

Plyometric training



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In this essay, we shall critique the article “ Short Term Plyometric Training Improves Running Economy in Highly Trained Middle and Long Distance Runners” by Saunders et al. The article details a research carried out by the team on highly trained runners to see whether Plyometric (PLY) training helps increase the running economy (RE) of this elite group. The study has taken care of all the basic research protocols. We shall now analyze the research in details. Introduction: The introduction to the article clarifies the need for carrying out this research.

In the last few years there have been a number of studies on the benefits of PLY training. The writers explain in details the benefits of PLY training. They explain that PLY is an explosive-strength training which invokes specific neural adaptations such as increased activation of the motor units with less muscle hypertrophy. Another adaptation resulting from PLY is that it increases the stiffness of muscle-tendon system. The writers are of the opinion that these adaptations resulting from PLY could potentially improve RE. Having thus explained the potential benefits of PLY, the writers go on discuss earlier research in this field.

They point out that the earlier studies on the benefits of PLY have shown that PLY do improve the RE performance in moderately trained runners. However, according to them, it may be easier to get such positive results in moderately trained runners. They feel that the highly-trained runners are already at the peak of their performance and RE levels have attained a plateau. According to them there is no study to test whether PLY benefits highly trained runners. So they propose to carry out this study in order to determine if PLY can also benefit highly trained runners.

The introduction here is very clear and concise. The writers have explained in details all the benefits of PLY without giving unnecessary information. The theoretical background for the research is also explained concisely. They have also made very clear the purpose of the study and the existing void that this study will fill. Although there are many studies that have tested the benefits of PLY training, by focusing on highly trained runners they have given a different dimension to the study and a perfect rationale for carrying out a new research in the field.

On the whole, the introduction to the paper is fairly adequate and covers all the main points. It also sets the tone for the rest of article so that we know what the paper is all about and what to expect. Methods: The methods section discusses the “ experimental approach”, the “ subjects” and the “ procedures”. The experimental approach section explains in brief the procedure followed during the study. The “ subjects” section gives the profile of the runners who had volunteered for the study. In the “ procedures” section, the authors talk about “ Plyometric training”, “ treadmill testing”, “ blood handling” and “ Force Plate measure”.

The week-by-week details of the PLY training helps understand the exact way the runners were trained. With these details, anyone can replicate the study. The various methods used to determine the benefits of PLY go beyond just testing for RE and thus provide a comprehensive insight into the benefits of PLY for highly trained runners. An earlier study by Potteiger et al (1999) had used similar testing techniques to check the muscle power output. However, Potteiger et al had also studied muscle samples to see any increase in the muscles after the training.

The writers of the present study have restricted themselves to measuring submaximal VO₂, blood samples and vertical jump tests. No rationale is given for not testing the muscle samples. Such a test could have helped us get a better insight into the benefits of PLY for highly trained runners.

Despite this one oversight, the overall testing procedures are quite comprehensive and test all the major factors influencing a runner's performance. The one area where the study could have done better is in the sample size. Although fifteen is a good sample size, a few more subjects would have given an even better picture.

However, considering that these were highly-trained runners who competed at national and international level, it is possible that getting more volunteers for a period of 9 weeks was not practical. Results: The authors used a minimum difference of 0.05 between pretest and posttests measurements for the difference to be considered significant. This minimum difference is small enough to record even small changes following training and yet not so small that it may record natural day-to-day variations. In the Running Economy test, no significant difference was found for lower running speeds.

However, at higher running speed of 18km/h, after 9 weeks VO₂ had decreased significantly. When compared to the control group, this decrease was even more significant. In cardiorespiratory and physiological measures test, no significant difference was found between the control group and the PLY group. The Force Plate Measures showed some evidence of increased power during 5-jump Plyometric test. All major measurements were slightly higher for the PLY group when compared to the control group. The results were given in complete details with the help of tables and charts.

The explanation for the results was also very clear, although a few more details would have made it easier to understand the tables. Overall, the results section is quite clear and shows all the details of the test for anyone to check them out. Discussion and Conclusion: Based on these results, it was found that PLY improved RE at higher running speed by 4.1% in highly trained runners after 9 weeks of training. The results were not so significant after 5 weeks of training. An earlier study by Turner, Owings & Schwane (2003) had shown that in medium trained runners, RE showed significant improvement after just 6 weeks of training.

Hence, the authors' assumption that it would be difficult to see benefits in highly trained runners has been proved to be right. The improved RE was also accompanied by higher average power production in a 5-jump Plyometric test lower time to maximal dynamic strength and strength quality assessment test. The improved RE was in absence of any cardio-respiratory changes. They suggest that better performance and improved RE of these highly trained athletes is due to improved muscular power related to improved muscle power development and better use of stored elastic energy following PLY.

The authors go on to discuss the results of their tests in details, discussing the limitations of their study. They are of the opinion that the intensity and volume of PLY was insufficient to obtain significant results. However, the slight improvements seen after 9 weeks of training could make important difference to highly trained athlete, resulting in worthwhile performance enhancements. Although 9 weeks is a substantial amount of time, in highly

trained athletes, it may have been worthwhile to carry out the study for even longer period of time.

It is natural for athletes to follow a training regime for months if not years. Nine weeks is too short a time to study the effects of new training methods on the well adapted bodies of highly trained runners. Better results could have been obtained by carrying out the study for a longer period. The authors felt that another limitation of the present study was that the amount of PLY training given was limited to unfamiliarity of athletes with this training method in order to avoid injury. They also concede that the tests to measure strength and power were not sensitive enough.

The authors also accepted the possibility that improved RE was the result of a training induced alteration in running mechanism which was evident only at the higher, normal speed of these highly trained runners. Based on their research results, the authors conclude that Plyometric training improved RE in elite runners at their natural speed of training and competition. The absence of any change in cardio-respiratory variable suggests that these improvements are the result of enhanced muscular power and elastic energy return or due to better co-ordination and timing of ground force application.

This conclusion is well supported by the test results as given in the tables.

Although a well researched study, the paper leaves a few questions unanswered. As discussed by the authors, a more rigorous PLY training could have even better effects on the performance of these elite runners.

However, the current study was only able to test the results of moderate PLY

training. The current study as well as previous studies has shown a significant increase in RE for long distance runners.

However, there is also a need to study if the PLY training benefits short distance runners as well. A study by Markovic et al (2007) suggests that another method of training, short-term sprint training, may produce even greater training effects in muscle function and athletic training. The positive effects of Plyometric training are well documented and the current study suggests that it may have positive effects even for elite runners. However, more recent studies show that there may be even better training methods. The current study is complete and comprehensive in all senses.

It tests the benefits of Plyometric training on elite runners and shows that the runners may actually benefit from such training. Although the study has some limitations, it does a good job of proving its research objectives within these limitations. The data and results are well documented and can be easily verified in test conditions. The authors have taken care to give detailed explanation of the research methodology to enable replication of the study. Overall, it is a well carried out research and a well presented paper which follows all the rules of reporting a research study.