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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, depression, 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

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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 IRB 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 paper structure. K.A.D., A.J.S., D.G.G., K.A.M., D.M.B., and M.R.W. wrote the paper. D.G.G. edited the final version and coordinated editorial communications. All authors contributed to reviewing and revising the survey, outline, and paper, and approved the final version.

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Resource Sharing

De-identified survey data have been or will be made publicly available via the Open Science Framework.

recommendations for the 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.

Keywords

clinical psychology training; graduate education; mental health; wellbeing

INTRODUCTION

The central goal of clinical psychology is to reduce the suffering caused by mental health conditions. Anxiety, depression, psychosis, substance use, personality, and other mental disorders impose a staggering burden on public health and the economy (CDC 2020, SAMHSA 2019, Vos et al 2020). 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 wellbeing of clinical psychologists and the public alike.

How Did We Get Here?

The essayist James Baldwin wrote that *“the great force of history comes from the fact that we carry it within us, [and] are unconsciously controlled by it”* (Baldwin 1998, p. 722). 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 these institutional fixtures were at least partially in place. Over half of all Ph.D.s awarded in psychology were clinical, with most students supported by the GI Bill or 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 the existing clinical workforce (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 encompassing a heavy dose of general (‘breadth’) and technical (‘depth’) coursework, a year-long 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, with graduates 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).

As Richard McFall noted, the ‘Shakow-Boulder’ model was a shrewd compromise, one 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...*” (McFall 2006, p. 25). 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 Doctor of Psychology (Psy.D.) 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 healthcare practices founded on clinical intuition rather than scientific evidence (Baker et al 2008, McFall et al 2015). More generally, members of the too-little science camp have argued that addressing the immense burden of mental disorders on global public health will require the development of more sustainable and scalable intervention strategies, *not* training a larger cadre of traditional 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 with 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 Ph.D.-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 2021a). And, unlike the post-war ‘golden age,’ most students are now supported by work-contingent teaching and graduate assistantships, rather than training and workforce development awards.

Of the 175 programs currently accredited by 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—UC Berkeley, Stony Brook, and Washington University in St. Louis—have announced that they will not seek APA re-accreditation 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, with licensure lobbying efforts 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 evidence (Levenson 2017). And it is clear that new challenges have emerged, from growing concerns about student mental health to hyper-competition 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, best practices, and data, including the results of our own anonymous national survey of nearly 600 clinical psychology Ph.D. students and faculty at research-intensive programs. Data collection efforts focused on research-intensive (‘R1’) institutions and clinical science-oriented listservs. *Key methodological details are detailed in the Supplement.* For heuristic purposes, we have organized the data into 9 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, investigators, and students.

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 *in press*, Wang et al 2021).

Data from our national survey underscore the ascendance of multidisciplinary approaches, with nearly half of respondents (43.2%) reporting a multidisciplinary professional identity. *See the Supplement 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 professional identity, many respondents say 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 approaches 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 applying neuroimaging techniques to psychopathology. They would need to learn a modicum of neuroanatomy, behavioral neuroscience, medical physics, digital signal processing, general linear modeling, programming, and 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 norm, 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%) say that specialized technical coursework (e.g., neuroimaging) is not available at their institution. Nearly one-third of students (30.2%) say 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%; $d=.27$), suggesting that faculty perceptions of course utility may be inflated relative to students' perceptions, or that faculty could do more to communicate the practical significance of coursework to students. Second, more than one-third of students (39.7%) say 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, with nearly two-thirds (68.2%) reporting low feasibility. As a result, many students report 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 research.

Recommendation: *Reimagine Multidisciplinary Technical Training*

Many programs have failed to systematically address the pedagogical demands created by the field's increasing reliance on complex, multidisciplinary tools and concepts, leading to inadequate access to relevant training opportunities. The problem is compounded by feasibility issues; many students simply 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 Supplement. Recommendations targeting broader structural issues are described in a later section.*

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 *ad hoc* one-on-one mentorship. A rapidly expanding catalog of online courses—many developed by leading methodologists—provide additional opportunities for learning specialized skills.

Increase Utility

Restructure courses. Our survey respondents highlighted the value of student-driven, hands-on technical training, traditionally achieved via one-on-one laboratory mentorship. 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 (e.g., coursework, workshops) on relevant skills that are devised for other specialties—like a coding course offered in computer science or a neuroimaging course offered in medical physics—can be 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 for mastering 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., pre-clinical 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' (DSKs), including the history of psychology, research design, statistics, psychometrics, and affective, biological, cognitive, developmental, and social aspects of behavior (CoA 2021b). 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 DSKs (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 DSKs. 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—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., APS) to actively foster the development of 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 necessary to create or host them. Preparing new instructional materials, devising new on- and offline training platforms, and retooling existing 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 us from other areas of psychology (e.g., developmental affective neuroscience), which provide no training in clinical service and from other mental healthcare specialties (e.g., psychiatry), which do not expect doctoral students to discover new knowledge. Today, the APA, PCSAS, and most research-intensive programs continue to publicly tout the integrative nature of clinical psychology training. This is even true of programs that plan to drop APA accreditation. UC Berkeley, for instance, highlights their 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 (UC-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 a critical spark of therapeutic innovation (Castonguay et al 2015). For example, Aaron Beck’s foundational work to develop cognitive-behavioral therapy (CBT) 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, leading to failures in translation (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.

In practice, the integration of basic and applied clinical psychology has proven exceedingly difficult (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, with nearly three-quarters (73.9%) saying that students are forced to prioritize one aspect of their training at the expense of the other. More than half of students say 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 ($d_s=.26-.38$).

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 (53.3%) of students 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 noted, *“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, with nearly half (45.6%) believing 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 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 hyper-competition 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 outside practicum 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 offsite supervisors—via program meetings, colloquia, workshops, and retreats. *For additional suggestions, see Challenge 3.*

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 are comprised 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, including

- Efficiency, because students are able to integrate 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, where 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 *in press*).

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 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 healthcare 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 alum 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. (Alberts et al 2014)

Tenure-track faculty are trained and incentivized to replicate and 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 Ph.D. degrees in clinical psychology were conferred in the U.S. (NSF 2019), but only 50 or so faculty positions were available at research-intensive institutions (25-to-1) (Psychology Job Wiki 2019). Consequently, less than 1 in 8 (13%) clinical psychology Ph.D.s 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 NIMH grant proposals are rejected, and the average age of first-time NIH R01 grant recipients has risen to 43 years (NIH 2016, NIH 2021). In the face of such discouraging prospects, the field risks losing the most talented individuals.

Beyond the Clinic and Academia

Either by choice or due to poor academic job prospects, many clinical psychology Ph.D.s 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, “*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 quite limited in scale and scope (e.g., AAAS/SRCD policy fellowships, NIH BEST program). As it stands, even with 6–7 years of success as a doctoral student, some graduates are compelled to pay for still more training to secure employment 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 multi-pronged strategy. Here we outline a few specific recommendations. *Several recommendations outlined in Challenge 2 are also likely to be helpful. We reserve our reflections on systemic issues and hyper-competition for later in the Review.*

Address Behaviors that Signal a Lack of Respect for Clinical Careers—The onus is on faculty to drive cultural change. 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 our 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 healthcare managers. Nevertheless, we urge departments, graduate schools, and universities to invest the effort and resources that will be required to nurture partnerships with non-academic/non-clinical 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 pre-doctoral 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 SAMHSA), enable access to unique datasets (e.g., electronic healthcare 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 wellbeing 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., Peterson Foundation 2021). Among clinical psychology students, median educational debt is now \$80,000 (APPIC 2021). Pay is typically low, making it difficult to cover basic expenses and achieve other age-appropriate financial milestones (\$16,035; 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 healthcare 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 student Loan Repayment Program 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 vs. 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, wellbeing, 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 'right-sizing' 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); lesbian, gay, bisexual, transgender, queer (LGBTQ+); women; and individuals with disabilities and disproportionately affect those who hold multiple oppressed identities (Freeman 2018, Gruber et al *in press*, Ledgerwood et al *in press*). 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 the public suffer when the mental health 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, Williams et al 2018b). While there is growing recognition of inequities in mental health and access to care (Finkelhor, Turner, LaSelva, 2021; Marrast, Himmelstein, Woolhandler, 2016; AHRQ, 2019), 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). Thus, current approaches are, in fact, often only evidence-based for White clients (Galán et al 2021). Simply put, doing the best clinical science possible requires us to undertake a radical re-examination 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, recent reports provide comprehensive guides to promoting diversity and inclusion and implementing anti-racist 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 components.

Increase Support for Trainees from Underrepresented Backgrounds—In order 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 have discontinued the use of the GRE for admissions or stopped requiring this exam (Sealy et al 2019). Coordinated grassroots efforts to provide guidance at various stages of the graduate application process (e.g., Project SHORT, Application Statement Feedback Program, and informational events) and to debunk the ‘hidden curriculum’ in academia 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 *in press*). Formal funding opportunities designed to enhance and retain BIPOC trainees at every stage of training would also have a meaningful impact and could follow the longstanding and successful example of NINDS-funded programs designed to increase and support BIPOC trainees in neuroscience (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, Williams et al 2018b). 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 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, and provide local support and incentives for training in socially just research and culturally responsive service provision, as well as educating faculty in 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 WELLBEING

“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 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 one-third (39%) reported significant depression (Rummell 2015). In our survey, over half of students say they feel overwhelmed (61%) and exhausted/burned out (53.8%), significantly higher rates than faculty (26.8% and 15.5%; $d_s=.65-.75$). Against this backdrop, it is concerning that over one-third (35.7%) of student respondents say they rarely have enough time for self-care, family, and other non-work activities—over twice the faculty rate (16.7%; $d=.49$). Among those who do manage to make time for self-care, many experience a degree of conflict, shame, or guilt. 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.*” Aside from 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 Wellbeing*

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 *in press*, 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 hyper-competition, 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 non-traditional 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 wellbeing 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 wellbeing. 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 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 non-traditional groups (Galán et al 2021, Satinsky et al 2021). Education, awareness, and engagement are all crucial elements of this multi-layered strategy.

Student-mentor relations are a key determinant of graduate student wellbeing (Duffy et al *in press*, Evans et al 2018, Sverdlik et al 2018). Yet some faculty lack the necessary ‘soft’ 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 a buffer against stress (Miller *in press*). To ensure a healthier culture in the future, we urge programs to incorporate structured training in self-care into their curricula. As Campoli and Cummings 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 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 2019, Fried 2017, McMinn et al 2009). And, more than ever, we expect them to produce. Fueled by hyper-competition 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 Foundation 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 hours per week, and over one-third (33.6%) work >60 hours ($M=55.5$ hours). This is consistent with other evidence (Rummell 2015), nearly 10% more than the average American graduate student ($M=51.3$ hours; $d=.34$) (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 most feel over-committed (62.6%) and find it difficult to relax (59.8%).

Aside from the damaging consequences for student's wellbeing 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, 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 non-academic 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 in earlier sections would go a long way to creating a more rigorous, equitable, and humane training environment, but they will 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 earlier.

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 2021a). 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 tradeoffs 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).

Bi-Phasic Framework—Berenbaum and colleagues recently proposed a bi-phasic training framework (Berenbaum et al 2021) 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 I, students 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 hours and focused on common mental disorders. Successful completion would provide a Master’s degree and path to licensure. In Phase II, 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 earlier. 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 bi-phasic framework has several potential benefits, including greater efficiency, reduced workload for some students, increased flexibility, and comparatively modest structural changes. But it also comes with some uncertainties and potential limitations.

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 or 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 unknown whether providers with different training credentials (e.g., MSW, Ph.D., M.D.) 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 healthcare 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 bi-phasic framework will only increase efficiency if a sizable number of students forgo substantive practical training in Phase II. 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 healthcare 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 bi-phasic framework.

M.D.-Ph.D. Framework—An alternative solution is to adopt features of the M.D.-Ph.D. framework (Brass & Akabas 2019). M.D.-Ph.D. programs are split into 3 phases. In Phase I, students complete basic science coursework (2 years). In Phase II, they complete their Ph.D. (~4 years). In Phase III, students perform clinical rotations and apply to residency programs (2 years). Traditionally, the focus of each training phase was strictly segregated. Phase I, for instance, was focused exclusively on coursework-based instruction, with no effort devoted to either research or practical clinical training. Contemporary training models strive for somewhat greater integration, and include elements like research-centered journal clubs and summer laboratory rotations in Phase I, and limited clinical practica (~120 hours) in Phase II (e.g., UW-Madison SMPH 2021). The M.D.-Ph.D. 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 M.D.-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 is more cultural rather than structural, and involves changing our expectations about the degree and breadth of competency that doctoral students can realistically achieve in a reasonable timeframe. As noted in Challenge 1, 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 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 tasked with 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' wellbeing.

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 recently made a similar recommendation, urging students and faculty to “*leave their silos, drain their moats, and build bridges,*” arguing that, “*because no individual psychologist can become an expert in all fields, collaboration across traditional disciplinary boundaries is essential*” (McFall et al 2015, p. 5). 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 skillset, 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 *post*-doctoral 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 M.D.-Ph.D. 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 re-envisioning 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 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 (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 to obtain program-level data (ACHA 2021, CSHE 2021, gradSERU 2021). 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 collect data from faculty or supervisors. Indeed, it was this gap that led us to collect 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 levels.

Recommendation: *Develop New Data Streams*

To fully understand the challenges facing today's trainers and trainees and 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 workgroups. 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 serve as 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 post-graduation career outcomes. This would enable applicants to make informed decisions and, we hope, will 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, de-identified 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.’...[where] 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 (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 Foundation 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 (63.1%) of faculty work >50 hours per week, and close to one-in-five (19.6%) work >60 hours ($M=53.6$ hours). On average, faculty already provide 4.1 months of ‘overload’ effort. Not surprisingly, most feel over-committed (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 ($d=.32-.48$). 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 Foundation 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. Workgroups, 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 and 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.

SUMMARY POINTS AND FUTURE DIRECTIONS

	Summary	Recommendations
Challenge 1: An Increasingly Technical and Multidisciplinary Field	<ul style="list-style-type: none"> The field has increasingly come to rely on complex multidisciplinary tools 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 research. 	<ul style="list-style-type: none"> 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 and coordinate efforts (e.g., through training consortia). Invest in the resources that students and faculty need to create or host training opportunities and to make instructional materials and platforms openly available.
Challenge 2: Dual Training	<ul style="list-style-type: none"> In practice, the integration of basic and applied clinical psychology is extremely difficult. 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Graduate student pay is low, and median educational debt among students is high. 	<ul style="list-style-type: none"> Increase student compensation. Create need-based mechanisms to help defray costs that arise during training (e.g., internship applications).

	Summary	Recommendations
	<ul style="list-style-type: none"> Financial stress represents a significant stressor among graduate students. 	
Challenge 5: Systemic Inequities and Inadequate Training	<ul style="list-style-type: none"> Systemic inequities and racism are pervasive in clinical science. Graduate students who identify as Black, Indigenous, or People of Color (BIPOC); lesbian, gay, bisexual, transgender, queer (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. 	<ul style="list-style-type: none"> 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 Wellbeing	<ul style="list-style-type: none"> Graduate students experience high rates of anxiety and depression. 	<ul style="list-style-type: none"> 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 training ecosystem.
Challenge 7: Heavy Student Workload	<ul style="list-style-type: none"> Expectations for clinical students have become increasingly unrealistic in the context of the allotted time to degree. 	<ul style="list-style-type: none"> Addressing the expectations-versus-time imbalance will require creative solutions and coordination at various levels. Possible solutions include a multi-phasic framework or a cultural shift toward a transdisciplinary focus. An optimal solution will likely encompass elements of each of several proposals and may benefit from increasing flexibility to facilitate structural and cultural changes.
Challenge 8: Insufficient Data for Recursive Refinement	<ul style="list-style-type: none"> Available data streams are not sufficient for recursive refinement of training practices. 	<ul style="list-style-type: none"> Develop new data streams and evaluate training practices. Develop evidence-based standards for training.
Challenge 9: Systemic Headwinds	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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 pursue the solutions proposed here.

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 (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 training¹. 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. In short, they need to be made with great care and transparency. This will require debate, advocacy, and action at both the individual and the 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.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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