

## Letters to the Editor

### PREDICTING HEALTH FROM STRESS RESPONSE TO CRANDALL

To the Editor

Crandall (1992) compared correlations between three composite measures of stress and a measure of symptoms for 115 fairly healthy, unstressed college students. The three composites were the sum of Holmes and Rahe's (1967) scale values (based on magnitude estimations of single events), a sum of scale values from the unified scale that Sotoodeh and I developed to explain "ratios," "differences," and "combinations" of life events (Birnbaum & Sotoodeh, 1991), and the number of life changes (as if all events are equally stressful). All three indices had a correlation of about .2 with a measure of symptoms. Because these correlations were not significantly different from one another, Crandall concluded that scaling of life events is unnecessary and that one might as well assume that all events are equally stressful. However, such correlational contests can easily yield wrong conclusions (Birnbaum, 1973, 1974). The methods used by Crandall can actually lead to higher correlations for incorrect models (or scales) than for correct ones. Therefore, it would be premature to draw strong inferences from his results.

**Confounding measurement and model testing** Although the unified scale of Birnbaum and Sotoodeh (1991) is meaningful in the configural weight model, it is not meaningful in the additive model. Crandall added up the Birnbaum and Sotoodeh values, plugging them into the additive model, which Birnbaum and Sotoodeh specifically rejected. To use the scales this way is analogous to using the Fahrenheit scale in the ideal gas law. Although the Celsius, Fahrenheit, and Kelvin temperature scales are perfectly correlated (they are linearly related), and work equally well in certain equations, only the Kelvin scale works properly in the multiplicative gas law. Birnbaum (1974) noted that a comparison of correlations with Fahrenheit scales would lead to the erroneous conclusion that the additive model is better than the multiplicative gas law for predicting gas volume as a function of temperature and pressure. Using the additive model, correlational contests would lead to the incorrect conclusion that the Fahrenheit scale is better than the Kelvin scale for predicting gas volumes. Because mismatching models and scales can lead to wrong conclusions, Crandall's use of the same techniques in psychology must be interpreted with caution.

**When variables don't vary, measures don't matter** Crandall sent me his data. None of his subjects had experienced "Death of spouse" or "Jail term." For these events, it makes no difference what scale is used, since no one gets that score. Only one person had been

"Fired" or had a "Marriage." Only four to seven people reported "Injury or illness," "Death of close friend," "Divorce," "Child leaving home," or "New family member." All 115 subjects had recently experienced "Christmas" (but only 90 acknowledged it). Of the 15 events scaled, Crandall's sample had reasonable variability on only 5 events, and these events ranged only from 15 to 28 on the Holmes and Rahe scale ("Death of spouse" = 100). When a "variable" does not vary, it will not correlate with any criterion, so measurement makes no difference.

**Nonsignificance does not prove the null hypothesis** Because correlations are not significantly different, it does not follow that events are equally stressful. For example, the lack of a significant correlation in Crandall's study between being "Fired" and health (only one person was "Fired") does not prove that being "Fired" has no effect. It is always difficult to infer the truth of the null hypothesis from nonsignificance, but to conclude that all events are equally stressful when virtually no one has experienced the events that are supposed to be stressful seems particularly unwarranted.

**Conclusions** Crandall concluded that one should just count the number of life changes, rather than try to scale them at all, in agreement with others who have argued for equal weighting in regression (Dawes & Corrigan, 1974; Wainer, 1976). This conclusion may have merit under limited conditions. When measurements of stress are not properly scaled, are improperly combined, contain too much measurement error, or are correlated in an uncontrolled survey, a simple calculation (such as the number of life changes) may indeed prove to predict as well as a scaled index. However, because contests of correlations are potentially misleading under these very same conditions (Birnbaum, 1973, 1974), it seems unwise to draw any strong conclusions from correlation coefficients. If granny's knee is as good as a barometer for predicting the weather, it does not follow that both instruments are equally accurate for measuring the theoretical construct of pressure.

The theoretical conceptions underlying stress research are that life changes cause psychological stress and stress is injurious to health. Birnbaum and Sotoodeh measured the causal effects of hypothetical life events, which led to their theory of perceived stress. Crandall argued that the focus should be instead on the life-event correlates of health. Although his argument brings "real" (self-reported) experiences and symptoms into the picture, it also introduces the problem of distinguishing causation from correlation in the confounded world. Birnbaum and Sotoodeh found that people judge that it would be more stressful to be fired than to go on vacation. According to Crandall, the student who was fired was not significantly sicker than students who took vacations. It would be

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interesting to know whether people who were randomly assigned to be fired rather than receive a vacation would also judge the event more stressful and, if so, whether their health would be significantly worse. These questions have not yet been answered.

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MICHAEL H. BIRNBAUM  
Department of Psychology  
California State University, Fullerton  
Fullerton, CA 92634

## PSYCHOLOGY AS AN EVOLVING SCIENCE

To the Editor

In the January 1992 issue of *Psychological Science*, Teitelbaum and Pellis (1992) presented their proposal to develop "a synthetic physiological psychology, which aims to build psychology apart from medicine" (p. 4). They noted that "as physiological psychologists, our primary scientific responsibility is to build psychology, not medicine" (p. 4). This theme of separating psychology from medicine runs throughout the article; consider the following passage: "We are saying that psychology, and in particular physiological psychology, whose most immediate problem is to separate itself from medicine" (p. 14).

Teitelbaum and Pellis are concerned that physiological psychology has become so reductionistic (i.e., medically oriented) that it has lost sight of its primary purpose, which is defined in the following statement: "The scientific goal of every psychologist is the same—to formulate principles that help us to understand behavior and thought" (p. 6). They also noted that "psychology is a science of pure abstract function" (p. 6). Later, in a question-and-answer section of the article, a respondent disagreed with Teitelbaum and Pellis's view of physiological psychology. The respondent in essence favored studying the physiological bases of behavior, but, again, Teitelbaum and Pellis reflected their view by responding that "the problem is that the issue as you pose it begs the

entire question of the field of psychology" (p. 17). Teitelbaum and Pellis's view rests on the assumption that psychology and medicine are two discrete fields with precise definitions and rigid boundaries which would allow for an easy categorization of what constitutes each field.

What if, for the sake of argument, psychology and medicine are not really two separate fields? What if the differences are more semantic than real? Just what constitutes the fields of psychology and medicine is not a matter of absolute criteria; it is a matter of the judgment of an individual or group of individuals. Over the years, the definition of medicine has changed. Only a few hundred years ago, surgery was defined as part of the barber's trade, not medicine per se. It is fortunate that medicine eventually redefined itself to include surgery. Where would psychology be today if the functionalist school had not challenged Titchener's definition of psychology, with its reliance on introspection as the only method of investigation? If the field of psychology had originally been defined as the study of the biochemical bases of behavior, there would be no question about the direction of physiological psychology today.

My concern with Teitelbaum and Pellis's view is that it fails to consider that psychology is a relatively young, evolving science that must not be locked into a definition that was formulated a century ago. One need only read the special edition of *American Psychologist* on the history of American psychology (Benjamin, 1992) to examine how psychology has evolved over the past hundred years. Rather than restrain psychology by holding to a rigid definition, we must recognize that a growing, evolving field may require redefinition. Perhaps the reductionistic study of the physical bases of behavior should be the focus of physiological psychology.

Teitelbaum and Pellis emphasized the need for psychology to leave the reductionist realm (medicine) and search for abstract function (psychology). We need only look as far as the mental health field to see what happens when psychology focuses on purely psychological functioning. As research has developed, it has become painfully obvious that some "psychiatric" patients are, in fact, medically ill, yet this fact is undiscovered because of the emphasis on "psychological" factors (Holmes, 1992). It is fortunate for patients such as these that someone was willing to look beyond pure abstract function (i.e., psychological factors). I fear that a concerted effort to purposefully take a divergent path from medicine may lead to further mistakes.

Rather than restricting psychology to a single, precise, limiting definition, we must consider the possibility that the original definition is in need of revision, perhaps expansion. We must at least entertain the possibility that psychology and medicine are not as distinctly different as we might like. It is possible that the two fields of study

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