As inclined treadmill running becomes increasingly popular among trained runners, the ability to maintain a metabolically iso-efficient velocity has gained importance. Treadmill velocity (TMV) for a specific incline and intensity can be determined by solving the ACSM running equation for speed as opposed to relative VO₂, but this may underestimate an appropriate correction factor to improve iso-efficient TMV identification during inclined running in trained runners. Methods: 11 collegiate distance runners (7 male, 4 female; 63.2±9.5 kg; 174.6±7.5 cm; 64.6±6.5 ml, kg⁻¹.min⁻¹) completed 3 x 4 min treadmill runs at 0%, 4%, and 8%, and 4% incline, with a 4 min recovery period between runs.Expired gases were collected during the final minute of each run to determine relative VO₂. Actual TMV at 0% was inserted into the ACSM running equation to determine predicted VO₂ for the 0% run (VO₂ calculation: See Equation 3). Then, this predicted VO₂ was divided by the measured VO₂ at 0% grade to develop a correction factor:

\[
\text{Correction Factor} = \frac{\text{Actual VO}_2}{\text{Predicted VO}_2}
\]

Our goal was to maintain VO₂ during each condition. So, the measured VO₂ for 0% was inserted into the ACSM running equation [1] to determine the predicted speed at 4% and 8% grades:

\[
\text{Predicted Speed} = \left(\frac{\text{Predicted VO}_2}{\text{Actual VO}_2}\right) \times \text{Predicted Speed at 0%}
\]

This predicted speed was multiplied by the correction factor to determine the corrected speed subjects ran at for 4% and 8% inclines. Differences within 0, 4, and 8% values were assessed using a paired t-test, while a one-way ANOVA compared VO₂ between grades (p<0.05).

CONCLUSION

The ACSM running equation [1] may underestimate treadmill speed when attempting to maintain metabolic iso-efficiency during incline running for trained runners. These data suggest that application of a correction factor to the TMV derived from the ACSM equation may provide a closer approximation of the speed necessary to maintain iso-efficiency during inclined running.

Investigators using the ACSM equation to determine an isoefficiency speed might develop a subject-specific correction factor by dividing the predicted VO₂ by the measured VO₂ during the baseline condition.

REFERENCES