Physical versus psychosocial measurement of influences on obesity. Letter to the editor


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Eminent colleagues in research on energy balance and human obesity argue that research participants’ reports of their own intake and physical activity should be replaced by monitoring instruments that generate data automatically.\(^1\) This proposal has two fundamental flaws. Both deficiencies can be overcome by objective verbal data developed in psychological science.

The first flaw is that the behaviour to be observed is liable to be changed by awareness that it is being monitored. Participants in energy exchange research who think that they might be regarded as unhealthily heavy are likely to try to eat less and to exercise more. Furthermore, such efforts are fully justifiable. Indeed, it would be unethical to try to persuade a participant to maintain habits which risk the disease and distress to which obesity can contribute. Attaching instruments to measure intake or movement may produce at least as much change as asking for a diary of weighed intakes or categories of physical activity.

The problem is not “self-”report. Awareness that an independent observer is making a record could change behaviour as much or even more.
Erroneous numbers for usual daily energy intake or expenditure can also come from intentional or unintentional omissions of ingestion or insertions of movement. Yet monitoring instruments can be abused, even when fixed to the body. People so minded can relax on a couch while knocking their wrist accelerometer in a walking rhythm!

In short, all ethical observation is invalidated by reactivity. In addition, calculations of physicochemical values from records by wearable instruments and verbal reports share considerable inaccuracies. Poor sampling makes food composition databases and energy conversion factors highly approximate. Also, metabolic efficiencies and energy partitioning vary within and across individuals.

The second basic flaw is that physics and chemistry cannot capture the socially objective patterns in human ingestion and movement. Choices of foods and drinks, as well as exercising or resting, and keeping warm or cool, are all actions construed in words by a community. The identity of each habitual practice is specifiable only by a culture’s consensus on descriptions of the observed activities, as shown by biosocial thought experiments in the 1930s and more recently in human sciences. This principle has been recognised for physical activity. It has been implemented for a number of common habits of eating, drinking and exercise.

Only habits that recur at least once a week or so are likely to have substantial effects on weight. Recall of habitual occurrences can be highly accurate back over at least a week. Hence it is possible to calculate changes in frequency of each habit with sufficient accuracy in free-living individuals to measure the effects on weight. Participants should never be asked, “How often do you ...?” Answering that question does not require any actual occasion to be recalled; there are many other ways of coming up with a number. Instead, the question should be “When did you last ...?”, followed by “When was the last time before that?” The time between those two occurrences gives the exact current frequency.

In order to measure the effect of a habit on weight, that pattern of actions must vary in frequency independently of other habits’ variations. This disconfounding has been attempted for energy intake between meals (‘snacking’) but not for other intake
patterns. To show that the behaviour influenced weight, rather than the other way round, the change in frequency of a habit must precede a change in weight. Crucially, the asymptotic effect on weight of a change in frequency of a habit includes all compensation by later intake and/or expenditure.

In summary, effects of observation on behaviour imperil accuracy and validity no less for physical measures than for verbal records. In any case, human actions can only be identified by communally agreed descriptions. Fundamental evidence from life in the locality is needed in order to determine the amount of weight change caused by a persisting change in frequency of a recognised habit. Once the effectiveness of a habit has been measured, approximate measures of the activity's usual material correlates are needed in order to specify supportive changes in the environment. These could include factors in food composition, labelling and marketing, or walkways, transport, room heating and so on, as well as dosage of a medication, a surgical procedure or epigenetic background. Most importantly, such evidence on communally recognised habits that alter energy exchange translates directly into clinical or public messages for use within the same culture.


The authors declare that they have no conflict of interest in this Letter.