Mental Energy: Assessing the Mood Dimension
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INTRODUCTION
This paper discusses mental energy as a mood state. It is organized into two major sections. The first section provides background information. Theoretical and practical information about mood is presented as part of the background in order for the reader to more easily appreciate the second section, which focuses on specific measures of the mood of energy. A brief summary of three widely used measures of the mood of energy is presented: the visual analog scale, the vigor scale of the Profile of Mood States (POMS), and the vitality scale of the SF-36 Health Survey. It is concluded that despite limitations in measuring mood, such as the fact that measures rely on self-reports of subjective feelings, the accumulated scientific evidence shows that scores from well-constructed questionnaires in most instances can be interpreted validly as an indication of the mood of energy.

“Mental energy” is a term with multiple meanings. It can be used to describe specific biological processes involved in the capacity of brain neurons to do physical work, and it can legitimately be used to refer to mood or motivational and cognitive processes. This paper focuses on the measurement of mental energy as a mood state.

BACKGROUND ABOUT MOOD
The measurement of any psychological construct is an extension of a theory or a conceptualization of the construct. Therefore, it is useful to provide some background information about mood. Moods are subjective feelings. There is no valid, objective measure of any mood. Self-reported feelings are recognized as the best method for assessing mood.

Moods are feelings that are sustained for a variable time frame, but on the order of minutes to days. Moods differ from emotions, which are shorter and more intense. Emotion is akin to the rainstorm in your backyard. The weather forecast is the mood.

Moods can be conceptualized in various ways. For example, there are general (e.g., I feel bad) and specific (e.g., I feel angry) moods, and there are positive (e.g., I feel happy) and negative (e.g., I feel sad) moods. Feelings of energy can be classified as a specific, positive mood.

In conceptualizing the mood of mental energy, a decision has to be made as to whether feelings of energy are separate from feelings of fatigue (i.e., unipolar) or the opposite of fatigue (i.e., bipolar). Put another way, if you are fatigued, does that mean that by definition you cannot feel energetic? If so, the mood is conceptualized as bipolar. Alternatively, the mood of energy can be conceptualized as a single continuum from no energy to as much energy as possible. In this unipolar scheme, fatigue would be a separate mood conceptualized in the same fashion as energy. A unipolar conceptualization of the mood of energy has a conceptual advantage: mixed feelings of energy and fatigue can be considered.

From a unipolar perspective, the moods of energy and fatigue can be defined in the following way. The mood of energy refers to feelings of having the capacity to complete mental or physical activities. The mood of fatigue refers to having feelings of reduced capacity to complete mental and physical activities.

The intensity and frequency of moods are the most common dimensions measured. Reports of how one is feeling at the moment are the most accurate measures of intensity. Intensity can range from feeling zero energy to the highest-intensity feelings possible. It is not ethical to anchor the highest intensity possible by inducing the experience, so careful word choice and/or instructions are used to elicit accurate reports of feelings. The scaling of intensity varies, and represents a compromise of two inadequate extremes: scales beyond what can be perceived (e.g., we can’t distinguish between 50 and 51 on a scale of zero to one million) and scales that are too crude to be useful (e.g., the absence or presence of a mood). The most common scales have from 3 to 100 categories.

Measures of frequency usually are recollections of mood over some time duration (e.g., how frequently one felt severely depressed over a weekend). They have the
advantage of quantifying a long time period but the disadvantage of error associated with poor recall of the mood. The reciprocal is true for the intensity measures. Intensity measures have the advantage of accuracy when one is reporting “right now” feelings, but the logistics of many repeated measures and the added burden on study participants may produce errors. One technique for the repeated assessment of mood that has become popular since it was introduced in the 1970s is called the experience sampling method. A common form of this method involves participants being alerted at random times during the day to report their mood. For example, participants can be alerted via a pager or cell phone to report how they are feeling. Questions are presented and answers recorded using a hand-held computer. This method has the advantage of ecological validity (i.e., measures are made in the real world not in a laboratory), and it also avoids reliance on memory. It has the disadvantages of potentially missing brief or uncommon events, and the potential for sample bias due to the burden on the participants (i.e., not all are able or willing to respond immediately to a page presented to them at random times during their day). A recently developed hybrid approach, the day reconstruction method, balances the high burden of experience sampling against the desire to minimize recall errors. The method, which involves making recollections from a prior day, appears promising, and initial validity-related data with feelings of fatigue have been reported.

MEASURES OF THE MOOD OF ENERGY

A large number of questionnaires have been developed to measure fatigue, but many of these have serious limitations. Some questionnaires consist of only a single item. This is a limitation because our language allows for a consideration of several “shades” of meaning in concepts and words. So vigor may be slightly different than energy, which might be slightly different than pep. Other questionnaires combine too many items. This is a limitation because some of the questionnaire items are not specific to the mood of energy. Other questionnaires are simply poorly constructed and fail to consider basic psychometrics in their creation and development.

Three widely used methods have strong support as a measure of the mood of mental energy: visual analog scales, the vitality scale of the SF-36 Health Survey, and the vigor scale of POMS.

Visual Analog Scales

Visual analog scales are simple and valid. Examples of evidence supporting validity include findings showing that visual analog scale scores of low energy characterize patients diagnosed with a fatigue-related medical problem such heart failure, cancer, or chronic fatigue syndrome. Also, effective treatment for fatigue-related medical conditions, for example, the administration of erythropoietin for the treatment of anemia, increases feelings of energy when this mood is measured by visual analog scale scores.

The intensity of mood is assessed by line length. A 10-cm horizontal line printed on a page or shown on a computer screen is often used. The participant makes a mark on the line in which the distance from the left edge represents the intensity of feelings. There is evidence that better data are obtained when appropriate verbal anchors are placed on each end of the line. For example, “no energy” on one end and “strongest feelings of energy imaginable” on the other end.

Like all measures, visual analog scales have advantages and disadvantages. Disadvantages include lower reliability compared with other scales and difficulty of use by certain people, such as those unable to see the scale or make a reliable mark due to a visual or movement disorder. The primary advantages of visual analog scales are that they are easy to use, brief, and potentially have greater sensitivity to change. For example, a 10-cm line can be scored in millimeters as 0 to 100. Thus, a real but small magnitude change in feelings of energy (e.g., 40 to 48 mm) associated with the consumption of a food, beverage, or drug may be detected with a visual analog scale but missed with a scale of fewer categories. For example, consider a scale with five questions, each with four possible categories of responses (0 = no energy, 1 = a little energy, 2 = a moderate amount of energy, and 3 = high energy). A real, but small, change in feelings of energy may be inadequate for an individual to change their rating on each of the five questions from moderate to high.

Profile of Mood States

The vigor scale of POMS appears to be the most widely used and accepted measure of the mood of energy. A prior review concluded that a large body of correlational and experimental evidence strongly supports the validity of the scores from the vigor scale of the 65-item POMS as a measure of the mood of energy. Much of the experimental evidence supporting that POMS vigor scores are a valid measure of the mood of energy stems from nutrition-related research. For example, the ingestion of substances such as caffeine that would be predicted to increase feelings of energy repeatedly have been found to increase POMS vigor scores. Similarly, substances expected to reduce feelings of energy, such as tryptophan, indeed have been shown to lower POMS vigor scores.
However, that review also suggested that the vigor scale of the 30-item version of the POMS may be better because it eliminates three items that may tap concepts separate from energy: “alert,” “carefree,” and “cheerful.” The 30-item POMS has five adjectives—“energetic,” “full of pep,” “vigorous,” “active,” and “lively”—to which people indicate one of five levels of intensity (“not at all,” “a little,” “moderately,” “quite a bit,” and “extremely”).

The POMS also contains a measure of the mood of fatigue. Scores on this measure generally respond in the opposite way to vigor scores in response to experimental manipulations such as the consumption of caffeine or melatonin. There also is strong evidence that scores from the fatigue scale of the POMS can be interpreted as valid measures of the mood of fatigue.

The POMS vigor and fatigue scales and visual analog scales of energy and fatigue are recommended as the best available measures of the mood of energy and fatigue in investigations that are short in duration (e.g., a few hours). Studies determining whether one of these instruments has advantages or limitations compared with others in nutrition-related investigations are needed.

**Vitality Scale of SF-36**

The vitality scale of the SF-36 Health Survey was originally conceptualized as a measure of well-being. However, the content of the questions reveals that it is more precisely a measure of energy and fatigue. The items query the frequency (“none at all” to “all of the time”) during the past month that one has felt “full of pep,” “full of energy,” “tired,” or “worn out.” The raw scores are converted to a 0 to 100 scale, where 100 represents someone who always feels lots of energy and never feels any fatigue. A large body of evidence supports the interpretation of vitality scale scores as measures of the bipolar mood of energy-fatigue. The focus on feeling frequency over a 1-month period lends the scale toward studies of a month or longer. A typical exercise regime on the mood of energy-fatigue.

Because of the widespread use of the SF-36, validity evidence, and impressive normative data, it is recommended for studies of chronic interventions. Visual analog scales and the POMS scales can also be recommended for this type of study. Based on their scaling, the visual analog and POMS scales may have greater sensitivity to change than the vitality scale. However, there does not appear to be any empirical evaluation comparing the sensitivity to change, or other psychometric strengths and weaknesses, of these scales for use in chronic intervention studies.

**SUMMARY**

Conceptualizing mental energy as a mood is important, because these feelings are important to people and can influence behavior in the real world. If a person feels a lack of energy, for example, he or she is more likely to avoid physical or mental work if it is possible to do so. Alternatively, this person may seek to improve feelings of energy by eating, drinking, taking dietary supplements or drugs, sleeping, or engaging in other behaviors. Thus, the measurement of the mood of energy has importance in numerous ways, including public health, work productivity, and ultimately economic growth and productivity.

Mood data have limitations, for example, self-awareness and literacy are necessary and faking is possible. The problem of faking is most salient in situations in which there is a strong motivation to fake, such as when psychological testing is used as part of an employment application. Despite these limitations, overwhelming evidence supports the validity for certain measures of the mood of energy such as the POMS vigor scale. This is not to say that mood measures are error free in all situations. Despite some error, however, validity evidence for mood measures is published in the scientific literature weekly. Future research aimed at determining the biological bases for the mood of energy, and its relationships to overlapping phenomena such as cognitive fatigue, should yield results that ultimately help us to understand how to optimize our feelings of energy.

**REFERENCES**


