Reviewer’s report

Title: Sustainable solutions to mitigate occupational heat strain – an umbrella review of physiological effects and global health perspectives.

Version: 0 Date: 11 Mar 2020

Reviewer: Brenda Jacklitsch

Reviewer’s report:

This is an important article, that brings to new light what actually works well when trying to protect workers from heat stress and strain in hot occupational environments.

The biggest limitation of the article (which is described by the authors) - is the lack of published research on interventions for occupational settings. Therefore, the majority of studies included in this umbrella review were related to athletics and not work. Regardless, with this limitation in mind, the article does a thorough job at describing how the authors made decisions on what to include and how papers were evaluated.

A few minor edits/comments for author consideration:

P. 4, line 79: use "workers" instead of "working people"

P. 4, line 81: Can you provide a short definition or an example by what you mean, "primary as well as secondary sector economies"?

P. 4, line 88: ...with all effects further aggravated "by" dehydration

P. 17, line 385: Improving hydration "had" a consistent moderate effects...

P. 29, line 662: NIOSH (at least NIOSH in the US) does not recommend starting the work day 3 hours earlier. NIOSH does make recommendations to adjust the heaviest tasks for the coolest parts of the day. For more information on NIOSH recommendations: https://www.cdc.gov/niosh/docs/2016-106/

P. 31, line 706: NIOSH actually recommends that during prolonged sweating lasting several hours, workers should drink sports drinks containing balanced electrolytes.

P. 35, line 793: ...or else "wear" PPE that is sufficiently loose... (Additionally, this could be construed as you encouraging workers to wear PPE incorrectly, depending on what it is. Most PPE needs to be well-fitted to give the proper protection).

General comments:

(1) It would be interesting to read in the discussion, the authors thoughts regarding their "hierarchy of effectiveness" results compared to the Hierarchy of Controls which are commonly cited by OSH professionals and industrial hygienists when making recommendations at worksites. It seems the results from this paper could be categorized as engineering, administrative, and PPE in the hierarchy of controls, BUT what is determined to be effective might not line up directly with the arrangement of the hierarchy of controls (e.g., PPE is usually a last resort in the hierarchy of controls, but this paper shows cooling garments [ppe] as more effective than personal
interventions [administrative]). I believe the OSH community would find this discussion of interest, if included.

(2) P. 21, line 468: It is a shame that manufacturing, agriculture, and construction were not well-represented, as these are some of the biggest sectors and tend to have great amount of HRI cases and deaths. Understanding what "real world interventions" are effective in these populations needs to be a research priority.

(3) P. 22, line 504: In the US, the employers and not the workers would be responsible for purchasing PPE like cooling vests. Even so, the majority of these businesses that conduct outdoor work ARE small businesses. And many small business employers will find some of these PPE options to be too expensive.

(4) Pp. 31-32, lines 710-721: I am not sure that you can equate athletes to workers when it comes to these sort of changes in diet. Many outdoor workers in the US at least, are not necessarily in good overall physical condition or health, so tweaking their diet in some of these ways may not heed the same results.

(5) P. 32, line 725: As these are not occupational examples, I'm not sure how feasible it is to cool BEFORE the work day? And as the authors noted, this may not even be applicable to an 8 hour work day. Also, similar thoughts to above about workers not necessarily being physically fit or healthy like these athletes in the examples.

(6) The authors might also find this paper of interest for some additional background on various heat guidelines in the US (Activity modification in heat: critical assessment of guidelines across athletic, occupational, and military settings in the USA): https://link.springer.com/article/10.1007%2Fs00484-019-01673-6

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