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COMMENTARY

Commentary on Crum, Corbin, Brownell, and Salovey (2011)

A. Janet Tomiyama
University of California, San Francisco

Traci Mann
University of Minnesota

In their article, Crum, Corbin, Brownell, and Salovey (2011) report intriguing results on the power of the mind to determine the body's physiological responses. They find that given the identical milkshake, participants led to believe that the milkshake is a high-calorie, "indulgent" milkshake have an up-and-down ghrelin response that is characteristic of hunger followed by satiety. When the same participants drink the same milkshake on another occasion but are led to believe that it is a low-calorie, "sensible" milkshake, their ghrelin response is essentially flat.

These simple findings have impressive implications. Ghrelin is a major driver of hunger when levels are high, and decreasing levels signal the brain to stop consuming food. That psychological expectations about the calorie content of food can change key parts of the physiological metabolic responses to that food has profound implications for any human trying to control their eating in our food-rich environment. Media, grocery stores, and even school cafeterias are rife with so-called "healthy" foods. To the extent that labeling the milkshake as sensible prevented or attenuated the decrease in ghrelin that one would expect to occur after consuming a filling milkshake, labeling foods as sensible may actually be counterproductive and ironically lead to increased consumption due to hunger.

This study also presents an alternative explanation for a widely publicized paper published recently in Science (Morewedge, Huh, & Vosgerau, 2010), in which imagining eating M&M candies led participants to eat fewer M&Ms. Morewedge et al. cited habituation as the likely explanation, but perhaps the effect was mediated by ghrelin secretion as observed here.

We hope that these findings will be the straw that, when added to the wealth of existing evidence on this point, finally does away with the "calories in/calories out" model that dominates the medical dieting literature. The larger implication of this study—that all calories are not created equal if they are not perceived equally—calls for dieting studies to move beyond designs that involve telling participants to simply cut their calories. The current study clearly underscores the need for more sophisticated studies that integrate medicine, physiology, and psychology to improve metabolic health.

At some point, however, we as a field should cease being surprised that a psychological factor modulates a physiological response. We know from decades of research in health psychology that, for example, if an event is not perceived as stressful, an individual will not mount a physiological stress response (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986). There is no compelling reason that this should be the case only for physiological stress pathways, and Crum and colleagues have given us strong reason to expand our focus to metabolic pathways as well.

This study hypothesized but did not find that dietary restraint moderated the association between the milkshake labels and ghrelin responses. Dietary restraint is an important moderator in prior studies of eating behavior (van Strien, Engels, van Staveren, & Herman, 2006), and may profoundly affect health in its own right (e.g., Kiefer, Lin, Blackburn, & Epel, 2008). The analysis of variance tested by Crum et al. may have been underpowered to find an effect of restraint, which the authors dichotomized, instead of the more common practice of treating it as a continuous measure. Future studies should not discard this important construct.

Looking more carefully at this study, we are intrigued that there were changes in ghrelin—a physiological marker of satiety—without accompanying changes in self-reports of satiety. If ghrelin is indeed a satiety hormone, the decrease in ghrelin after the "indulgent" milkshake should have produced an accompanying decrease in a psychological indicator of hunger. These types of disconnects, however, are not uncommon in health psychology. Returning to the parallel example of stress, subjective ratings of stress often do not correlate with cortisol responses (e.g., Fischer, Calame, Dettling, Zeier, & Fanconi, 2000).

More puzzling is the fact that expectations did not have any effect on *psychological* factors in this study—the very same psychological factors that do change in other studies (Herman & Polivy, 2008). If one shake was labeled "indulgent" and the other "sensible," one might expect that taste ratings, self-reported hunger, and enjoyment of the two shakes would differ, but they did not in this study.

This, however, raises an interesting possibility that prior psychological studies deemed "failures" because there were no observable effects on psychological outcomes may have in fact led to important, yet unseen, physiological changes. This possibility argues for interdisciplinary studies that examine the full complement of human psychology and physiology.

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A. Janet Tomiyama, Robert Wood Johnson Foundation, Health and Society Scholars Program, University of California, San Francisco and University of California at Berkeley; and Traci Mann, Department of Psychology, University of Minnesota.

Correspondence concerning this article should be addressed to A. Janet Tomiyama, Robert Wood Johnson Foundation, Health and Society Scholars Program UCSF & UC Berkeley, 3333 California Street Suite 465, San Francisco, CA 94118. E-mail: tomiyamaj@chc.ucsf.edu

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