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Experimental Psychopathology in Psychological Science

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Although the enterprise of experimental psychopathology has been around for quite some time, the integrative role that it plays in psychological science has not received explicit attention. This issue sits on the backdrop of theoretical and empirical evidence that, as an enterprise, experimental psychopathology has the potential to tie together psychological processes studied both in basic and applied domains. In this article, the authors discuss the nature of experimental psychopathology, focusing on its research agenda, historical perspective, and why and how it can be improved to have more of a direct impact in the study of psychopathology.

Basic and applied research represent two end points along a continuum of scholarly activities in psychology. Although these approaches share a commitment to the scientific method, they often differ in regard to how, what, and when specific types of questions are addressed as well as the technologies and settings used in the research process. Numerous strategies have been used to enhance the connection between basic and applied research (e.g., task forces, conferences, and special issues of journals; Belar & Perry, 1992). Although there is merit in drawing connections between these two research domains, their agendas differ significantly (see Davison & Lazarus, 1995; Hayes, Rincover, & Solnick, 1980; Stricker & Trierweiler, 1995, for representative discussions of this issue), such that the most effective approach likely would involve a separate discipline that is focused on a research agenda that spans the continuum of basic and applied research in theory and in practice. Experimental psychopathology has been identified as such a discipline, yet it suffers from a lack of identity and consequently has had limited impact on "mainstream" mental health work. We believe that the relatively limited impact of experimental psychopathology is due to several factors, most notably a lack of identity in contemporary psychological science. In the present article, we attempt to clarify the role of experimental psychopathology, focusing on its research agenda, historical perspective, and why and how it can be improved to augment its impact in mental health research and practice.

Nature of Experimental Psychopathology

For the purpose of the present article, we offer an operational definition of experimental psychopathology as laboratory-based research with humans, nonhuman animals, or both types of participants, directly aimed at discovering and explaining the etiology and maintenance of psychopathological processes, potentially contributing to the amelioration of dysfunctional behavior through intervention and prevention. This definition can be contrasted to that of applied or clinical psychopathology research that involves research with humans, typically with a particular psychological disorder, directly aimed at (a) addressing the treatment and pre-

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vention of psychopathology in settings primarily outside of the laboratory or (b) identifying the constellation of symptoms that characterize psychological disorders. Finally, experimental psychopathology can be distinguished from basic research. Although basic research ultimately may have important clinical implications, the goal and overarching framework of this research is to elucidate basic principles, independent of clinical relevance (Osgood, 1953).

Research Agendas

The types of a priori research questions addressed by scientists in a domain reflect that domain's research agenda. In general, basic research scientists are most concerned with questions about the processes underlying how or why a particular phenomenon of interest occurs. Their research agenda is designed to examine fundamental behavioral processes, identify sources of prediction or control, and elucidate mechanisms of action. As such, there may be little, if any, a priori focus on the public health relevance or clinical importance of a specific research question. Of course, this does not mean that basic research may not ultimately have clinical relevance. In fact, many of the developments in both pharmacological and psychological interventions for psychopathology stem from research in basic laboratories (Baum, 1970). Still, the logic of basic research dictates that systematic clarification of fundamental psychological principles should provide the foundation on which a science of behavior is developed and sustained (Lakatos, 1970).

Clinical researchers, in contrast, generally are most interested in identifying immediate answers to pressing public-health problems. Accordingly, applied research is typically pursued in a wide variety of naturalistic contexts in an effort to develop and test assessment instruments, interventions, and etiological theories that have practical or functional utility. Scholarly attention is devoted to assessment and intervention services that can effectively affect the behavior of interest in the immediate circumstance and maintain positive behavior change over time. The logic to this approach is that societal problems demand prompt attention in which the best information of what is currently known about identified behavior problems is used (Lakatos, 1970). Research methodology is often secondary relative to feasibility, which is primarily a function of preexisting demands of the situation. Moreover, in the service of establishing clinical applicability, it is necessary to predominantly study participants who have the problem of interest, behavior selected for clinical relevance, and settings where the problem behavior actually occurs. As a result, it is perhaps not surprising that applied research may sometimes fail to provide fully comprehensive explanations of the etiology and maintenance of psychopathology and may tend to neglect mechanisms of action or change for specific procedures or behavioral processes (Michael, 1980). Because experimental psychopathology directly focuses on psychopathological processes, it is meaningfully related to the research agenda of applied research. As such, clinical researchers can find experimental psychopathology research relevant because of its rigorous examination of clinical processes.

Experimental psychopathology is also committed to the laboratory methods designed to systematically evaluate fundamental psychological processes involved with abnormal behavior. Similar to basic researchers, experimental psychopathologists are concerned with identifying sources of prediction or control, understanding specific components of the behavioral process, and examining mechanisms of action. Furthermore, experimental psychopathology research maintains its connection with basic research through its use of similar observational strategies. Thus, experimental psychopathology research is relevant to basic research scientists because it helps extend basic research to other contexts, providing explicit tests of the generalizability of the findings among individuals with psychopathology (or individuals that vary on key psychopathology characteristics).

Our intention is not to challenge either the basic or applied approach. Rather, it is to call attention to experimental psychopathology as a research enterprise that can explicitly help bridge these domains by its research focus. Experimental psychopathology theoretically serves an intermediary role in the study of psychopathology in terms of its research agenda—extending basic principles to psychopathological processes by using laboratory procedures and observational tactics. Furthermore, it builds upon basic research findings by applying these principles and concepts to human functioning and

emotional suffering in a more clinically convincing manner. In this way, there can be an increased confidence that basic principles extend to human problems, which has been a frequently cited reason why applied researchers do not typically pay close attention to basic research (Beutler, Williams, Wakefield, & Entwisle, 1995).

Historical Perspective

Similar to many now "classic" findings in scientific history detected serendipitously by careful observation, experimental psychopathology arguably first developed somewhat by "accident" (Popplestone & McPherson, 1984). Pavlov and his students, when studying basic conditioning processes involved with the digestive system, observed that "some of the dogs demonstrated a chronic pathological state . . . under difficult conditions" (Pavlov, 1927, pp. 289–290). Specifically, aversive states produced agitation and disrupted performance on experimental tasks. This phenomenon served to stimulate a large amount of later work in Pavlov's laboratory and elsewhere. Indeed, as Pavlov began to actively present the work, behavioral scientists soon realized that a laboratory approach to studying abnormal behavior processes was a worthwhile pursuit (see Benjamin, 2000, for a more detailed historical discussion of laboratory-based research).

Although we could not locate a definitive point in time when the label *experimental psychopathology* was first used, by the late 1930s laboratory research in the service of understanding the nature of a wide variety of psychopathological problems was being conducted. By the 1950s, the term *experimental psychopathology* was being used by researchers to describe empirical work contributing to the development of clinical interventions and models of behavioral dysfunction in which laboratory-based research on nonhuman and human animals was used (Sackler, Marti-Ibanez, Sackler, & Sackler, 1957).

The early work of Pavlov and his students served as a springboard for a number of significant historical discoveries in experimental psychopathology specifically and in abnormal psychology generally (e.g., Brady, Porter, Conrad, & Mason, 1958). Most of this early work involved creating laboratory-based psychopathological states that mirror critical dimensions of psychological problems. Naturally, these laboratory models are not exact replicas of a psychological disorder. Instead, they attempt to mimic the essential underlying features or predominant symptoms of a disorder of interest (Costello, 1970). Contingent upon the sophistication of the model in question, this experimental psychopathology work also seeks to build in commonalities that underlie the phenomenon of interest in terms of the core processes that contribute to its maintenance, remediation, and prevention.

Beginning in the late 1960s, contemporary experimental psychopathology grew to include laboratory observation of psychopathological processes in the service of identifying defects in functioning. In particular, researchers sought to identify cognitive–affective deficits and excesses in functioning that theoretically are related to psychopathological problems (see Hunt & Cofer, 1944; Kihlstrom & McGlynn, 1991, for more comprehensive descriptions of this approach). This domain of experimental psychopathology research has greatly been influenced by basic cognitive and neuropsychological research in an attempt to understand higher order cognitive processes not necessarily apparent in nonhuman animals and potentially relevant to various psychopathological states (e.g., executive functioning, language abilities, and attentional functions). This domain of experimental psychopathology study has led to many developments in diverse areas of abnormal behavior (Chapman & Chapman, 1973; Ingram, 1986; McNally, 1998). Moreover, it has offered insights into the role of cognitive functioning in the development, expression, and maintenance of psychopathology heretofore not attained in clinical science (see Abramson & Seligman, 1977; Kihlstrom & McGlynn, 1991; Maser & Seligman, 1977, for reviews).

Challenges Facing Experimental Psychopathology

Despite the many historical contributions of experimental psychopathology, its impact on mainstream psychology has been somewhat limited. Abramson and Seligman (1977) identified important impediments to the development of experimental psychopathology, highlighting difficulties inherent in the types of laboratory

models that can be utilized. Specifically, these impediments focus on issues of ethics and knowledge regarding the inability to truly understand the types of symptoms that characterize a syndrome of interest and the ability to take the steps to produce these symptoms in humans when they are determined. Although other researchers have argued that these limitations are insurmountable, we believe that creative attempts to better understand syndromes will be beneficial, as will finding ethical means for producing relevant symptoms. However, these efforts have partially been limited by the absence of a clear overarching theoretical framework, one that outlines experimental psychopathology as a discipline that starts with clinical concerns, develops sophisticated experimental approaches to better explicate the fundamental issues of interest, and then synthesizes the resulting findings in clinically meaningful ways. In short, for experimental psychopathology to have more of a direct impact on mainstream psychology, it will need to develop a more sophisticated identity and use the resulting strengths from this conceptual basis to advance clinically oriented research in new and innovative ways.

Other researchers have identified the type of bridge between basic and applied research potentially afforded by the discipline of experimental psychopathology as important (e.g., Onken & Bootzin, 1998). Indeed, psychology has made many efforts to call attention to the benefits of such endeavors and has gone as far as recently developing a commission to better explicate its role and facilitate its development (e.g., National Advisory Mental Health Council Behavioral Science Workgroup, 2000). Unfortunately, with few exceptions, these efforts have not fostered the type of a priori research agenda described previously. Instead, these initiatives seem to have provided challenging "hoops" to jump through for researchers focused within either the basic or applied domain, often resulting in post hoc attempts to make research clearly within one domain (e.g., basic) appear connected to another domain (e.g., applied). For example, it is not uncommon to see casual and often tangential references to basic research findings in the introduction or discussion sections of papers that clearly fit within the applied domain and equally casual and tangential references to clinical implications in basic research papers. This is not to say that the connections, some of which are made by us, are necessarily inaccurate or not potentially useful for further discussion and extension. However, we believe that these efforts do not embody the spirit of experimental psychopathology, for which the core strengths derive from an a priori focus on the use of experimental rigor in the direct aim of clinical application (i.e., translational focus). Serious concerns regarding experimental psychopathology research will rightly continue so long as the methods used are not considered in terms of the long-term goals of the research.

In an effort to more clearly make this point with an illustrated example, we briefly discuss the nature of research participants being investigated. Perhaps one of the most historically contentious issues regarding experimental psychopathology research involves the selection of participants to be studied. One of the clearest differences between basic and applied research is that applied research most often utilizes a sample of individuals with the clinical concern in question, whereas in basic research participants often are drawn from convenience samples (typically without the clinical concern of interest) or nonhuman animal subjects. Although individuals with the primary clinical complaint nearly always would be essential for the applied researcher studying a particular disorder and not necessarily at all relevant for the purposes of the basic researcher interested in general underlying processes, experimental psychopathology can often fall in an admittedly "gray area."

The debate regarding the types of samples that should be utilized by experimental psychopathologists generally tends to be focused in absolute terms. From one point of view, research characterized as experimental psychopathology has often been criticized for overrelying on convenience samples. For example, the majority of existing studies on depression have either used mildly depressed college students selected on the basis of their Beck Depression Inventory scores or relied on manipulations that produce a mild depressed mood in previously nondepressed individuals (Coyne & Gotlib, 1983). However, from another point of view, the use of a convenience sample offers many obvious, practical advantages, including ease of access, increased power to test hypotheses that are due to reduction of within-group heterogeneity on many potentially important participant

characteristics (e.g., age, education level, IQ), and increased internal validity resulting from readily available well-matched control groups (e.g., who do not display the target symptomatology). Furthermore, many researchers have observed that psychiatric disorders are simply too heterogeneous and that boundaries between various disorders are somewhat arbitrary and perhaps artificial (Buchwald & Rudick-Davis, 1993; Kihlstrom & McGlynn, 1991; Persons, 1986). Without reliable classification of patients into homogenous groups, power to detect underlying mechanisms responsible for these heterogeneous disorders will be severely limited because of excessive noise. Therefore, methods to reduce potential within-diagnostic-group heterogeneity must be utilized (e.g., focus on homogeneous subgroups within clinical disorders, attention to the moderating role of individual differences, and focus on mechanism rather than clinical disorder per se).

In light of the nature of these complex issues, we believe the appropriateness of a convenience sample in experimental psychopathology research, as is the case with many of the issues in this domain, cannot usefully be considered in absolute terms. Rather, these issues should be considered on a case-by-case basis for particular experiments based upon the specifics of the procedures utilized and the types of questions posed. First and foremost, by designing experiments with direct clinical implications, the appropriateness of the sample can be considered in terms of its utility for answering the question of interest both immediately (i.e., clinical impact) and in informing future process-oriented experiments that might follow (i.e., systematic and uniform knowledge base). For example, one might consider using a subclinical sample in a study of factors underlying response to biological challenge procedures to better understand the development of panic disorder. A strong general argument can be made for not having to subject actual patients to panic-provocation procedures and the avoidance of methodological problems, including differences in the use of anxiety-reducing medications and individual panic-related avoidance experiences. However, these advantages are only of value if the symptoms experimentally produced can be argued to accurately represent the low end of a continuum of severity, with full-blown clinical symptoms of psychopathology at the other pole and similar mechanisms operating across this full continuum of severity. If this is not the case, then the information gained, although holding value on a basic process level, is not useful in direct clinical application. Furthermore, despite the problems discussed previously, there does come some point at which the less controlled conditions outside of the laboratory must be tackled in the laboratory. Thus, researchers' ability to understand the basic underlying processes of panic might be enhanced after careful studies with nonclinical participants, but then proceeding with this knowledge into studies with patients. Such a research approach is important for demonstrating clinical relevance and is a key aspect separating the experimental psychopathologist from the basic or applied researcher.

How Can Experimental Psychopathology Have More of a Direct Impact?

Thus far, we have argued that experimental psychopathology is a domain with a missing identity. In its absence, we argue that a disconnect between basic and applied research cannot truly be remedied, as simple translations are not feasible given the differing agendas. Thus, by positioning itself as an enterprise that integrates basic approaches and findings with clinical concerns and findings into one unified research program, it has the potential to provide a genuine translational bridge, thereby inspiring genuine interdisciplinary dialogue and the following long-term accompanying benefits.

Increasing multianalytic analysis and interdisciplinary dialogue. One way experimental psychopathology can have an impact is by contributing to future interdisciplinary movements within behavioral science. We suggest that this is largely due to experimental psychopathologists' development and use of technologies that can enhance observational strategies and theory across multiple levels of analysis. The comprehensive understanding of complex clinical phenomena will require that research focus on controlled production of important clinical processes; examination of such phenomena from multiple perspectives and with multiple measures; and discussion of these phenomena with reference across levels of analysis including biological/neurological, affective, cognitive, and behavioral domains. Naturally, we expect these activities will result in increased interdis-

ciplinary collaboration that will be due, at least in part, to the technology and knowledge bases required in this process.

In current practice, it is common for psychopathologists to develop theories about behavior problems with little or no reference to whether observations are supported by theories at more basic levels of science (e.g., neurobiological). Unfortunately, this results in discontinuity between and within various scientific fields. Reference to this lower level of analysis can and should inform and constrain theory about observed psychopathology at higher levels. At the same time, some may suggest that the "Decade of the Brain" has fueled the viewpoint that all psychopathology outcomes can be reduced to biology. Yet, psychopathology cannot usefully be considered strictly in biological terms because by definition, it is not reducible to biological processes alone. For example, fear is a functional state characterized by colateral changes across systems and therefore is not reducible to biological activities alone. As Miller and Keller (2000, p. 213) recently argued, "We advocate not that every study employ both psychological and biological methods, but that researchers not ignore or dismiss relevant literature, particularly in the conceptualization of their research." To be sure, experimental psychopathology researchers are well positioned to develop and test theory that spans levels of analysis.

Recent theory and data on the underlying mechanism responsible for symptoms of schizophrenia epitomize the utility of attention to multiple levels of analysis. Cohen and his colleagues have suggested that many of the prominent clinical symptoms observed among patients with this disorder are produced by the same underlying mechanism—deficits in the representation and maintenance of contextual information required for task appropriate behavior (Braver, Barch, & Cohen, 1999; Cohen, Barch, Carter, & Servan-Schreiber, 1999; Cohen & Servan-Schreiber, 1992). In their investigations of contextual processing deficits, attention is directed to behavioral deficits in task performance (e.g., language deficits on lexical decision tasks and inhibition deficits on continuous performance tasks), cognitive processes that account for these behavioral manifestations (e.g., attention and working memory), neural systems responsible for these cognitive processes (e.g., prefrontal cortex and anterior cingulate), and potential neurotransmitter abnormalities (e.g., dopaminergic function) within these neural systems. This work serves as an important bridge between neurobiological and psychological research on schizophrenia.

Cross-level analysis of theory development and evaluation requires broad assessment of pertinent constructs that integrates information from multiple response systems at these different levels of analysis. Utilization of the laboratory context for the examination of clinical psychopathology provides the experimental psychopathology researcher with the necessary flexibility in measurement. The multimethod assessment strategy may be particularly helpful when completed within the context of experimental elicitation of important clinical phenomena. Assessment of emotional response provides one such example. Without broad measurement, any one index may yield ambiguous, incomplete, or misleading information about the affective response (Cacioppo & Tassinary, 1990). Moreover, during clinically relevant cognitive–affective distress states, "differential" information from response domains may reliably manifest to inform theory about underlying mechanisms. For example, when investigating emotional response among psychopaths in an emotional slide-viewing paradigm, Patrick and colleagues (Patrick, Bradley, & Lang, 1993) observed self-report and facial electromyogram measures to dissociate from startle reflex potentiation. This dissociation suggested that psychopaths were similar to nonpsychopathic control participants with respect to surface features of emotion (i.e., they know to report emotion and display appropriate facial responses of smiling and frowning), but that they possessed a core deficit in affective response in primary subcortical fear centers of the brain. Findings from studies such as these have important implications for the underlying biological mechanisms operating in these psychological disorders.

More generally, researchers must recognize that most complex, clinically pertinent phenomena are multiply determined and probably involve interactive response systems (Levenson, 1992). Aside from decreasing interpretative problems associated with method variance, use of multiple response system measures will help in researchers' understanding of the connections among these systems, a topic of primary

focus in interdisciplinary movements within behavioral science (American Psychological Society, 2000). In particular, as experimental psychopathology researchers advance to examining more integrative, cross-level of analysis questions, the use of multiple measures will become a necessity. For example, Curtin and his colleagues have focused on acute alcohol challenge effects on cognitive–affective interactions (Curtin, Lang, Patrick, & Stritzke, 1998; Curtin, Patrick, Lang, Cacioppo, & Birbaumer, in press). To examine this model fully, concurrent measurement of both cognitive–attentional processing of emotion cues and subsequent emotional response were required. Their model of intoxicated behavior suggests a causal chain initiated by alcohol-produced deficits in attentional systems, leading to altered emotional response to stimuli in which appraisal requires attentional processing, with ultimate impact on behavioral response. As such, these investigators utilize specific measures to tap each of these constructs, including cortical event-related potential measures of attentional processing, psychophysiological assessment of emotional response (fear-potentiated startle), and overt behavioral task performance.

Importantly, such efforts to study psychopathology can greatly be aided by technological advancements, as reflected by those in human neuroimaging. Numerous functional brain-imaging techniques are currently available to examine neural mechanisms in clinical psychopathology. Some examples include positron emission tomography (PET), single photon emission computed tomography (SPECT), and functional magnetic resonance imaging (fMRI). The application of fMRI techniques to examine basic emotional processes, with potential important implications for clinical psychopathology, is rapidly growing (Davidson & Irwin, in press). Moreover, researchers directly investigating clinical psychopathology have begun to utilize fMRI and other imaging techniques to examine neural systems associated with psychopathological states (Davidson, Abercrombie, Nitschke, & Putnam, 1999). For example, neuroimaging techniques have contributed significantly to the understanding of the pathophysiology in obsessive–compulsive disorder (OCD; Saxena, Brody, Schwartz, & Baxter, 1998). Similarly, initial promising application of neuroimaging techniques in the study of other anxiety disorders (e.g., social phobia; Birbaumer et al., 1998), and depression (Heller & Nitschke, 1997) has begun. With the continued application of these brain-imaging technologies, experimental psychopathology researchers' ability to advance understanding of the mechanisms responsible for psychopathology will dramatically be increased.

Direct extension of technologies to assessment and treatment strategies. Another way experimental psychopathology can make more of an impact is by using methodological tactics to investigate the assessment, remediation, and prevention of behavioral problems. For example, if application of interventions targeted at theoretically important basic processes resulted in observable behavior change, confidence in the accuracy of these theoretical models would be increased. At the same time, such research would explicitly demonstrate the clinical relevance of laboratory tactics. Additionally, many of these efforts could incorporate prospective methodology, which is critical for providing information about the time course of psychological change.

To illustrate how intervention efforts can be accomplished in the laboratory, consider the use of biological challenge procedures to treat anxiety disorders. A substantial body of evidence suggests that exposure to feared stimuli is a necessary component of treatment for anxiety-related disorders (Foa & Kozak, 1986). Numerous theoretical propositions have been suggested to account for fear reduction during exposure, although none are uniformly accepted. To better understand this psychological change process, experimental psychopathology researchers could utilize biological challenge procedures in a repeated exposure paradigm (van den Hout, van der Molen, Griez, Lousberg, & Nansen, 1987). By tracking on-line changes in affect, cognition, behavior, and physiological responding, experimental psychopathology researchers will be well positioned to examine markers of positive treatment outcome. In addition, the clinical appeal of these studies could be increased by recruiting persons who vary on theoretically relevant individual difference characteristics and by including short- and long-term follow-up assessment. In this way, information that is of direct clinical importance and applicability will be collected while simultaneously providing empirical examination of the

basic mechanisms of psychological change during exposure.

Using similar logic, experimental psychopathology studies can be expanded to provide clinically relevant assessment information that can be used in intervention-related contexts. A frequently cited concern about much clinical research is that it relies too heavily on self-report information contained in verbal-report instruments and interview-based methodologies. This is particularly true when one is interested in understanding "automated" behavior involved in many clinically relevant phenomena such as emotional states, motivation levels, consciousness, and so forth (Kirsch & Lynn, 1997). For example, some people may not indicate that they are fearful of bodily reactions, yet demonstrate physiological activation and overt escape and avoidance behavior in laboratory settings that characterize abrupt, somatic arousal (Forsyth, Eifert, & Canna, 2000). Similarly, recent research suggests depressiogenic thinking may be apparent in certain laboratory tasks but not psychometrically valid questionnaires, particularly among individuals with a prolonged history of depression (Rude, Covich, Jarrod, Hedlund, & Zentner, in press). Such information may be useful in identifying potentially clinically relevant responding in individuals who may not otherwise share (or even be aware of) this information through interviews or self-report instruments.

We do not intend to imply that all experimental psychopathology methodologies are or can be clinically useful strategies. A particular methodology should be a "clinical tool" only to the extent that it is relevant to the questions of clinical relevance at hand. Only at this point can the findings be truly applicable in practice. To illustrate this point, we consider a research question that began in the context of smoking-cessation treatment groups, focusing on what underlying factors led a large group of motivated individuals to relapse back to smoking within the first day of cessation (Brown, Lejuez, Kahler, & Strong, in press). In considering most of the current treatments, a focus on long-term relapse prevention strategies was clear, with little opportunity for individuals to practice coping with stressful situations in the context of withdrawal symptoms, as would occur once the cessation attempt began. On the basis of a study showing enhanced distress tolerance in non-smokers compared with smokers, we hypothesized that a continuum of distress tolerance might exist across smokers, with those on the low end most vulnerable to relapse in the initial stages of the physical and psychological discomfort associated with withdrawal. If correct, we further hypothesized that a component of treatment involving exposure to stressful experiences in the context of mock cessation attempts would be a useful adjunct for those individuals.

To test these hypotheses, we began at a basic level, exposing smokers with no past cessation attempt longer than 24 hr and smokers with extended previous quit attempts to a psychological stressor consisting of a computerized version of the Paced Auditory Serial Addition Task rigged to be highly difficult (Lejuez, Kahler, & Brown, in press) and a physical stressor consisting of CO_2 inhalation (Zvolensky, Eifert, & Lejuez, in press). We measured response to the task across several channels of behavior including latency to terminate the tasks when given an option to quit, as well as self-reported emotional and physiological reactivity to the task. We further measured personality differences between the groups. Although these stressors were not the type of stressors that might be experienced by smokers in the context of a quit attempt, they were easily controlled and did produce the expected self-reported emotional and physiological responses. As a result of these conclusions, we are now extending this study to include a prospective analysis and a dexamethasone suppression test to examine if distress tolerance extends to a core biological level. Most important, we are focusing on taking these procedures and not only using them to identify individuals with vulnerability to early lapse, but also modifying these procedures in more ecologically valid ways to induce stress during practice quit attempts while teaching relevant coping strategies.

Concluding Comments

The zeitgeist is ripe for experimental psychopathology to move forward in a manner consistent with the type of approach portrayed in the present article. As a prime example, the National Advisory Mental Health Council Behavioral Science Workgroup (Workgroup; 2000) issued a report calling for the National Institutes

of Health to invest more resources in "translational" research and to provide avenues to systematically develop this area. In this age of "overspecialization," the Workgroup stressed the importance of interdisciplinary collaboration, the need to attract more researchers to examine "risky" topics, and the need to increase training and educational opportunities in experimental psychopathology.

These efforts encourage a proliferation of interdisciplinary or cross-area psychology training programs (Workgroup, 2000). These trends reflect the more general recognition that scientists from different research areas each bring a unique set of theoretical perspectives, tools, and research methodologies that, when combined, can offer profoundly powerful means of understanding psychopathological behavior (Campbell, 1969). Interdisciplinary research in which clinical scientists work collaboratively with neuroscientists, cognitive scientists, developmental scientists, and behavioral and molecular geneticists, and so forth, will lead to an improved understanding of the phenomenon of interest. This integration of diverse fields, in turn, may potentially lead to improvements in our classification systems, assessment instruments, etiological theories, and, ultimately, prevention and intervention strategies.

The Workgroup (2000) emphasized the critical catalytic role that the National Institute of Mental Health (NIMH) must play in the conduction and adoption of translation research. The group insisted that NIMH identify translational research as a funding priority and help to systematically promote the development of these research endeavors by issuing requests for grant applications and program announcements, stimulating NIMH-funded research centers, committing resources to translational research for the long term, and using many other innovative approaches. The Workgroup also highlighted the need to find means of facilitating the exchange of information across disciplines within the profession, as well as disseminating findings to the public, practitioners, health-care representatives, and policy makers. Workgroup members suggested increasing the publication opportunities in scientific journals, increasing workshops and national conferences devoted to translational research, and facilitating "virtual" on-line meetings when appropriate.

Taken together, we suggest that although experimental psychopathology has been around for quite some time, it has not received explicit attention to its integrative role. This issue sits on the backdrop of theoretical and empirical evidence that as an enterprise, experimental psychopathology has the potential to tie together psychological processes studied both in basic and applied domains (i.e., serves a translational function). This perspective helps offer a more integrated approach and explicitly takes into consideration the complexity of behavioral phenomena as well as the multiple levels of analysis at which it can be described. At the same time, for experimental psychopathology to have more of a direct impact on mainstream mental health research and practice, it will need to develop and expand in innovative ways rather than rely exclusively on its past traditions and successes.

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