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Bridging Theory and Practice: Conceptual Understanding of Treatments for Children With Attention Deficit Hyperactivity Disorder (ADHD), Obsessive-Compulsive Disorder (OCD), Autism, and Depression

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Serves as an introduction to a special edition of the journal on bridging theory and clinical practice for childhood disorders. Issues concerning the current trend of developing and evaluating new treatments devoid of a theoretical perspective are discussed. A conceptual model of child psychopathology is presented to illustrate the relevance and interplay between theory and the design and evaluation of treatments with particular emphasis on the selection and measurement of target behaviors. The means by which theory and empirical evidence interact and their relevance to understanding particular childhood disorders are discussed and emphasize the need for theoretical and conceptual models that describe the linkages among hypothesized brain substrates, cognitive function, behavior, and the environment to augment the development of potent biological and psychological interventions.

A central devoir for researchers and clinicians interested in child psychopathology is to bridge the gap between theory and practice. Theoretical perspectives of select disorders of childhood are presented in the ensuing articles to address this concern. They intentionally include both biologically and psychologically based orientations. Presentation of the theories is followed by a succinct review of controlled outcome studies relevant to the particular disorder. Theoretically derived variables that should be targeted for amelioration are emphasized. The final sections of the articles provide a summary and integration of extant knowledge relevant to the particular theoretical perspective reviewed. Drs. Alan Kazdin and John Werry, renowned experts in the field of child psychopathology, offer erudite commentaries on the psychologically and biologically oriented articles, respectively, and suggestions for future empirical work.

The central theme of this edition emerged after numerous conversations with clinical colleagues and graduate students concerning whether theories are of value to practicing clinicians working in the field of child psychopathology. The overriding consensus was that the imposing demands of clinical practice leave little time for consideration of theory development. Their energies are consumed with the design and implementation of treatment plans for children in the context of increasingly complex and time demanding health maintenance organizations. Others appear to have abandoned hope of developing suitable theories for childhood disorders, assuming perhaps prematurely that the endeavor is like looking for orchids in the desert.

The conceptual emphasis on understanding, developing, and refining efficacious treatments for various childhood disorders is not unexpected. This is a central part of what clinicians do given the complex and at time perplexing presentations of aberrant behavior we are asked to remedy. Treatment interventions are frequently based on or derived from existing theory, but all have direct or indirect implications for theory development. In turn, it will be argued that theory has important implications for the design and evaluation of effective treatments—particularly those in the inchoate stage of development.

Designing an effective treatment requires clinicians to initially specify which behaviors or constellations of symptoms are in need of change. This decision is usually based on multiple factors. Representative factors include clinical interview and observation of the child, reports from significant others (parents, teachers), past experience derived from working with similar cases, and a sound knowledge of child development and psychopathology. At this juncture, our primary emphasis concerns identifying which variables to target for intervention. Afterward, an intervention is designed to selectively affect identified target behaviors. There are two primary shortcomings encountered at this stage. First, it is often difficult to differentiate core from secondary or peripheral variables. Second, treatments must typically be designed without sufficient under-

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standing of what accounts for the variability in criterion variables (i.e., clinical disorders). The manner in which these shortcomings are intertwined and integrally related to theory merits discussion.

The Relevance of Theory to Practice

Theory consists of explanatory statements that are intended to account for, explain, and facilitate understanding of relations among variables, how they operate, and the processes involved (Kazdin, 1999). Its relevance to clinical practice is incontrovertible. Theory addresses initial conceptualizations about the clinical problem as well as informing us about how and why treatment works. It accomplishes the former by outlining the conceptual underpinnings and hypotheses leading to the clinical problem, the processes involved, and how these processes operate. It accomplishes the latter by informing us about what variables should be targeted for change and the processes of change during treatment. That is, by specifying the composition of treatment variables, why the treatment works, with whom, and under what conditions, as well as what factors affect, mediate, and moderate change under what conditions.

The foregoing comments serve to highlight the relevance of theory for clinical practice. A conceptual model of child psychopathology is presented to illuminate the relevance of theory for understanding causal relations implied in various disorders and implications for designing efficacious treatments (see Figure 1).

A hypothesized neurobiological substrate is frequently assumed for the four childhood disorders reviewed in this series based on accumulated evidence from genetic, neurological, neurophysiological, and neuroanatomical research. This substrate is presumed to be causally responsible for the core variables associated with a particular disorder, the latter of which are frequently though not always represented by formal diagnostic criteria (e.g., *Diagnostic and Statistical Manual of Mental Disorders* [4th ed.; American Psychiatric Association, 1994]). These core variables, in turn, may affect multiple areas of functioning that are considered secondary or peripheral features of the disorder. Several implications follow from the model. Interventions intended to affect the underlying substrate level (or alternatively, by means of a compensatory mechanism related to the hypothesized substrate) should result in the broadest range of treatment mediated improvement, as measured by both core and peripheral variables. Those aimed at the core level (e.g., constructs such as attention, depression, or obsessional thinking) should invoke improved functioning in related peripheral areas. And, those targeting secondary features of the disorder (e.g., discrete behavior problems) are expected to show minimal generalization of effects to either core or corresponding but different areas of functioning over and above what is expected based on overlapping topographies.

The logic of the conceptual model implies clear differences for pharmacological and behavioral treatments in terms of intended level of effect. For example, psychopharmacological interventions are typically (albeit not always) directed at the specific neurobiological

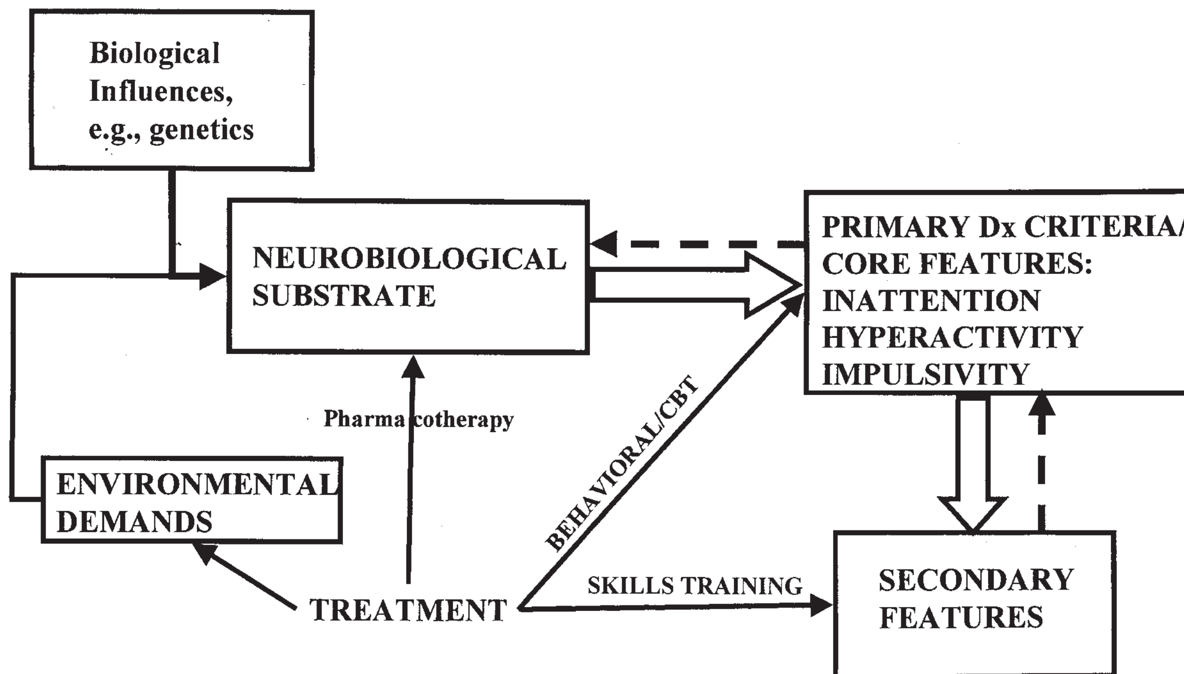

Figure 1. A conceptual model of child psychopathology.

substrate, or alternatively, some compensatory mechanism or system relevant to the substrate. Successfully affecting the underlying substrates is expected to influence core variables, and in turn, secondary or associated features of the disorder. Most available drug treatments, however, are neither specific to single neurotransmitter systems nor for specific sites within the brain. Behavioral and cognitive behavioral interventions, in contrast, are occasionally directed at the core variable level and are not expected to affect the hypothesized underlying substrates, albeit recent exceptions are noteworthy (Schwartz, 1998). Intervening at this level will normally produce generalized effects for a variety of secondary or peripheral features associated with a disorder. Finally, secondary or peripheral features of a disorder are usually addressed by highly specific treatment interventions such as skills training. Generalized effects upward to either the core variable or substrate level are generally not expected unless the peripheral variable represents the primary expression of the core and its underlying processes (e.g., the relation between obsessional thinking and compulsive behavior).

The hypothesized conceptual model has several implications for clinical practice. First, it implies that treatments designed to target an underlying substrate should produce the broadest level of improvement with respect to both core and peripheral features. Comprehensive evaluation of behavior change thus becomes paramount and must include a broad range of indicators that are psychometrically relevant and sensitive to changes in pertinent core and peripheral variables. Insufficient change at one or both levels of functioning indicates that (a) the treatment is not specific for the underlying substrate, (b) the hypothesized substrate has not been correctly identified, (c) the intent of treatment was not to produce change at the substrate level (e.g., pharmacological management of overactivity in a child with autism), (d) core variables have been incorrectly specified, or (e) the treatment lacks necessary potency. Similar logic holds for treatments designed to affect hypothesized core variables (e.g., OCD-specific cognitive–behavior therapy and select behavioral interventions). Lack of treatment effect or a limited range of effect implies that (a) the intervention is not specific for the core areas, (b) core variables have been incorrectly specified, or (c) the treatment lacks potency. Clinical observation of this phenomenon is apparent when we find ourselves "chasing" behavior problems—that is, constantly altering our treatments and redesignating target behaviors. Given demonstrated treatment integrity, it may prove fruitful to question whether certain diagnostic criteria correctly describe core areas of dysfunction or whether they have been simply reified by existing nomenclature. Finally, to avoid physiological reductionism, it is important to point out that treatment effects may be bidirectional. Several treatments aimed at the core, peripheral, or both levels can potentially produce changes at the substrate level or in some compensatory system of the brain (see dashed treatment lines in Figure 1). Examples of this phenomenon merit mention. Discrete trial training is commonly used for children with autism, wherein children are taught basic language skills aimed at both core and peripheral areas, that may produce change in the underlying brain substrate for some children (e.g., acquisition of language). The use of exposure combined with response prevention aimed at treating peripheral behaviors in children with obsessive–compulsive disorder (OCD; e.g., compulsive rituals) frequently produce change in core areas (i.e., obsessional thinking), and perhaps at the substrate level (e.g., Schwartz, 1998). And, environments structured to reduce demands on the underlying substrate (e.g., Jacob, O'Leary, & Rosenblad, 1978; Whalen et al., 1978) may also lessen the severity or reduce the frequency of core and peripheral behaviors (see "Environmental Demands" in Figure 1).

Explaining Criterion Variance

Criterion variance refers to the variability inherent to and responsible for a particular disorder, and it is intrinsically related to discovery of core variables as well as to the design of efficacious treatment interventions. Explaining significant criterion variance requires an understanding of the underlying mechanisms responsible for a particular disorder, how they operate to affect behavior and cognition, and their interplay with the environment.

Without this knowledge, the design of treatment interventions is likely to be bereft of potency and direction. Thorough explication of criterion variance leads to more potent but not immaculate treatments, as underlying mechanisms of many disorders may not lend themselves to biological or psychological manipulation (e.g., brain lesions).

Accounting for criterion variance requires a theoretical framework that is represented by a set of formally and logically interconnected statements. These include definitions, axioms, postulates, hypothetical constructs, intervening variables, laws and testable hypotheses that serve to describe unobservable structures, mechanisms, and processes that are related to observable events and behavior. Postulates and axioms are invoked at the most abstract level, are the farthest from observable behavior, and represent assumptions that are not directly testable. Hypothetical constructs represent the more general level. They consist of concepts that are not directly observable but describe higher order latent variables that are assumed to be responsible for relations among events, objects, properties, and manifest (observable) variables. These, in turn, are usually translated into testable hypotheses, which represent tentative statements concerning the relations

among events, objects, properties, variables, and behavior. A hypothesis becomes a fact when it is sufficiently supported by empirical research. As facts accumulate, they are bound together by specific laws concerning the governance of behavior.

The Interaction Between Theory and Empirical Evidence

Four of the most commonly described modes by which theories and facts interact include deductive theory, inductive theory, functional theory, and models (Marx, 1970). Variations of these theories and their relevance to understanding children with attention deficit hyperactivity disorder (ADHD), OCD, depression, and autism are presented in the ensuing articles.

Deductive theories are scarce in the field of child psychopathology. The reason for this is that the researcher must integrate large fields of data (e.g., neuroanatomical, neurophysiological, genetic, developmental, cognitive, behavioral, and their complex interactions with the environment) and specify a priori the linkages between and mechanisms responsible for maladaptive behavior. For example, deductive theories involve a top-down approach and are traditionally represented by a logically organized set of propositions wherein initial assumptions and their implications are elucidated from the outset. These propositions include basic assumptions and definitions from which additional propositions are deduced. There is a two-way interaction between data and theory. Theoretical propositions are continually subjected to empirical scrutiny and the results are subsequently used to modify the theory. Inductive theories, in contrast, involve a bottom-up approach and consist of descriptive statements that summarize sets of data. There is a one-way relation between data and theory: Data leads to theory. Collecting facts unbiased by interpretation is expected to result in statements that bind the data together in the form of laws or principles that explain behavior. Most theories involving behavioral principles use this approach.

A third mode by which theory and facts interact involves the use of models. A model is a framework, structure, or system that is borrowed from a different field and applied to the current field. Barkley's (1997) recent theory of behavioral inhibition is a modified example of this approach, as the central framework was based on Bronowski's (1977) model of human language. Information processing theories relevant to ADHD are additional examples of the model approach (e.g., Sergeant & van der Meere, 1990). Models typically serve as an analogy or metaphor to guide thinking and research, and there is a one-way influence between theory and data. The model suggests and guides research, and there is minimal interest in using empirical findings to modify the general model, albeit specific features of the model may be altered.

Most present-day theory construction falls under the rubric of functional theory. Its mode is more informal and modest than deductive theory, wherein there is a rapid interplay between theory and data. Propositions are closely tied to data and frequently restricted to a particular research hypothesis or problem. Research findings are typically used to form broader statements or hypotheses. These statements and their theoretical implications are subsequently submitted to further empirical scrutiny and modified accordingly. As a result, hypotheses are continually refined through modification and evaluation.

Collectively, functional and inductive theories are closer than deductive theories or models to the data. The distance between the theory and behavior is important for two reasons. The greater the distance, the more difficult it is to either support or refute the theory. And, the distance between data and theory is functionally related to the number of competing theories that can be invoked to explain the same set of observations or facts.

The foregoing discussion outlines how theory bestows meaning and adds the necessary framework for accumulating facts. It accomplishes this by emphasizing particular behaviors, and in many cases, by inferring hypothetical constructs. For clinicians, theory serves to outline and organize which variables are important for observational, diagnostic, and treatment purposes and concomitantly has special implications for what types of measurement to employ. Some of these variables will be central to a particular disorder, whereas others will serve as proxy variables that may be expected to change in parallel fashion with those central to the disorder.

Evaluating Theories

Several fundamental elements of theories may prove useful for evaluating the perspectives advanced in this issue. A theory should be logically and empirically sound (internally consistent), and thus devoid of contradictory statements. Theories must be testable and parsimonious. To enhance parsimony, they should minimize the number of constructs, propositions, and statements to the greatest extent possible. To be testable, the theory should be explicated in a manner that enables both confirmation as well as falsification for it to be of use to science. Finally, a theory should attempt to explain a reasonably large domain of behavior while integrating extant research findings.

Concluding Comments

The theoretical and treatment outcome reviews relevant to children with ADHD, OCD, depression, and

autism in the ensuing articles suggest significant challenges for the field. Foremost among these is the need for theoretical and conceptual models that describe the linkages among hypothesized brain substrates, cognitive function, behavior, and the environment. Closer examination (and empirical scrutiny) of core and peripheral variables will prove helpful in this regard, in addition to providing the necessary guidance for selecting and developing appropriate psychometric indexes. Improved understanding and scrutiny of current treatment interventions can play a pivotal role in this endeavor. Carefully outlining and examining the specific features, topography, and range of core and peripheral behaviors relevant to a particular disorder and describing their linkages with respect to treatment outcome will provide essential information for the development and advancement of conceptual and theoretical models of child psychopathology. More frequent assessments during the course of therapy will provide much needed evidence concerning the process of therapeutic change. Conceptual difficulties associated with the alternative approach—devising clinical interventions devoid of theory—was highlighted over a century ago. “Those who fall in love with practice without science are like a sailor who enters a ship without a helm or a compass, and who never can be certain whither he is going” (da Vinci, 1883/1977).

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