some clinical science programs, it will make sense to drop APA accreditation. Doing so may not in itself solve all problems, but it would create new opportunities for reenvisioning clinical psychology training to address unsustainable student workloads and other urgent challenges. In this sense, dropping APA accreditation is not an end but a new beginning, with PCSAS accreditation serving as a catalyst for structural and cultural revisions. In considering bold reforms or even minor modifications, careful attention must be paid to our field's core values and the potential for adverse off-target effects (e.g., increased time to first full-time position).

CHALLENGE 8: INSUFFICIENT DATA FOR RECURSIVE REFINEMENT

> Contemporary clinical psychology training is "based on a patchwork of accumulated wisdom, historical practices, observation of past successes and failures, and feedback from past trainees. It is particularly seductive. . .to enumerate the students. . .who have gone on to do great things. . .and to conclude that we must be doing something (probably a lot of things) right. However, we all know that good intentions, anecdotal outcomes, and personal endorsements are a weak basis for making important decisions.
>
> —Robert Levenson (2017, p. 18)

Available data streams are not sufficient for recursive refinement of training practices. Existing national surveys provide detailed assessments of the graduate school experience, but it can be challenging or impossible to obtain local, program-level data (ACHA 2021, CSHE 2021, gradSERU 2021). The Association of Psychology Postdoctoral and Internship Centers (APPIC) and APA financial and occupational surveys are aggregated across degrees, and neither is readily available at the program level. Data collected by accreditors lack detailed assessments of workload, climate, mental health, financial strain, discrimination, and other key challenges. None of these surveys collects data from faculty or supervisors. Indeed, it was this gap that led us to conduct our own survey. While useful, there are crucial limitations to such grassroots efforts (e.g., selection biases). In short, none of the existing data collection efforts is sufficient to allow recursive refinement of training practices at either the national or local level.

Recommendation: Develop New Data Streams

To fully understand the challenges facing today's trainers and trainees and to determine whether revised training practices are having the desired effects, we need new data streams, which ultimately can be used to develop evidence-based standards for training (Levenson 2017). At the local level, we recommend that programs collect anonymous annual surveys of faculty and students. Items can be adapted from existing surveys (e.g., gradSERU), and new items can be devised based on the challenges and interventions of greatest local interest. Longitudinal data collection will be particularly important for understanding the consequences of local innovations. To enhance efficiency and rigor, survey design should be coordinated across institutions via APCS or CUDCP work groups. In some cases, it may be possible to organize randomized trials of particular training or climate interventions. At the national level, we recommend that accreditors harmonize and institutionalize these efforts, for instance, by expanding the scope of accreditation-related data collection. This would also create an institutional incentive to invest in healthier and more sustainable environments for students and faculty alike. We also recommend that programs transparently advertise 5- and 10-year postgraduation career outcomes. This would enable applicants to make informed decisions and, we hope, promote more realistic and respectful conversations about jobs outside of academia. We urge professional groups to advocate for these changes, accreditors to nurture them, and funders to provide the modest level of necessary support. For maximal transparency and return on investment, deidentified national data should be made publicly available to allow for data mining.

CHALLENGE 9: SYSTEMIC HEADWINDS

> I vividly remember. . .seeing Charlie Chaplin's film "Modern Times." . . . [In the film] machine-like workers are forced to work more and more quickly to the point of absurdity. Little did I know then that I would find myself in a strangely similar position in academia. Over the past 50 years, I have experienced increasing pressure to "speed up."
>
> —Uta Frith (2020, p. 1)

Substantial work will be necessary to overcome the challenges facing clinical psychology, and much of the burden will (and should!) fall on the shoulders of faculty. Faculty's most precious commodities are time and mental energy. Yet they are buffeted by the same systemic headwinds that students face. Decades-long declines in government support for higher education and psychopathology research fuel a hypercompetitive culture and faculty burnout (Alberts et al. 2014, Barrett 2019, CACTUS Found. 2020, Edwards & Roy 2017, Frith 2020). Stretched to the limit by their existing research, instructional, service, clinical, and administrative responsibilities, many faculty lack the surplus bandwidth that will be required to reimagine and rebuild clinical psychology training. Data from our survey revealed that over two-thirds of faculty (63.1%) work >50 h/wk, and close to one in five (19.6%) work >60 h ($M = 53.6$ h). On average, faculty already provide 4.1 months of "overload" effort. Not surprisingly, most feel overcommitted (63.1%), and over one-third (33.9%) say they do not have enough time for existing professional responsibilities. One-quarter (26.8%) feel overwhelmed, and 16.7% say they rarely have time for self-care, family, and other personal endeavors. These challenges are exacerbated for female faculty, who report greater burnout, are less satisfied with their work–life balance, and have less time for self-care and family responsibilities than their male colleagues ($d = 0.32$–0.48). Of course, these unfortunate consequences of long-term economic forces are not unique to clinical psychology; a similar pattern is evident across higher education (Azubuike et al. 2019, CACTUS Found. 2020, Jaremka et al. 2020, Urbina-Garcia 2020).

Recommendation: Work Together

To ensure feasibility, a team science approach will be necessary to solve the challenges confronting today's clinical psychology trainers and trainees. Work groups, task forces, and other kinds of creative grassroots approaches that cut across programs provide an immediate means of forging the necessary collaborations. We urge accreditors, professional organizations (e.g., APCS, CUDCP), and other institutional partners to encourage and support their development. No single agent or intervention will be sufficient to cure the system, but by working together we can mitigate some of the most urgent challenges.

CONCLUDING THOUGHTS

> We cannot perpetuate the status quo in clinical training simply because it is familiar and comfortable. . . . If evolving circumstances render past approaches no longer defensible or sustainable, then we must face this reality and deal with it forthrightly.
>
> —Richard McFall (2006, pp. 22–23)

Addressing the burden of mental disorders requires new etiological insights and the development and implementation of more effective, scalable, and equitable approaches to disease prediction, prevention, and treatment. To be successful, clinical psychology needs to honestly confront some uncomfortable truths about the unsustainable current state of clinical psychology training.[1] Fully addressing the challenges that we have identified will require fundamental changes. These changes are necessary and, in many cases, long overdue. Some of these changes will be difficult to implement. Some will be disruptive in the near term, and they need to be made with great care and transparency. This will require debate, advocacy, and action at both the individual and the

[1] Our perspective on these issues is strongly influenced by Varmus and colleagues' landmark commentary on the state of the larger biomedical research ecosystem (Alberts et al. 2014).

institutional levels. As a first step, we call on accreditors, professional organizations, and funders to create the necessary meetings ("Boulder 2.0") and other resources that will be necessary to discuss the challenges and recommendations we have highlighted. Students, alumni, and other key constituencies must have a robust voice in these discussions. Of course, the 75-year history of clinical psychology is replete with debates, and discussion alone will not be sufficient to overcome the urgent challenges facing today's trainers and trainees. Bold thinking, creative collaborations, novel incentives, and new institutional investments will be necessary to create a sustainable training environment where talented students and faculty can focus their energies on understanding and reducing the suffering caused by mental health conditions. Given the staggering burden that mental disorders impose on public health and the critical role that training plays in preparing future generations of clinical scientists to tackle this burden, we urge all stakeholders to lobby policy makers and demand greater parity in the resources allocated to clinical psychological science.

DISCLOSURE STATEMENT

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AUTHOR CONTRIBUTIONS

A.J.S., R.M.T., D.G.G., and D.M.B. envisioned the study, which emerged from a roundtable discussion at the 2018 meeting of the Society for Research on Psychopathology. R.M.T. and A.J.S. devised and piloted the survey. K.A.D., D.G.G., and A.J.S. devised the final survey and coordinated institutional review board approval and data collection. A.J.S. and K.A.D. processed and analyzed data. K.A.D., D.G.G., and A.J.S. developed the article structure. K.A.D., A.J.S., D.G.G., K.A.M., D.M.B., and M.R.W. wrote the main text. D.G.G. edited the final version and coordinated editorial communications. All authors contributed to reviewing and revising the survey, outline, and main text and approved the final version.

RESOURCE SHARING

Deidentified survey data are publicly available via the Open Science Framework (**https://osf.io/r5yhd/**).

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Errata

An online log of corrections to *Annual Review of Clinical Psychology* articles may be found at http://www.annualreviews.org/errata/clinpsy

Supplemental Material: Annu. Rev. Clin. Psychol. 2022. 18:43-70
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Training the Next Generation of Clinical Psychological Scientists: A Data-Driven Call to Action
Gee, DeYoung, McLaughlin, Tillman, Barch, Forbes, Krueger, Strauman, Weierich, and Shackman

Supplemental Text

Gee, DeYoung, McLaughlin, Tillman, Barch, Forbes, Krueger, Strauman, Weierich, & Shackman

Survey

Overview

To better understand the state of the field, we conducted our own anonymous national online survey of clinical psychology Ph.D. students and faculty. Data were collected in April and May 2019, and yielded nearly 600 usable responses from current affiliates of APA-accredited clinical psychology Ph.D. programs residing in 32 U.S. states (426 students, 171 faculty). Respondents had a wide range of expertise, from first-year graduate students to senior faculty with decades of mentorship experience. In addition to the quantitative data summarized in our Review, survey respondents generously provided a wide range of suggestions—nearly 40,000 words of narrative—for enhancing training practices. While this approach is not without some potential limitations (e.g., selection biases), it represents the largest and most comprehensive attempt to discern the state of the field from the perspective of both faculty and students at research-intensive clinical psychology programs in the U.S.

Method

The survey was advertised on the Council of University Directors of Clinical Psychology (CUDCP), Society for Research in Psychopathology (SRP), and Society for a Science of Clinical Psychology (SSCP) listservs and social media. In addition, we emailed the Directors of Clinical Training (DCTs) at every Carnegie Research I institution with an APA-accredited clinical psychology Ph.D. program. The survey was completely anonymous to minimize potential reporting biases. All respondents provided informed written consent and all procedures were approved by the University of Maryland Institutional Review Board.

Participants

- 426 students and 171 faculty (*n*=597)
- 28.5% private institutions
- Faculty (48.5% female)
    - Median=13 years of faculty experience
    - Median=10 supervised students (total to date)
- Students (79.6% female)

Additional Recommendations

Due to journal-imposed word limits, some of our more granular recommendations and suggestions are detailed here.

Recommendation: *Reimagine Multidisciplinary Technical Training*

Increase Access

- **Massive Open Online Courses.**
    - As others have noted, online courses create opportunities for expanding access to specialized technical training (McFall, 2006). Online coursework is particularly useful in situations

where there is insufficient student demand or faculty expertise to warrant traditional classes.
    - In some cases, it may be useful to deploy hybrid instructional approaches, where students watch pre-recorded lecture materials and complete learning exercises and knowledge checks outside of the classroom. This would be complemented by hands-on classroom training led by a campus-approved instructor of record. This approach would enable students to receive institutional (i.e., department, university, accreditor, licensing board) credit for training that was partially completed off campus. It would also enable faculty to receive appropriate credit for multi-institutional team-taught courses. Alternatively, students and their mentors could petition the department or graduate school to provide credit for online coursework.

- **Open-Source Software.** Training platforms that incorporate well-supported open-source software tools (e.g., *AFNI, R, scikit-learn*) are especially valuable because they connect students to international communities of experts, who can provide an additional source of scientific guidance and methodological advice.

- **Winter/Summer Courses.** In some cases, winter and summer courses may be useful, but this should be balanced against students' self-care needs (see Challenge 6).

Increase Utility

- **Maximize Utility and Research Integration.**
    - Survey respondents highlighted the value of student-driven, hands-on technical training, which is typically achieved via traditional one-on-one mentorship in the laboratory. To achieve this at scale, existing courses could be retooled to increase the amount of learning-by-doing and on-demand teaching (e.g., Lombardi et al., 2021; Millman, Brett, Barnowski, & Poline, 2018). Consider a course on Psychometrics. Students could complete readings, watch pre-recorded video lectures, and complete online learning checks outside the classroom. The content and techniques emphasized could be partially informed by student and faculty polls (e.g., conducted several months before the course is delivered). Classroom time could be devoted to question-driven mini-lectures and hands-on exercises (e.g., devise a new psychometric instrument) using real or simulated data. This same recommendation applies to bootcamps and workshops.
    - In some cases, it will be helpful to integrate classroom instruction and ongoing student research projects, for instance, by explicitly allocating a portion of the semester to hands-on mentoring of individual projects.

Increase Efficiency

- **Enhance the undergraduate curriculum.** In the long-run, significant gains in the efficiency of graduate training could be realized by modifying the *undergraduate* curriculum. Integrative course sequences (e.g., pre-clinical psychology, data science, behavioral neuroscience, computational psychology) that lead to specific degrees, minors, or certificates are likely to be highly desirable for undergraduates pursuing a range of careers and, ultimately, would provide the next generation of

doctoral students with the additional time and mentorship necessary to master these increasingly crucial technical skills.

- **Consolidate Coursework.** We encourage programs to eliminate 'checklist' coursework and, insofar as possible, develop mechanisms that enable students to satisfy multiple discipline-specific knowledge (DSK) requirements with a single course. This can be accomplished in an integrative manner, by tailoring the title, content, and assessments to specific DSKs (e.g., *Developmental Affective Neuroscience*). Course 'overlays' are an alternative approach that can be implemented with more traditional courses, including courses taught by faculty in other departments. In this case, students are required to successfully complete both the course (e.g., *Human Attachment*) *and* an independent written assessment ('overlay') of DSK-specific competency (e.g., developmental aspects of behavior), with the latter organized by clinical faculty in consultation with the course instructor or other subject-matter experts. Foundational knowledge in the affective, biological, cognitive, developmental, and social DSKs can be demonstrated by successful completion of undergraduate coursework or the Psychology Graduate Record Examination.

- **State Licensing Mandates.** We recognize that some state licensing boards mandate a minimum of 3 credit hours per DSK. If programs choose to ignore the local licensure mandate, we urge them to transparently advise students on alternatives and to actively lobby—with partnership with PCSAS and other institutional allies—for updated standards grounded in demonstrated competencies (e.g., thoughtfully designed examinations or simulations), not credit hours.

- **Department Requirements.** In some cases, it will be useful for clinical psychology faculty to encourage refinement of department-level course requirements to maximize compatibility with program requirements and students' training needs.

- **Multi-Course Sequences.** Thoughtful multi-course approaches and sequences create additional opportunities for strengthening technical training. For example, using a unified conceptual framework (e.g., generalized linear model) and a single open-source software package (e.g., *R*) for a sequence of basic (e.g., regression) and advanced (e.g., multilevel modeling, machine learning) statistics courses sidesteps the need for students to master multiple software packages or programming languages.

- **Create structured flexibility.** Sabbaticals, retirements, leaves, and course buy-outs create additional training barriers. This can be partially mitigated by proactively creating a selection of courses—inside or outside of the department—that students can use to satisfy particular DSKs ('choose-your-own-adventure'). In some cases, there may be sufficient demand to warrant the development of specialty coursework tracks (e.g., clinical neuroscience, developmental psychopathology). In other cases, individualized development plans (IDPs) make more sense. In contrast to *ad hoc* approaches, intelligently structured tracks and IDPs have the virtue of compelling faculty and students to actively prepare for future instructional needs, including specialized technical and multidisciplinary training that falls outside the scope of traditional DSK requirements.

Supplemental References

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