



The Future of Intervention Science: Process-Based Therapy

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Abstract

Clinical science seems to have reached a tipping point. It appears that a new paradigm is beginning to emerge that is questioning the validity and utility of the medical illness model, which assumes that latent disease entities are targeted with specific therapy protocols. A new generation of evidence-based care has begun to move toward process-based therapies to target core mediators and moderators based on testable theories. This could represent a paradigm shift in clinical science with far-reaching implications. Clinical science might see a decline of named therapies defined by set technologies, a decline of broad schools, a rise of testable models, a rise of mediation and moderation studies, the emergence of new forms of diagnosis based on functional analysis, a move from nomothetic to idiographic approaches, and a move toward processes that specify modifiable elements. These changes could integrate or bridge different treatment orientations, settings, and even cultures.

Keywords

clinical trials, cognitive therapy, CBT, evidence-based treatments, psychotherapy

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Relieving human suffering is a challenging goal in every aspect. It requires powerful conceptual tools that will parse human complexity into a manageable number of issues. It requires clinical creativity that will lead to the successful targeting of key domains and dimensions of human functioning. It depends on methodological tools that permit the development of generalizable knowledge from detailed experience with myriad individuals. Two disciplines, psychiatry and behavioral sciences, share the same goal to relieve human suffering. However, they operate off of different paradigms and utilize different tools to accomplish this goal.

In the early days of the behavior therapy movement, the late Gordon Paul (1969), then just a few years past his PhD, asked one of the most widely cited questions about the proper goal of a science of evidence-based interventions: “What treatment, by whom, is most effective for this individual with that specific problem, under which set of circumstances, and how does it come about?” (p. 44). This incited a new scientific approach to therapeutic intervention: specified and tested interventions for specific problem areas that fit the needs of individuals based on known processes of change.

This promising beginning did not quite extend far enough into the field, however, because the early days of behavior therapy relied on learning principles and theories that were largely drawn from the animal laboratory, in the absence of similarly well-developed theories of human cognition and emotion. Indeed, excessive confidence in learning principles may explain why 2 years earlier Paul (1967) had not included the phrase “and how does it come about” in the original formulation of this question, focusing entirely on contextually specific evidence-based procedures. The early behavior therapists generally assumed that the learning laboratories could be trusted to map out needed principles of change for intervention science (Franks & Wilson, 1967).

Our argument is that the field has now developed sufficiently to return to an expanded form of Paul’s original vision. We believe that the time is ripe for

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modern psychotherapy and intervention science to focus on a new foundational question: “What core biopsychosocial processes should be targeted with this client given this goal in this situation, and how can they most efficiently and effectively be changed?” Answering this question is the goal of any form of process-based therapy (PBT), which can be defined as the contextually specific use of evidence-based processes linked to evidence-based procedures to help solve the problems and promote the prosperity of particular people. In contrast to treatments focused on syndromes, PBT targets theoretically derived and empirically supported processes that are responsible for positive treatment change. It is our view that such a process-based approach is the key for the future of evidence-based care.

For the following discussion, it is important to clarify a few key terms. Most importantly, we need to distinguish the underlying *therapeutic processes* from the *therapeutic procedures* that are utilized in treatment. Therapeutic procedures are the techniques or methods that a therapist utilizes to achieve the treatment goals of the client: the defined and measurable outcomes upon which the therapist and client have agreed. Such goals are not static goal posts, but they may change as treatment progresses. Usually, therapy is directed toward multiple goals, which can often be arranged in a hierarchy depending on priority, immediacy, difficulty, or related dimensions.

Therapeutic processes are the underlying change mechanisms that lead to the attainment of a desirable treatment goal. We define a therapeutic process as a set of theory-based, dynamic, progressive, and multi-level changes that occur in predictable empirically established sequences oriented toward the desirable outcomes. These processes are *theory-based* and associated with falsifiable and testable predictions, they are *dynamic* because processes may involve feedback loops and nonlinear changes, they are *progressive* in the long term in order to be able to reach the treatment goal, and they form a *multilevel system* because some processes supersede others. Finally, these processes are oriented toward both immediate and long-term goals.

It should be noted that the term *therapeutic process* is sometimes used in the literature to refer broadly to the patient-therapist relationship that includes so-called common factors, such as the therapeutic alliance and other factors of the therapeutic relationship. The term *therapeutic process*, as we use it, can include this more traditional use of the term as long as such processes are based on a clearly defined and testable theory and meet the empirical standards we are suggesting. It is not, however, synonymous with that traditional use.

Our argument is not new. In fact, it brings us back to the very beginning of behavior therapy and its

foundational element—functional analysis. Functional analysis utilizes idiographic assessments of a target behavior and the history and context in which it occurs to identify the functional relationship between variables that cause or contribute to the occurrence of this behavior (for a review, see Haynes & O’Brien, 1990). The historical and philosophical roots of functional analysis are based on Skinner’s (1953) approach to the analysis of action in its historical and situational context. In clinical contexts, it has expanded beyond contingency analysis to include “the identification of important, controllable, causal functional relationships applicable to a specified set of target behaviors for an individual client” (Haynes & O’Brien, 1990, p. 654). This approach has been a guiding principle since the early days of behavior therapy and has been embraced by many notable scholars, including Albert Bandura, David Barlow, Walter Mischel, Arthur Staats, and Gerald Davison, to name only a few. The early emphasis on functional analysis changed, however, when modern psychiatry adopted structuralism for its nosology.

The Latent Disease Model of Psychiatry

Mental health care professionals have been engaged in a long and heated debate over how to best define, classify, and treat mental disorders (Varga, 2012). The official definition of a mental disorder in the contemporary psychiatric nosology is “a syndrome characterized by clinically significant disturbance in an individual’s cognition, emotion regulation, or behavior that reflects a dysfunction in the psychological, biological, or developmental processes underlying mental functioning” (American Psychiatric Association [APA], 2013, p. 20). To explain such a “dysfunction,” the *Diagnostic and Statistical Manual of Mental Disorders (DSM)* has adopted a medical illness model. This model makes the assumption that symptoms reflect underlying and latent disease entities. Earlier versions of the *DSM* were based on psychoanalytic theory and assumed that mental disorders are a result of deep-seated conflicts; modern versions point to dysfunctions in biological, genetic, psychological, and developmental processes as the primary cause.

The view of the National Institute of Mental Health (NIMH), the major funding agency for clinical science in the United States, has been that “mental illnesses are brain disorders” and that “in contrast to neurological disorder with identifiable lesions, mental disorders can be addressed as disorders of brain circuits” (Insel et al., 2010, p. 749). Thus, the NIMH is attempting to utilize findings from modern brain sciences to define and diagnose mental disorders, rather than relying on clinical impressions, which may result in arbitrarily defined and

consensus-derived diagnostic groups that show a high degree of heterogeneity and comorbidity (Insel et al., 2010). The motive behind this exploration is that eventually the acquired information may be used to develop better treatments or to tailor existing treatments to the individual.

Similarly, the *DSM-5* noted that “the diagnosis of mental disorders should have clinical utility: it should help clinicians to determine prognosis, treatment plans, and potential treatment outcomes for their patients” (APA, 2013, p. 20). Specifically, the hope is that the *DSM-5* validates diagnostic criteria: “Approaches to validating diagnostic criteria for discrete categorical mental disorders have included the following types of evidence: antecedent validators (similar genetic markers, family traits, temperament, and environmental exposures), concurrent validators (similar neural substrates, biomarkers, emotional and cognitive processing, and symptom similarity), and predictive validators (similar clinical course and treatment response)” (p. 20). However, although the *DSM-5* recognizes the importance of such validators, it concludes that the empirical support for these validators is insufficient. Therefore, “until incontrovertible etiological or pathophysiological mechanisms are identified to fully validate specific disorders or disorder spectra, the most important standard for the *DSM-5* disorder criteria will be their clinical utility” (APA, 2013, p. 20). Unfortunately, there is scant evidence that the latent disease model has met that criterion for success.

The Quest to Link Treatment to Syndrome

For nearly 50 years, intervention science has pursued the dream of establishing evidence-based therapy (EBT) by testing protocols for syndromes in randomized trials (e.g., Thompson-Hollands, Sauer-Zavala, & Barlow, 2014). Government agencies also wanted to see the development of EBT, but they had their own ideas about how to do so, driven largely by ideas from the psychiatric establishment. After the third version of the *DSM* was developed in 1980, the U.S. NIMH decided to pour resources into funding randomized trials of specific protocols targeting psychiatric syndromes.

This combination had an enormous impact on the field of cognitive-behavioral therapy (CBT) and on EBT in general, bringing prestige and attention to psychotherapy developers while also inadvertently narrowing their vision. In the grand arc of history, these developments did a lot of good for the field. The study of protocols for syndromes captured some of the essence of Paul’s agenda, and there was a large increase in the amount of data on psychotherapy and other psychosocial

interventions, the impact of psychiatric medications, the development of psychopathology, and other key issues. Among other things, the concerns raised by Eysenck (1952) about whether evidence-based psychotherapy could be shown to be better than doing nothing at all were answered once and for all. CBT was a prime beneficiary of this growth of evidence, leading to its current position as the most empirically supported intervention approach.

As the new research program unfolded in the 30-year period between 1980 and 2010, it was extremely discouraging, scientifically speaking, that a focus on syndromes never seemed to lead to conclusive evidence on etiology, course, and response to treatment. In other words, a syndromes approach never led to the discovery of diseases, which is the ultimate purpose of syndromal classification. Comorbidity and client heterogeneity was so great within syndromal groups that traditional diagnosis felt more like an empty ritual than a vitally important and progressive process. The treatment utility of syndromes was weak, and lack of specificity in treatment linked to *DSM* categories was more the rule than the exception. The biomedicalization of human suffering that underlay these developments left behind several key features of Paul’s clinical question. The new question intervention scientists were answering—“What protocol is best for the symptoms of this syndrome?”—failed to adequately capture the needs of the individual, the context of interventions, the specificity of procedures, the specificity of problems, and the link to processes of change. In other words, protocol and syndrome-based empirical therapy left behind a number of the defining features of the initial PBT approach of behavioral and cognitive therapy.

After 2010, the NIMH began withdrawing its interest—in effect, abandoning the very approach it had taken on board as its developmental strategy 30 years earlier, bringing CBT researchers along for the ride. The *DSM-5* was released in 2013 with a notable lack of enthusiasm in almost every corner of the field. As a result, NIMH began to turn away from the *DSM* as an avenue of progress and focused attention on underlying mechanisms, such as through the Research Domain Criteria (RDoC) initiative (Insel et al., 2010).

The field is still dealing with the practical and intellectual challenges that resulted from the decades of *DSM* domination. Theory suffered, and a more purely technological approach blossomed. How important are processes and principles if they are just used as a vague setup for technologies and are not formally tested as moderators and mediators of intervention? If theory development is merely an untested ritual to engage in before the real action of protocol development linked

to syndromes occurs, the inability to develop robust theories of behavior change should be expected.

The Traditional CBT Approach

For decades, psychologists have been creatively developing psychological models as alternatives to psychiatric disease models to conceptualize and treat mental disorders. Indeed, even though CBT went along for the *DSM* ride, it never set aside a concern for principles and models. The problem was that a full-throated embrace of a PBT agenda was interfered with by the “protocols for syndromes” emphasis of funders and as a result certain key questions were missed.

A case in point is the diagnosis and explanatory model of panic disorder. The original conceptualization of *panic* as a pathological state was based on a medical illness model, which assumed the existence of a syndrome with an inherently organic etiology and specific treatment indications (Klein, 1964; Klein & Klein, 1989).

As cognitive views entered into behavior therapy, robust alternatives to this perspective emerged. For example, Clark (1986) argued that panic attacks were best viewed as a result of catastrophic misinterpretations of bodily sensations, such as heart palpitations or breathlessness. An example might be a healthy person who perceives his or her heart palpitations and interprets them as evidence of an impending cardiac arrest. The vicious cycle model of the cognitive theory of panic suggests that various external or internal stimuli are perceived as threatening, leading to anxiety and fearful bodily sensations, which, when interpreted in a catastrophic way, further increases the anxiety and further enhances the bodily sensations. The attacks seem to come from “out of the blue” because patients automatically associate the body sensations with anxious apprehension and panic.

It is worth noting that the difference between a model of this kind and a latent disease model is not simply a difference between a psychological approach and a biological approach. Clark’s cognitive perspective did not rule out any biological factors in panic. In fact, it is assumed that biological variables contribute to an attack by triggering benign bodily fluctuations or intensifying fearful bodily sensations. Pharmacological treatments might be effective in reducing the frequency of panic attacks if they reduce the frequency of bodily fluctuations, which can trigger panic, or if they blocked the bodily sensations that accompany anxiety. However, if the patient’s bias to interpret bodily sensations in a catastrophic way is not modified, one might expect a high chance of relapse when the drug treatment is discontinued.

Taken on its own terms, subsequent studies provided strong evidence supporting the validity of the cognitive approach to panic, including data from biological

challenge procedures. For example, verbal information was shown to have a major impact on the occurrence of anxiety in panic-disordered participants. Panic patients who were told about the effects of CO₂ inhalation felt less anxiety and reported fewer catastrophic thoughts than individuals who were uninformed (Rapee, Mattick, & Murrell, 1986). In addition, people who believed that they had control over the amount of CO₂ they inhaled by turning an inoperative dial had felt less anxious than people who knew that they had no control over it (Sanderson, Rapee, & Barlow, 1989).

Other studies suggested that it was the cognitive interpretation of sensations produced by the biological challenge procedures that determined the emotional experience. The intensity of the emotional experience did not necessarily correlate highly with the intensity of the bodily response during panic attacks (e.g., Johnson, Federici, & Shekhar, 2014). Panic patients who did a CO₂ challenge experienced less anxiety in the presence of their “safe person” than patients without their “safe person” (Carter, Hollon, Carson, & Shelton, 1995). Finally, CBT for panic disorder significantly reduced CO₂-induced panic attacks (Schmidt, Trakowski, & Staab, 1997).

A similar story could be told in many other areas of psychopathology. CBT prospered in the era of protocols for *DSM*-defined syndromes (Hofmann, Asnaani, Vonk, Sawyer, & Fang, 2012), and the underlying behavioral and cognitive models performed well. The problem areas were more in what was not being studied than what was. Mediation studies were underemphasized, so the functional importance of process of change was at times not sufficiently well-established. The range of treatment approaches that were tested in relation to particular models was somewhat restricted, which raised the possibility that third variables could explain the theoretical evidence and that the treatment implications of process-evidence might be less direct. Clarity about philosophical assumptions remained largely unexplored or underdeveloped. The term *CBT* became very broad, referring to a large family of interventions, sometimes containing contradictory assumptions about the centrality of key theoretical ideas. On the positive side, CBT was generally recognized as the treatment with the most extensive empirical support (Hofmann, Asmundson, & Beck, 2013). On the negative side, progress toward CBT as a vibrant version of PBT was slowed after a promising start.

The Next Generation of CBT

A concern over processes of change was reemphasized when controversy over the so-called “third wave” of CBT emerged (Hayes, 2004). Newer forms of CBT had

appeared that lay outside of traditional behavioral or cognitive models, such as mindfulness-based cognitive therapy, dialectical behavior therapy, metacognitive therapy, acceptance and commitment therapy (ACT), functional analytic psychotherapy, and several others. These methods emphasized issues such as emotion, mindfulness, acceptance, sense of self, metacognition, the relationship, attentional flexibility, and values, many of which were more focused more on the persons' relationship to experience than on the content of experience itself. There was a notable sense of openness to new concepts and methods—a key claim was that the third wave “reformulates and synthesizes previous generations of behavioral and cognitive therapy” while encouraging CBT to expand into “questions, issues, and domains previously addressed primarily by other traditions” (Hayes, 2004, p. 658) but “from a scientific point of view, with an interest in coherent theory, carefully assessed processes of change, and solid empirical outcomes” (p. 660).

The notion that a “third wave” of CBT had arrived led to scientific debates, including among the authors of the present article (e.g., Hofmann & Asmundson, 2008). The “wave” metaphor suggested to some that previous generations of work would be washed away. However, this was neither the intent nor the result. Waves washing ashore assimilate and contain previous waves, but they also leave behind a morphed shore. We are now in a position to begin evaluating what is being left behind by this era of work in CBT.

Undoubtedly, there are several methods and concepts that are now part of the CBT tradition and other evidence-based therapies more generally (e.g., acceptance-based procedures, mindfulness methods, cognitive defusion, decentering, values, psychological flexibility processes). The retention of interest in this notably broader range of concepts and methods is in large part due to the empirical evidence suggesting that they can be clinically helpful and cost-effective (e.g., A-Tjak et al., 2015; Feliu-Soler et al., 2018; Hofmann, Sawyer, Witt, & Oh, 2010; Houry et al., 2013). Third wave approaches have also been added to packages that include traditional cognitive and behavioral methods, resulting in useful and new interventions (Arch et al., 2012). These newer concepts and approaches now coexist with established ones. The dialectic between them serves as a useful new branch to theoretical and technological investigation.

In addition, there has been an increased recognition within CBT of the importance of philosophical assumptions that give rise to methods of intervention and their investigation. For science to evolve, we need preanalytic assumptions about the nature of data, truth, and the questions of importance. Some of the differences

between the waves and generations of CBT were philosophical rather than empirical. To this point, the Inter-Organizational Task Force on Cognitive and Behavioral Psychology Doctoral Education (Klepac et al., 2012) concluded that all CBT training programs going forward should place more emphasis on philosophy of science training in order to increase the progressivity and coherence of research programs.

Finally, there has been a notable re-emphasis on the centrality of the issue of process of change and of moderation and mediation in particular to the behavioral and cognitive therapies. Baron and Kenny (1986) defined a mediator as “the generative mechanism through which the focal independent variable is able to influence the dependent variable of interest” (p. 1173). In contrast, a moderator is a “variable that affects the direction and/or strength of the relation between an independent or predictor variable and a dependent or criterion variable” (Baron & Kenny, 1986, p. 1174). Since this seminal article, a number of revisions and clarifications for the testing of moderation and mediation (and moderated mediation) have been provided (Hayes & Preacher, 2014; Holmbeck, 1997; Judd & Kenny, 1981; Kraemer, Wilson, Fairburn, & Agras, 2002; MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). Most analysts today would agree that a statistically significant mediator is not synonymous with a generative mechanism because third variables can always exist (e.g., Tryon, 2018), and a detailed, pragmatically useful, and theoretically consistent account of how an intervention translates into events that lead to the outcome is still required (Kazdin, 2007). Instead, there is a recognition that the identification of mediators and moderators is the first step in producing an adequate account of the relationships between all of the variables that can be involved in change processes, including clinician factors, client factors, and actual mechanisms of change (Nock, 2007). In other words, knowledge about moderators and mediators provides evidence from which causal and functional accounts can begin to emerge (Kazdin, 2007; Kazdin & Nock, 2003).

The combination of new ideas, examination of assumptions, and a renewed emphasis on the centrality of processes of change has begun to change our views of what CBT encompasses and how it works. We now know that traditional CBT methods sometimes work in part by changing processes that were elucidated during arrival of third-wave methods—for example, CBT-based exposure for anxiety disorders works in part through cognitive defusion (Arch, Wolitzky-Taylor, Eifert, & Craske, 2012). Process-based evidence notably expanded the range of methods that needed to be considered as treatment options. Take, for example, the data on the centrality of catastrophic thoughts in panic.

At first glance a logical implication of this finding is that changing catastrophic thoughts must be the treatment focus, but as the CBT research focus broadened, it turned out not to be so direct. For example, patients high in catastrophic misappraisal actually did better with capnometry-assisted respiration training than CBT (Meuret, Hofmann, & Rosenfield, 2010).

Research has begun to identify moderators that indicate when specific methods, both old and new, work best for different populations. For example, it appears that patients with an anxiety disorder alone may do better with traditional CBT than ACT, while those who are also comorbid with mood disorders may do better with ACT than traditional CBT (Wolitzky-Taylor, Arch, Rosenfield, & Craske, 2012). Data of this kind suggest that evidence-based practitioners can best help their patients by utilizing strategies from all of the CBT generations, linked to evidence of moderation and mediation.

To some degree, the reemphasis of a process focus in CBT reflects many of the same pressures that have led the NIMH to focus on the RDoC framework instead of the *DSM* as a way forward (Insel et al., 2010). Whether RDoC succeeds remains to be seen, but there is no doubt that it has also taken intervention science in a process-based direction (Klepac et al., 2012).

This suggests that the field is now developing greater sophistication about what is needed to create progress in a post-*DSM* era. When theory and processes of change are brought to the forefront, training will be needed in philosophy of science, scientific strategy, ethics, and the broad range of domains from which principles can arise. Furthermore, more emphasis should be placed on linking procedures to principles and in fitting procedures to the particular needs of a particular case in an ethical and evidence-sensitive manner. Such an evaluation of assumptions naturally leads to questions about theories, models, and processes.

A Move Toward PBT

It is our argument that process-based CBT (PB-CBT) is rapidly becoming the vital core of CBT itself. Modern CBT places much less focus on protocols for syndromes and more focus on evidence-based processes linked to evidence-based procedures (Hayes & Hofmann, 2018; Klepac et al., 2012). CBT contains core client processes and treatment procedures that are common to many specific approaches. Examples include contingency management, stimulus control, shaping, self-management, arousal reduction or management, attentional flexibility, coping and emotion regulation, problem solving, exposure strategies, behavioral activation, interpersonal skills, cognitive flexibility and reappraisal, modifying or addressing core beliefs, defusion/distancing,

psychological acceptance, values, mindfulness, motivational strategies, and crisis management, among others (Hayes & Hofmann, 2018; cf. Klepac et al., 2012). Each of these competencies focuses on theoretically derived and testable mediators and moderators that link these methods to the process domains and principles.

Some, but not all, of these CBT competencies target specific therapeutic processes (e.g., cognitive flexibility and defusion/distancing), whereas other competencies represent specific treatment strategies (e.g., exposure). Treatment strategies generally target a number of different processes, and any particular process is likely to be changed through a number of possible strategies (e.g., psychological flexibility may be changed both through exposure and mindfulness practices). Various processes could likely be arranged in a hierarchy of specificity in which some processes may be subsumed underneath others. For example, it may be that reappraisal/modifying core beliefs can be subsumed under a broader category of cognitive flexibility. Speculations such as these await the kind of empirical support that requires research to move in a process-based direction. As these data accumulate, new and more advanced treatment models may then point to further links and new processes.

These CBT-based processes can be expanded by processes studied in traditions outside of CBT such as attachment, autonomy, or mentalization. This expansion of vision and participation seems to portend an even more profound transition. The greater emphasis on processes of change and their biobehavioral influence is being increased by changes in research funding (Insel et al., 2010), which in turn is impacting evidence-based care across the board, not just CBT. The ascendance of transdiagnostic and unified models (Barlow, Allen, & Choate, 2004) and a heightened focus on moderators and mediators of change applies to all intervention methods.

CBT itself is becoming a vehicle for these changes since it is now more open to the studies of a wider range of approaches from existential, analytic, humanistic, systemic, and spiritual traditions. A process focus promises the gradual elimination of walled-off schools of thought and trademarked intervention protocols within intervention science, in favor of a far more catholic approach that can bring together different traditions in an evidence-based search for coherent and powerful change processes. The term CBT might stretch to a breaking point as evidence-based care moves toward a process-based field that seeks to integrate the full range of psychosocial and contextual biological processes into behavior change. We would not be surprised if the term CBT loses its importance as PBT is embraced across traditions.

The impact of redirecting attention to processes of change is not limited to therapy methods focused on psychopathology. As the syndromal focus weakens while a process focus strengthens, the thriving of whole persons and human psychological prosperity also naturally become more central. Mental health is ultimately about *health*, not only the absence of disorders. Many of the processes of change that are now central in evidence-based methods are based on a psychology of the normal, and there is no reason not to explore their relevance to broad human concerns, beyond psychopathology.

Researchers and practitioners alike seem ready for a new day of evidence-based care that addresses the needs and strengths of individuals. Consistent with the overall trend toward personalized and precision medicine, focusing on change processes provides a way for evidence-based methods to be person-centered. Reorienting the field back in a direction of process-based care might ultimately be the most important “changed shore” left behind by the latest wave of CBT.

Examining evidence-based interventions in light of the ideas outlined in the new training standards allows the field to redefine EBT itself to *mean* the targeting of evidence-based processes with evidence-based procedures that resolve the problems and promote the prosperity of individuals. In other words, we are headed toward a day in which EBT is PBT, and PBT is EBT. If that is the direction, what lies ahead?

Implications of PBT for the Future of Intervention Science

The decline of named therapies

We believe that named therapies that are defined by sets of techniques will become much less dominant as packages and protocols are broken down into procedures linked to processes. Indeed, the term *cognitive-behavioral therapy* is already becoming too narrow because the therapeutic change that occurs is by no means restricted to cognitive and behavioral processes. Other processes that have become prominent include social, motivational, emotional, epigenetic, neurobiological, and evolutionary factors.

One could argue that CBT is not a singular term but that there are many CBTs, some more evidence-based, theory-grounded, and process-oriented than others. However, allowing evidence-based treatment to continue to develop under a mountain of specifically named technologically defined treatments will keep the field stuck in an era of packages and protocols that encourages a cottage industry of proprietary training programs and specializations (see also Rosen & Davison, 2003). In a process-based era, there is just no need to

name every technological combination and sequence any more than there is a need to name every architectural design or layout of city roads. Named technological protocols will continue to have a role for some time, but as procedures and processes take center stage, most of them will begin to move to the sidelines.

Names that are linked to well-developed and specific theoretical models of how to take a process-based approach can be accommodated as terms for clinical strategies for implementing a process-based approach. It is possible that ACT is an example—but if so only because of its tight link to psychological flexibility as an empirically and clinically useful set of processes of change based in behavioral and evolutionary principles and Relational Frame Theory as a model of cognition (see Zettle, Hayes, Barnes-Holmes, & Biglan, 2016). This transition to a model of PBT (which has been under way for some time) will not be without challenges for ACT, however. As with any proposed PBT model, it must show that it (a) can seamlessly accommodate the full range of key empirically established processes and procedures and (b) can compete against alternative models of implementing process-based care in terms of efficiency, effectiveness, training, cost, implementation, and similar criteria.

Greater scalability

The contemporary approach of treatment development and implementation has resulted in a mindboggling list of highly specialized treatment protocols for an ever-expanding number of *DSM*-defined disorders. This has impaired scalability and accessibility to adequate care, as is evident in recent efforts to improve dissemination and implementation by the NIMH. PBT can facilitate training and dissemination of evidence-based mental health care by training clinicians in strategies that target a set of core therapeutic processes. In the future, it might further be possible to train paraprofessionals in specific therapeutic procedures to target the therapeutic processes that more highly trained professionals identify as the most promising treatment targets. This would not only improve access to care and treatment efficacy but also reduce mental health care cost.

The decline of general schools and the rise of testable models

We predict that amorphous systems, schools of thought, and vague theoretical claims will either fold into more specific and testable models and theories or be recognized as broad philosophical approaches. Distinct sets of philosophical assumptions will likely remain distinct, precisely because assumptions establish the grounds

for empirical testing and thus are not fully subject to empirical testing. However, this reality does not mean that philosophically distinct approaches cannot coexist and even cooperate, especially in our field, since the pragmatic social purposes that are inherent to application provide a compelling and shared bottom line. Indeed, cooperation in fostering this bottom line is more likely if differences in assumptions are appreciated, even when they come from the different wings and traditions in CBT.

Testable models and high-precision/high-scope theories are highly useful in applied science, especially if more of an eye is given to their utility. In the era of syndromal protocols, theory was often given short shrift as it bore on intervention. That seems sure to change going forward. Pragmatically useful models and theories will be subjected to great scrutiny on several key dimensions, including the next four we are about to mention.

The rise of mediation and moderation studies

Even now, with the handwriting on the wall, agencies and associations that certify evidence-based intervention methods, such as Division 12 (clinical psychology) of the American Psychological Association, have failed to require evidence of processes of change linked to the underlying theoretical model and procedures deployed (Tolin, McKay, Forman, Klonsky, & Thombs, 2015). That cannot continue in a process-based era. Theoretical models that underlie intervention need to specify the processes of change linked to that intervention for a particular problem, person, and context. Even if the intervention works well, if the specified process of change cannot be shown to be consistently applicable, the underlying model is incorrect and needs to be set aside. The field can tolerate short delays while measurement issues are worked out, but the task of developing adequate assessment falls on those proposing models and theories, not on those properly demanding evidence for processes of change.

The distinction between a model failure and a procedural failure is important in the other direction as well. For example, if a procedure fails to alter putatively critical processes of change that may have been shown in other studies to be important (e.g., in longitudinal studies of developmental psychopathology), then the model remains untested even if the procedure fails. In this case, the field can tolerate short delays while procedural details are worked out to produce a better impact on processes of change in specific areas, but again it falls on proponents of models to show that they reliably lead to successful change procedures.

The most important point is that an intervention should be thought of as evidence-based only when science supports the usefulness of that intervention and its component procedures and the functional linkage to its underlying model. If a procedure reliably produces gains and manipulates a process that mediates these gains, then it is ready to be admitted into the armamentarium of PBT. If a model specifies interventions that coherently and successfully integrate collections of such processes and procedures, then that model and the intervention approach it leads to are likewise evidence-based. We look forward to the day when meta-analyses of procedural mediation are as common and as important as meta-analyses of procedural impact.

Even then, there is more to do on practical grounds. If moderation is not specified, it still needs to be investigated vigorously because the history of evidence-based methods shows that few processes are always positive regardless of context (e.g., Brockman, Ciarrochi, Parker, & Kashdan, 2017). Thus, in a mature, process-oriented field, evidence of theoretically coherent mediators and moderators will be as important as evidence of procedural benefits.

Fully exploring a PBT agenda will require a reexamination of the very meaning of terms like *moderation* and *mediation*. For example, moderation is normally limited to baseline characteristics only, but clinical decisions often need to be linked to reassessments of client status—in effect blurring the distinction between baseline characteristics and ongoing reassessment. Similarly, mediation is often restricted to change processes that antedate significant client outcome changes, but this crude cutoff obfuscates the conceptual and empirical need to model the systematic interrelationship between change processes and outcomes.

New forms of diagnosis and functional analysis

As PBT approaches evolve, core processes that are used in new forms of functional analysis, and person-based applications, will become more central. The rise of statistical models that can delve into individual growth curves and personal cognitive and behavioral networks holds out the hope for a reemergence of the individual in evidence-based approaches. For example, the complex network approach can offer an analytic alternative to the latent disease model. This approach holds that psychological problems are not expressions of underlying disease entities but rather are interrelated elements of a complex network. This approach, which is an extension of functional analysis, provides not only a framework for psychopathology, but it might be used

to predict therapeutic change, relapse, and recovery at some point in time (Hofmann, Curtiss, & McNally, 2016).

We need an approach for targeting interventions that is not so much transdiagnostic (a term with its feet placed uncomfortably across a divide that seems likely to widen) as it is an alternative approach to diagnosis itself. For PBT to prosper, well-developed alternatives to the *DSM* that can guide research and practice are needed.

As a process focus takes hold, models of moderated mediation can begin to provide the empirical and theoretical grounds for a new and more useful diagnostic nosology. Client problems, characteristics, and goals can all be examined as possible moderators (cf. Nock, 2007). If two different problem areas show the same processes of change for the same procedures, functionally there is little reason to distinguish these problem areas. As theoretical models emerge for *why* particular patterns of moderated mediation are seen, a more clinically useful approach to categorization may result from what Kazdin (2007) termed *mechanisms of change*. In our view, the degree of treatment and conceptual utility of process-based models of mediation and moderation provide a kind of operational measure of the degree to which more adequate causal accounts of psychopathology and its amelioration are emerging from a process-based approach (cf. Kazdin, 2007).

From nomothetic to idiographic approaches

Contemporary psychiatric nosology, which views psychiatric problems as expressions of latent disease entities, forces a nomothetic system onto human suffering. Consistent with this approach, in the protocol for syndrome-era CBT, Protocol X was developed to treat Psychiatric Disease X, whereas CBT Protocol Y was developed to treat Disease Y, while all but ignoring any differences between individuals.

However, in order to answer PBT's new foundational question, a purely top-down, nomothetic approach will never be enough. This question requires a bottom-up idiographic approach in order to understand why in a particular case a psychological problem is maintained and how the change process can be initiated. Nomothetic principles are key, but their basis and their application need to include the intense analysis of the individual. Often qualitative research will inform these developments. Psychologists are already well-equipped with many of the methodological tools to deal with these issues, ranging from single-case experimental designs (Hayes, Barlow, & Nelson-Gray, 1999) to ecological momentary assessments, and the use of these methodological tools will likely increase, especially as

they are linked to modern statistical methods, as we noted with the immediately preceding trend. For example, we expect that new forms of assessment focused on change processes that are immediate and can be repeated will emerge (e.g., automated transcript analyses, low-cost biomeasures linked to smartphone apps).

Processes need to specify modifiable elements

The practical needs of practitioners present the field with a natural analytic agenda. This is one reason that different philosophies of science can more readily coexist within CBT than in many other areas of science: Contextualists may view pragmatic outcomes as truth criteria in and of themselves, whereas elemental realists may view them as the natural outgrowth of ontological knowledge, but both can agree on the practical importance of outcomes for intervention work (Biglan & Hayes, 2016). One implication is that processes that are clearly modifiable, and theories and models that specify contextual elements that can be used to modify processes of change, are inherently advantaged in a PBT approach to empirical therapy. Cognitions, emotions, and overt behavior are all the dependent variables of intervention science. Awareness of that simple fact adds to the next key feature.

The importance of context

If a dependent variable is going to change in psychology, ultimately it needs to be done by changing history or the situational circumstance. Said in another way, context needs to change. That is exactly what a therapeutic technique does. Intervention scientists are far better at measuring the emotional, cognitive, or behavioral responses of people than they are at measuring the historical, social, and situational context. Although understandable, the latter needs continued attention in a process-based approach. This truism about measurement suggests that theories and models that specify the relationship of processes of change to methods of manipulating these processes should be advantaged over theories and models that omit this key step. Identifying this relationship is a demanding criterion that few current models and theories meet. It is easier to develop models of change that are not specifically tied to intervention components, but the treatment utility of our models requires this important step (Hayes, Nelson, & Jarrett, 1987).

To some degree, PBT can solve this problem empirically: Trial and error can determine which components move which change processes. In the long run, however, we need to know *why* certain methods move

certain processes, not just that they do. Theories that explain the link between evidence-based processes and evidence-based procedures and components will thus become more important as a process-based empirical approach matures.

Component analyses and the reemergence of laboratory-based studies

The considerations we have touched upon partly explain why carefully crafted component studies have reemerged in CBT. It is possible to drill down in a very fine-grained way to specific process-based questions with clinical populations in the laboratory, but it is much harder to do in randomized controlled trials of packages and protocols (e.g., Campbell-Sills, Barlow, Brown, & Hofmann, 2006). It is unwise to allow packages to exist for many years before they are dismantled, but in a more process-based era, treatment developers can build information about component processes from the bottom up, allowing even a meta-analysis of scores of component studies to inform clinical work (see Levin, Hildebrandt, Lillis, & Hayes, 2012, for an example).

New approaches to training

A PBT approach requires that practitioners need to be able to detect changes in key processes, to direct intervention toward them, and to continually adjust to person-specific indications of progress. This will require more flexible forms of clinical training that are less focused on linear sequences of technology and more focused on reading and responding to empirically proven indications of progress in establishing healthy processes of change. For example, practitioners might be trained to score client tapes or transcripts accurately, establishing their ability to recognize key ongoing change processes even in session.

Integration of behavioral and psychological science with the other life sciences

Behavioral and psychological science does not and cannot live in a world unto itself: Behavior is part of the life sciences more generally. The enormous increase in attention to the neurosciences in modern intervention science reflects this more holistic and biologically friendly zeitgeist—in the modern era, we want to know how psychological events change us as organisms and vice versa. There are other shoes still to fall, however, that are part of this same zeitgeist. We now know, for

example, that epigenetic processes impact the organization of the brain (Mitchell, Jiang, Peter, Goosens, & Akbarian, 2013), but they are themselves affected by experiences that are protective in mental health areas (e.g., Dusek et al., 2008; Uddin & Sipahi, 2013).

An interest in biology does not need to lead to eliminative reductionism, meaning that psychological processes are no longer needed because biological processes account for all observations (Sarkar, 1992). History and context are as important to an evolutionary biologist as they are to a psychotherapist, and it is quite possible to link modern psychological intervention methods to contemporary issues in evolution science (Hayes & Sanford, 2015; Wilson & Hayes, 2018). Every level of analysis has its own place in a unified fabric of science. In the modern era, however, it is likely that intervention scientists will be increasingly called upon to be broadly trained in the life sciences and to be knowledgeable about developments in them.

New forms of delivery of care

As the changing role of practice shows, the world of apps, websites, telemedicine, and phone-based intervention is upon us. For decades, psychotherapy trainers have worried that there will never be enough psychotherapists to go around given the enormous human need for psychological care. That sense of overwhelming need only increases when we think of global mental health needs or when we realize that therapy methods are relevant to social problems (e.g., prejudice) or to human prosperity (e.g., positive psychology and quality of life).

Fortunately, there is no reason to think of psychotherapy as being limited to a 50-min, one-on-one, face-to-face intervention. Human beings can change because they read a book (Jeffcoat & Hayes, 2012), use an app on their smartphone (Bricker et al., 2014), or receive a brief follow-up call from a nurse (Hawkes et al., 2013). A process-based approach is able to encompass these methods because of the relatively controlled research strategies that can document process changes as these methods are used and because of the branching, interactive, and dynamic possibilities that many forms of technological intervention permit.

A science of the therapeutic relationship

The therapeutic relationship and other common core processes themselves require an analysis. It is not enough to know that general therapy features predict outcomes; common core processes need to be manipulated and shown to matter experimentally. Evidence-based intervention methods are having an impact on

our understanding of the therapeutic relationship itself (Hofmann & Barlow, 2014). For example, it has been shown empirically that psychological flexibility can account for the impact of ACT, but it can also help account for the impact of the therapeutic alliance (e.g., Gifford et al., 2011). Thus, as processes of change enter into PBT from traditions outside of CBT, we can expect a dynamic interaction in the research being done that will lead to new knowledge.

The role of culture

Only a few countries on the planet can afford the kind of grant infrastructure that funds large, well-controlled outcome studies. Most are in the West, and most are dominantly White. Yet at the same time, the world is awakening to enormous global health needs, which include mental and behavioral health needs across the globe.

It is important to examine whether processes of change in EBT are culture bound—in the main, the answer so far appears to be reassuring (e.g., Monestès et al., 2016). PBT holds out hope that it can draw additional information from the world community, while it can also better fit itself to such needs. For example, if a process mediates an outcome and it is culturally valid, clinical creativity can be put to use figuring out how to best move that process in culturally sound and contextually appropriate procedures that are adjusted to fit specific needs.

Taking Down the Walls Between Traditions, Schools, and Waves

We would like to conclude this article on a personal note that seems relevant and, we believe, is hopeful for the impact of PBT. Although both of us have served as presidents of the Association of Behavioral and Cognitive Therapies (ABCT), our philosophical backgrounds are quite different. We are both considered prominent figures in the communities representing two seemingly opposing camps in contemporary CBT: the ACT/new generation CBT and the Beckian/more traditional CBT, respectively. After a stormy beginning with countless heated debates in writing (e.g., Hofmann & Asmundson, 2008) and during panel discussions (often resembling the academic version of boxing matches or wrestling events), we became close friends and collaborators. What drew us together scientifically were two things: an appreciation of our philosophical differences, and our shared recognition that processes of change that apply to particular people need to be given empirical priority, not broad schools or general approaches. As that foundational focus took hold, we found it

remarkably easy to re-envision CBT as a form of PBT, despite our differences. We have recently completed a book on PB-CBT (Hayes & Hofmann, 2018) that begins to reorganize CBT interventions around known processes of change. Our recent edited volume (Hayes & Hofmann, 2018) describes a number of new diagnostic methods linking these processes to evidence-based intervention components. We have found that a process focus has turned difficult arguments (for example, between the “waves” of CBT) into manageable empirical issues, explored in the context of acknowledged philosophical differences.

Buoyed up by that experience, we see the possibility of PBT to move the science and practice of clinical intervention forward across an even wider range of traditions. In our view, the foundational PBT question (“What core biopsychosocial processes should be targeted with this client given this goal in this situation, and how can they most efficiently and effectively be changed?”) applies regardless of school of thought or therapy approach.

If we are right in that claim, its very breadth seems likely to change our field. Ironically, over time, a process-based approach seems likely to shorten the life of CBT as a clearly distinct approach compared to EBT more generally. This will not occur because all evidence-based methods will be shown to emerge from CBT. Rather, as CBT reorients toward issues that were previously the focus only of other therapy traditions, there will be fewer and fewer reasons to distinguish CBT from analytic, existential, humanistic, or systemic work. We are not (yet) calling for an end to the use of the term *cognitive-behavior therapy*. However, we can see a day when the term will add little to our description of the current field.

We are not sure if all of these trends will unfold nor if they will do so anytime soon. However, many of the shifts mentioned in this article are already under way, so there is no doubt that the world of psychological intervention is changing. The question is whether we will choose to grasp this moment and take the field in a PBT direction. It is our argument that we should do so. A more process-focused approach will help today’s students push out the boundaries of tomorrow’s consensus. The goal is progress. People are in need and are seeking answers from our field. It is up to us to provide for them.

The era of protocols for syndromes is over, and the collapse of that former vision gives CBT and EBT more generally a chance to reconsider its future from the ground up. The agenda suggested by PBT is positive, possible, and progressive. We hope this article offers not just a snapshot of where we are today but also shines a beacon toward a powerful and useful place we can go.


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Author Contributions

S. G. Hofmann and S. C. Hayes jointly drafted the manuscript, and both authors provided critical revisions. Both the authors approved the final version of the manuscript for submission.

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