Reviewer's report

Title: An Explorative study of metabolic responses to mental stress and yoga practices in yoga practitioners, non-yoga practitioners and people with metabolic response

Version: 4 Date: 18 June 2014

Reviewer: Marshall Hagins

Reviewer's report:

Overall the authors do an excellent job in their introductory remarks describing previous work and establishing that excessive stress has negative health effects and that yoga has been shown to relieve psychological and physiological markers of stress. The authors state that the unique question being addressed by this work is whether or not experienced yoga practitioners have a different metabolic cost to a psychological stressor (Math test) compared to non-yoga practitioners and those with metabolic syndrome. In addition, in this observational, repeated measures design, the authors have all participants complete a series of yoga practices—all the while measuring metabolic costs via oxygen consumption.

Major Compulsory Revisions:

1. The limitations of this design are somewhat, but not fully, addressed by the authors. First, the authors should more explicitly point out that this design is observational and consequently it remains unclear if the differential effects found for yoga practitioners are due to their history of yoga practice or some other factors.

2. Second, the authors state: “The YP group was all well versed with the yoga practices and some were familiar with the laboratory testing, whereas the NY and MS groups were not well versed with the yoga techniques or the laboratory.” The authors ONLY suggest that these differences may have prohibited the non-yoga participants from performing identical tasks. This is absolutely true—in fact—very likely and a genuine limitation of the study in that no controls were established to determine equivalency across groups for the tasks. (e.g., how many achieved the breathing rates for the full period). The authors even state that the non-yoga participants who could not breathe appropriately were allowed to breath at a different rate. It is difficult to compare oxygen consumption across groups if the groups are doing different tasks. But perhaps the biggest issue here is that the Yoga group was performing a practiced task in a well-known environment. And although the authors state this may have influenced the ability to perform the task they do NOT state how this may have altered metabolic costs. When the authors state their awareness of these issues generally and that because of them they were careful to not “overly-analyze” the yogic breathing portions—I do not think that is what occurred. What analyses did they choose NOT to perform? I think a much more compelling paper would be one in which ONLY the novel procedure
for all groups is the one being analyzed—the Math test. I suggest dropping the analysis of the other tasks as there is no way to determine the influence of practice on metabolic costs for those activities. If the authors do not wish to do this then I would strongly recommend that the limitations of the analyses of these other tasks are made clearly and compellingly.

3. The authors state that their study demonstrated that yoga practitioners have greater metabolic variability than non-yoga practitioners. I am not sure that the statistics and analysis demonstrate that. They HAVE shown that yoga practitioners breath differently compared to non-yoga practitioners. However, an analysis of increased variability in breath control would require different statistical approaches. I think this is a worthwhile pursuit and encourage the authors to consider comparing variability across groups (rather than comparing mean values at select time periods).

4. The authors suggest that this is the first study to measure oxygen consumption in metabolic syndrome patients. I don’t believe that is fully accurate—see below for examples.

Effects of exercise program on physiological functions in postmenopausal women with metabolic syndrome.
Heli V1, Ihab H2, Kun H3, Brad M4, Jessica W5, Vera N4.

Ann Hum Biol. 2013 Nov 4. [Epub ahead of print]
Cardiorespiratory fitness and incident metabolic syndrome in middle-aged Korean men.
Jae SY1, Heffernan KS, Kim DK, Park WH, Choi YH, Kim SH.

5. Given the limitations above I believe the authors strongly overstate their case when they conclude that these findings suggest that yoga may reduce risk of metabolic syndrome, that yoga practitioners have greater metabolic variability, and that yoga practitioners have greater ability to recover to baseline levels (I saw no analysis regarding this last suggestion).

Minor Essential Revisions
Please state how long the yoga and non-yoga groups had been on their alcohol and diet regimens prior to the study.

I would ask that the authors describe whether the respective increased body mass of the patients with metabolic syndrome has an expected and known effect on oxygen consumption. I realize that the results are normalized per body mass—however—I wonder if the different composition of body mass in these patients has some effect.

Although the authors may be technically correct when they state that this is the first study to examine yoga using indirect calorimetry with “…a ventilatory hood.” It would be more accurate to state that other studies have examined yoga using similar indirect calorimetry methods (Hagins 2007 BMC). This is particularly true
when the implication is that this has value precisely because the participants do not have mouthpieces—rather than some unique value relative to the hood.

• Table 4. Please clarify that the asterisks are “significance” if that is the case. And if it is…it is unclear how the p values in table 4 are Bonferroni adjusted and significant as this many comparisons would greatly reduce the alpha levels below what some of these are suggesting.

**Level of interest:** An article whose findings are important to those with closely related research interests

**Quality of written English:** Acceptable

**Statistical review:** Yes, but I do not feel adequately qualified to assess the statistics.

**Declaration of competing interests:**

I have no competing interests.