PART I CLINICAL PSYCHOLOGICAL SCIENCE

An Evolving Field
Clinical psychology sits at the confluence of many basic and applied sciences including psychometrics, measurement, biology, neuroscience, cognition, psychotherapy, development, and epidemiology. These merging scientific streams have supported the ascendancy of clinical psychology as a broad and fast-moving discipline that has the potential to deliver important findings about the etiology and treatment of psychopathology. However, navigating these waters can be challenging due to the field’s complexity, made even more difficult by rapid changes in the dominant methods and thinking in recent decades. Some of the most marked changes have come from continued debates about the fundamental nature of the constructs we seek to study. For instance, is psychopathology composed of kinds or continua? Although the field continues to be organized in part by a diagnostic nosology based on legacy categories, the cumulative evidence now clearly tilts in favor of dimensions of pathology, with little compelling evidence in support of discrete mental disorders. This shift in a longstanding debate has major implications that ripple across the field. For example, who should be included in research studies if there is no clear cutoff between normality and pathology? How should they be assessed, and along which dimensions? If psychopathology is predominantly dimensional, how can we develop treatments that are empirically supported for a given person? And what sorts of statistical models can accommodate the complexity of multidimensionality?

In addition to the question of categories or dimensions, there are many other paradigm shifts occurring in clinical psychology. For instance, findings from genetics and neuroscience are increasingly being infused into the conceptualization of psychopathology. Although exciting, this shift comes with the challenge of pursuing translational research that bridges wide divides in levels of analysis. Some trends are more methodological, such as the rise of technologies that provide unprecedented access to human experiences in daily life. For example, intensive sampling methods such as ecological momentary assessment have the potential to measure dynamic psychological processes at the timescale of greatest relevance, but unlocking the potential of such approaches depends on advanced quantitative analyses of time-varying processes. Likewise, many modern studies collect an immense amount of multimodal data on each participant, in some cases covering much of the lifespan. Thus, we must address both the promises and pitfalls of “big data” that require one to synthesize across methods and timescales (e.g., ecological momentary assessment, fMRI, and self-report). Some approaches to “big data” in clinical psychology have begun to emphasize the value of predicting clinical outcomes using machine learning methods that can cope with an overwhelming volume of data, even if they at times lack a strong theoretical basis. Finally, as in many other disciplines, clinical psychology is becoming increasingly aware of the value of examining how we conduct our science. This shift has promoted a greater emphasis on staying true to best practices and avoiding approaches that can lead to problems with replicability and reproducibility or to questionable research and interpretive practices.

Clinical scientists of today can no longer equip themselves for a successful program of research by selecting a preferred diagnosis, picking a level of analysis (e.g., behavior, physiology), and looking at an F-table to find the critical values for an ANOVA of a hypothesized clinical group x experimental condition effect. Rather, to succeed, clinical psychologists increasingly have to grapple with difficult philosophical, technological, and methodological issues. We believe that progress in the field will be best supported by a tight synthesis between theory and method founded on a conceptual continuity in the way clinical psychologists think about the phenomena of interest, how they sample data, and how they model the data quantitatively. The overarching aim of this book is to provide a map of the major tributaries of modern clinical science and to look downstream toward where the field will flow in the future.

Relative to other similar handbooks, we have solicited contributions that emphasize philosophy of science, paradigms of inquiry, data acquisition apparatuses, and quantitative methods. In the first part, the field’s larger questions are addressed, including the definition of
This transitions naturally into a part on observational designs, headlined by a definitive treatise on the foundations of descriptive psychopathology (Chapter 4). This part also covers important fundamentals, including chapters focused on survey and interview methods (Chapter 5), psychometrics (Chapter 6), latent variable models (Chapter 7), and epidemiology (Chapter 8). Although we do not intend to suggest that experimental and observational designs are incompatible, the next part focuses on experimental designs as an important and distinct approach to understanding psychopathology. This part also covers biological approaches, as they have so often been incorporated within the experimental paradigm. A background on the field of experimental psychopathology (Chapter 9) is followed by a detailed look at strategies and issues in the area (Chapter 10). The coverage then turns to biological approaches, including deep dives into the well-established but continually developing fields of peripheral psychopathology (Chapter 11), molecular and behavioral genetics (Chapter 12), and functional neuroimaging (Chapter 13). This part ends with an overview of the emerging field of computational clinical neuroscience (Chapter 14).

In the next few parts, the focus shifts to longitudinal research designs. The first of these parts emphasizes a developmental perspective, beginning with an overview of developmental psychopathology (Chapter 15). This introductory chapter is followed by a review of how and why to study pubertal changes in psychopathology (Chapter 16). The focus then turns to quantitative genetic strategies for studying gene-environment interactions (Chapter 17). This part concludes by examining more general issues in longitudinal research designs (Chapter 18) and tuning statistical models of longitudinal data to specific research questions (Chapter 19).

At their heart, treatment studies are also longitudinal research, and the first chapter in the next part covers contemporary strategies in developing and evaluating psychological interventions (Chapter 20). As the field moves away from treating specific diagnoses as unique disorders, so too do treatment designs need to accommodate broad dimensions of dysfunction that encapsulate specific impairments. The next chapter describes progress and future directions in developing psychological treatments from a transdiagnostic dimensional perspective (Chapter 21). This part concludes with a chapter on behavioral medicine and health psychology, which integrate the diverse areas of behavioral science and traditional medicine (Chapter 22).

Traditional longitudinal designs have been built on sampling relatively few observations per person (e.g., fewer than 10), but many processes of theoretical interest in clinical psychology occur at a finer timescale and may necessitate more intensive measurement. The past couple of decades have seen rapid advances in the methodology for sampling and modeling intensive longitudinal data, and the next part focuses on these developments. Ambulatory assessment, perhaps the methodology most associated with intensive longitudinal designs, is covered in the first chapter of the part (Chapter 23), followed by analytic strategies for such data (Chapter 24). When a study collects many observations per participant, a model can be developed for each individual. Although idiosyncratic designs have been around for a long time, they have seen a major resurgence alongside the recent increased interest in personalized medicine. This has ushered in a need for methodology for person-specific modeling and generalizing to the nomothetic from the idiographic. This perspective and methodology are covered in Chapter 25. Social process and dyadic research have long focused on micro-processes that require intensive longitudinal designs. Thus, an overview of study design (Chapter 26) and appropriate statistical models (Chapter 27) round out this section.

In the final part, we have enlisted world leaders in philosophical and methodological topics that span specific research designs and are relevant for all earlier parts of the volume. These are foundational topics we believe all clinical scientists should understand because they are fundamental to the research enterprise. The topics covered in this part include reproducible science (Chapter 28), reviews and meta-analyses (Chapter 29), mediation, moderation, and conditional process analyses (Chapter 30), causal reasoning and inference (Chapter 31), nested data structures (e.g., observations nested within persons; Chapter 32), accommodating and modeling missing data (Chapter 33), and finally the value of machine learning in clinical psychology (Chapter 34).

Altogether, these chapters cumulatively reflect our view of current and emerging research themes in clinical psychology. We hope that this volume aids the training and continuing education of clinical psychologists whose research employs interdisciplinary approaches that can support a more mechanistic approach to clinical science. Many of the scientific questions addressed in clinical psychology are complex, and key variables such as genetic vulnerability, environmental exposure to stress, and social support are often outside of our (experimental) control. Thus, we believe that better methods can potentially help us to characterize dynamic psychological processes in observational studies. Likewise, more nuanced experimental manipulations and biological approaches can potentially help us test the role of specific processes in psychopathology. Furthermore, if mental illness can be conceptualized in terms of the configuration of many dimensions of pathology, our approaches to developing treatments must carefully examine which components are crucial to positive change and what are the best targets.

Finally, we would like to express our deep gratitude to the many authors of this volume whose contributions reflect clear, contemporary thinking on key methodological topics in clinical psychology.