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Letter-to-the-Editor: Improving the language specificity of stress in psychological and population health science

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<https://www.stressmeasurement.org/>.

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Conflict of Interest

The authors declare that they have no conflict of interest.

A long standing and large of the struggles that has occurred in for the field of stress science has been the inconsistent use of the term ‘stress.’ Researchers have used the word to mean many things – from biomarkers captured in blood and saliva to traumatic childhood experiences to giving a speech in front of research assistants. This loose use of the term has meant that our ability to build a cumulative science has been considerably slowed (1), with some even suggesting we stop using the word in scientific research (2). This suggestion is not new, as in the 1980 presidential address for the American Psychosomatic Society, Dr. Robert Ader, describes the use of ‘stress’ as harmful to science in that it “may actually impede conceptual and empirical advances by its implicit assumption of an equivalence of stimuli” (3). Other scientists contend, however, that the term itself is still useful, the meaning of measurement of it just needs to be clarified (4).

The lack of precise language has also meant that stress science has been communicated incorrectly to the public through media portrayal of the research findings. For example, a paper published in the *Lancet* (5) led to the following media headline in the *Daily Mail*: “*Cheer up! Being miserable won't kill you after all: Stress and unhappiness have NO direct impact on mortality, study finds*” (6). Given the decades of human and animal research demonstrating that chronic stress is detrimental to life expectancy, this is an incorrect representation of the science, with potential harmful effects for the public. This paper, using data from the UK Million Women Study, used a single item: “How often do you feel stressed?” The wording of the item did not include a timeframe, so it is unclear whether the respondent was answering how often they felt stressed today, this month, or across their entire lifetime. The assumption made in the item is also that “feeling stressed” is a universal emotional experience as there are no other descriptive words to provide detail or context for the state, though emotion researchers do not consider stress

a specific or universal emotion. The item also fails to capture 1) whether the individual was exposed to a stressor (objectively stressful event), 2) assessment of the person's response to the stressor, and 3) what resources they have had to cope with the stress. These are important omissions given the decades of research linking stress exposure and stress responses to health trajectories, and the numerous moderators of those relationships. The response scale for the item further limited the utility of this single item as there were only four options - most of the time, usually, sometimes, or rarely/never – limiting variability in the scale. Thus far, research does not support that a single item can capture all exposures and responses that fall under the broad category of stress. However, this is an empirical question that should be thoroughly explored given that researchers have identified 1-item measures of other psychosocial factors that are meaningful predictors of negative health outcomes such as subjective social standing (7). Finally, an important point to highlight about the Liu et al. (2016) study is that the stress item was indeed associated with increased risk of mortality before the authors covaried out the key health behavior pathways, such as smoking, exercise, and sleep duration, which are known lifestyle mechanisms linking stress to worse health. These results were then distorted by the media to indicate that stress was not associated with mortality risk. This is presented as a single example of how overly simplistic measures of the complex human experience of stress muddies stress-science and the implications of body of research.

In the September issue of *Psychosomatic Medicine*, Whittaker and colleagues provide a review of the state of the research on acute stress reactivity, including a detailed overview of the various ways reactivity can be conceptualized and calculated, and remaining questions for the field (8). This paper represents a positive contribution to the field of stress science in a particular way that we would like to highlight – its use of specifying with great precision, the *type* of stress

they mean to talk about. With this paper as an exemplar, we are taking this opportunity as the leadership team of the Stress Measurement Network to alert readers to the general problem in the field of stress science and present a possible solution to how we can solve the “stress” problem.

As the Stress Measurement Network, funded by the National Institute on Aging, we have present here a recommendation for how researchers can help to solve this problem address the problematic use of the term stress in their research. Based on nearly a dozen workshops and

meetings of psychologists and other behavioral scientists who are experts in the science of psychosocial stress from 2012 - 2021, we developed specific language to describe, with granularity, the various dimensions and constructs commonly captured by researchers measuring psychological stress in humans. These dimensions are outlined in a ‘Stress Typology’ that is published as an appendix in Epel et al. (2018), with consensus from Network members. The basic dimensions are outlined in Text Box 1; we recommend that specific attributes of stress be described in methods sections of future papers.

In the example provided at the beginning of this letter, a more appropriate label for the construct that single item is measuring would be along the lines of: “single-item of current perceived stress”. The word ‘current’ in the description is the most important given that the item is not capturing lifetime exposure to stressors, but instead a current moment assessment, which in singular form, is a measure that is unlikely to be significantly associated with critical health outcomes like premature mortality. Which indeed, is what Liu et al. (2016) found. Additionally, it should be reported that the validity of this single item is not known; the most commonly used and well validated measure of current perceived stress is 10 items (9) and that was not reported on in this study. The authors did not describe the origin source of the single stress item or present a description of its validity.

As members of the Stress Measurement Network we are imploring health scientists to increase their attention to methodology for measuring stress in humans, and the language used to describe their methods. An example of how an old paper abstract (from co-author ESE) could be improved in terms of language specificity based on our recommendations is presented in Text Box 2. More specific details on how to improve stress measurement and descriptions of measures can be found in papers by our group and others (4,10–12), and at <https://www.stressmeasurement.org/>. We suggest that editors and reviewers play an active role by encouraging authors to use more precise language, and by pointing authors to this resource as a place to begin. The Stress Measurement Network welcomes feedback from the community of experts to aid in refining stress measurement to thoughtfully move the field forward.

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Table 1: Specific attributes of stress measurement that authors should select from when describing their measurement approach in methods sections.

Timescale	Acute stressor Daily event/hassle Life events Chronic stressor
Life period	In utero Childhood Adulthood Lifespan/ cumulative
Assessment window	Measurement timeframe (e.g. diary rating, retrospective) Proximity of assessment to exposure
Stressor attributes	Duration Severity Controllability Life domain Target of stressor Potential of stressor to elicit potentially harmful emotional responses
Stress responses	Global subjective stress Subjective stress within a life domain Subjective and behavioral responses (e.g. emotional responses, appraisals)
<u>Cultural contexts</u>	<u>Information pertaining to how specific survey items may be understood differently depending on geography, nationality, religion, or other cultural</u>

contexts.

Table 2.

The edited abstract below presents an example of how to edit an abstract to increase language specificity. This abstract was previously published and we are using it with permission (13). Our suggested improvements are presented in bold font.

~~Old abstract selected with permission from Epel et al. (2004). Suggested improvements are presented in bold font in order improve language specificity.~~

Numerous studies demonstrate links between **exposure to chronically stressful life contexts** and indices of poor health, including risk factors for cardiovascular disease and poorer immune function. Nevertheless, the exact mechanisms of how **chronic stressors** gets “under the skin” remain elusive. We investigated the hypothesis that **chronic stress exposure** impacts health by modulating the rate of cellular aging. Here we provide evidence that psychological stress— both ~~perceived stress~~ **high levels of self-reported general subjective stress** and **the number of years living with an objective stressor (i.e. caregiving for a child with an autism spectrum disorder)** ~~chronicity of stress~~—is significantly associated with higher oxidative stress, lower telomerase activity, and shorter telomere length, which are known determinants of cell senescence and longevity, in peripheral blood mononuclear cells from healthy premenopausal women. Women with the highest levels of perceived stress have telomeres shorter on average by the equivalent of at least one decade of additional aging compared to ~~low stress~~ **women who reported low levels of global subjective stress**. These findings have implications for understanding how, at the cellular level, **subjective stress** and **chronic stressor exposure** may promote earlier onset of age-related diseases.

