

Abstract

Purpose: To determine if physical exercise can change an individual's phoria.

Methods: Subjects walked on a treadmill for one mile. Phorias and pulse were measured pre exercise, post exercise, and twenty minutes post exercise.

Results: All phorias shifted towards an esophoric direction post exercise. Distance phorias returned to baseline twenty minutes post sitting and near phorias continued to increase in an esophoric deviation.

Conclusion: Physical exercise does change an individual's phoria immediately after exercise towards an esophoria deviation.

Introduction

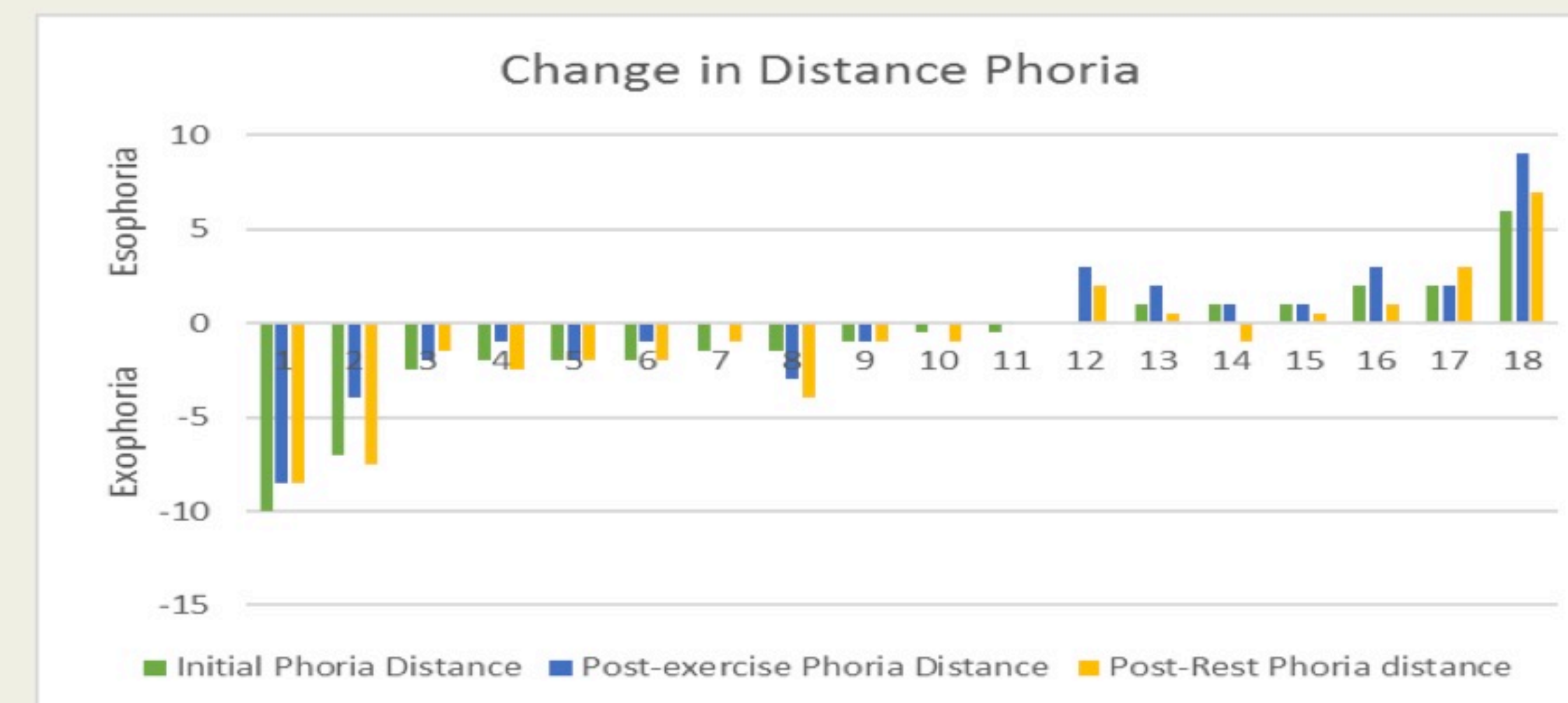
Binocular vision problems, which can be due to abnormal phorias, cause a variety of visual symptoms including diplopia, decreased depth perception, and asthenopia. We speculate that physical exercise may have an impact on an individual's phoria due to the general benefit of exercise on the human body and an investigator's personal experience. Currently, there are no studies to link exercise with a change in a phoria. The goal of our research is to determine if physical exercise can change an individual's phoria.

Methods

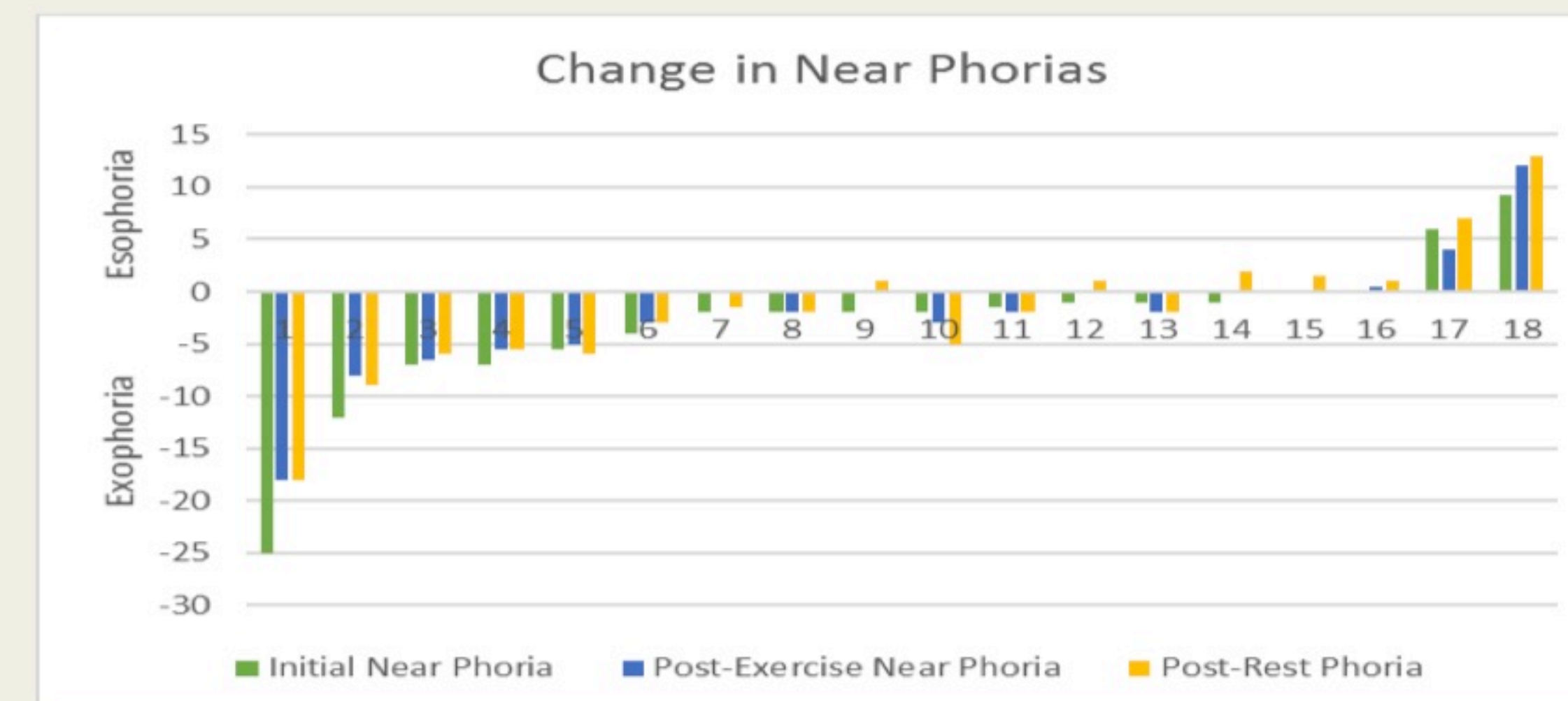
Eighteen subjects walked on a treadmill for one mile at a standard walking pace of 3.5 miles per hour at a 1% incline. The subject's phorias were measured with the modified Thorington test at distance and near, as well as pulse. The measurements were taken before, immediately after, and twenty minutes post exercise. Phorias measured prior to exercise and post exercise were recorded and analyzed using the two-tailed paired t-test. Phorias measured prior to exercise and twenty minutes post exercise were recorded and analyzed using a separate two-tailed paired t-test.

Results

The readings immediately following exercise showed a significant shift in distance phorias toward an esophoria deviation. The readings taken twenty minutes post exercise showed a nonsignificant shift in distance phorias due to the mean value returned approximately to the baseline phoria. The readings immediately following exercise showed a significant shift in near phorias toward an esophoria deviation and then continued to shift to a more esophoria deviation twenty minutes post exercise. The average pulse increased from baseline after exercise and then returned to the baseline twenty minutes post-exercise, indicating that the participants did increase their heart rate.



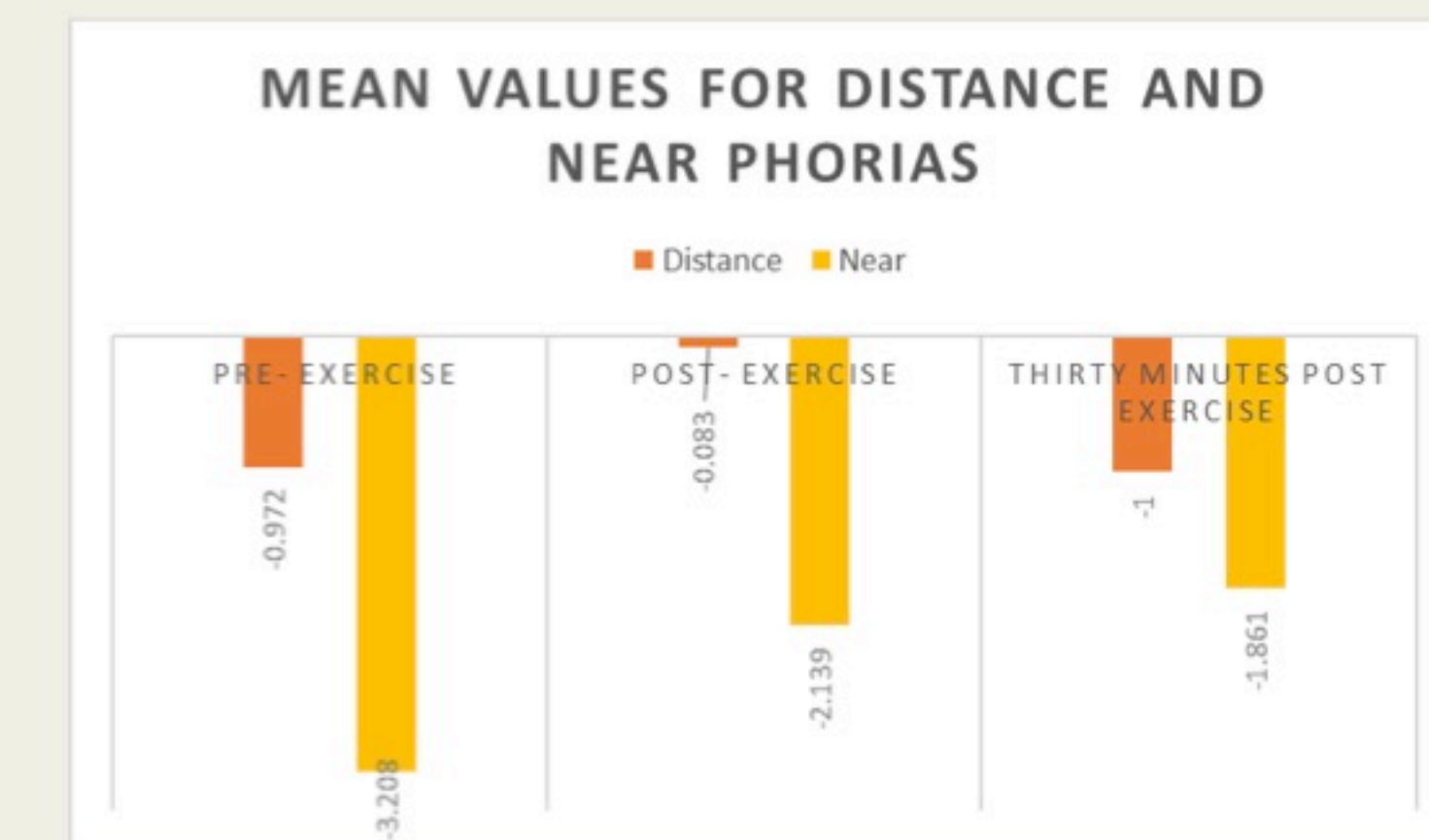
The change in initial phorias compared with post-exercise phorias and post-rest phorias at distance.



The change in initial phorias compared with post-exercise phorias and post-rest phorias near

Discussion

Physical exercise does change an individual's phoria immediately after exercise towards an esophoria deviation. After sitting for twenty minutes an individual's distance phoria will likely shift back towards their original baseline phoria; however, at near, an individual's phoria will continue towards an esophoria deviation. Individuals with convergence insufficiency may benefit from exercise prior to near work or before vision therapy activities at near. Due to our small sample size, further research using a larger sample size is recommended.



The means from the two-tailed t-test

Acknowledgments

The authors extend their appreciation to Northeastern Oklahoma State University Fitness Center for allowing us to use their facility. Also to Dr. Joseph Shetler for providing us with the necessary equipment needed. Last, to Dr. Earlena McKee for assistance with analyzing our results.

References

- Teague K, Clay S, Nelson T, Proctor A. The effect of distance running on intraocular pressure in high school athletes. [Optometry project]. Tahlequah, OK: Northeastern State University; 2009.
- Goss DA. Ocular Accommodation, Convergence and Fixation Disparity Clinical Testing, Theory and Analysis. Bloomington: Optometric Extension Program Foundation Press; 2009.
- Barrett BT. Assessment of binocular vision and accommodation. In: Elliott, DB, ed. Clinical Procedures in Primary Eye Care. China: Elsevier Limited; 2014:147-208.
- Cooper SB, Bandelow S, Nute ML, Morris JG, Nevill ME. The effects of a mid-morning bout of exercise on adolescents' cognitive function. Ment Health Phys Act 2012;5:183-90.
- Sanker N, Prabhu A, Ray A. A comparison of near-dissociated heterophoria tests in free space. Clin Exp Optom 2012;95:638-42.