

The effect of plyometric training on athletic performance essay sample



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The study attempted to establish two causal connections. First, that plyometric training directly increases muscle size, and that bigger muscle size results in greater muscle power. Greater muscle power is an important indicator of performance in athletic events. The participants of the study consisted of nineteen males who had not undergone previous plyometric training. In one treatment group participants underwent plyometric training. In the second there was a combination of plyometric training and aerobic exercise. Muscle fibers were collected and measured before and after the training period. The results showed improved muscle power output, measured through events like vertical jumping. However, aerobic exercise didn't affect this change. Furthermore, no significant difference in muscle fiber size increase was observed between treatments. Thus, there is a causal relation between plyometric training and muscle power. However, the role that increased muscle fiber plays in such a relationship has not been clearly established.

The research could have been significantly improved had the researchers controlled more attentively for extraneous variables and focused on the two causal relationships attempted to be established. For example, the sample size was rather limited and should have been increased in order to better control for individual differences. Also, the nature of the past athletic experience of the participants was not specified apart from their previous exposure to particular trainings or exercises. This proved inadequate to reflect their muscle tendency to develop faster and adapt better to the rigid training procedure. It can also be observed that the set-up of the experiment was effective in measuring the effect of plyometric training on muscle power

but did not isolate effectively the variables under study. A treatment condition wherein plyometric training is absent should have been provided for.

In this study, both treatment conditions subjected the participants to plyometric training thus providing no control condition upon which to base comparison of results. In order to improve the research results, a control condition should be included wherein participants are either given no training whatsoever or are given only aerobic exercise. This would serve to show how different muscle fiber increase is when participants undergo plyometric training. Should it be found that a significant difference may be observed in muscle fiber size, then the focus may shift to establishing whether the group with the greater muscle fiber improvement actually demonstrates greater muscle power as well. Finally, given the results of the relationship between muscle fiber and muscle power, a parallel may be drawn with the relationship of muscle power with enhanced athletic performance.

Plyometrics vs Isometric Training Influences on Tendon Properties and Muscle Output

Two training procedures were pitted against each other in this study. The effectiveness of enhancing tendon stiffness was compared in both plyometric and isometric trainings. A stiffer tendon would result in less time needed to develop muscle force thus increasing muscle output. Thus, thirteen men were recruited to participate in the study to determine which training procedure would be more effective. The two treatment groups subjected

some of the participants to plyometric training while subjecting the others to isometric training. The stiffness of the tendon was measured by monitoring the gastrocnemius tendon stiffness before and after training. Having established tendon characteristics, muscle output was measured through performance in athletic events, such as through jump height. The study showed that isometric training provided the same benefits as regards tendon stiffness as plyometric training. However, unlike isometric training, plyometric training exposed athletes to impact forces which raised the potential for injuries.

The study reflected that tendon stiffness was increased in both plyometric and isometric training. There was also an established relationship between tendon stiffness and enhanced athletic performance, particularly so in vertical jump height. This reflects that plyometric and isometric training both serve to improve athletic performance through improvement of tendon stiffness. However, the serendipitous finding that plyometric training serves to increase impact force and thus makes the individual more prone to accidents serves to enhance the value of isometric training. However, reviewing the results and findings of the study, there is little evidence to show the reliability of such preference for isometric training. Thus, to improve the general findings and application of the study, closer research should be conducted regarding the impact force associated with both plyometric and isometric training. Furthermore, the present study limited its focus to six-week training. However, athletic training most often exceeds the six-weeks used in the study. Further study should thus be made regarding the short- and long-term effects of prolonged exposure to plyometric and

isometric training. Only with a closer investigation of such long-term training will knowledge of the overall benefits derived from each training program be exposed.

Effect of Six Weeks of Squat, Plyometric and Squat-Plyometric Training on Power Production

The focus of the study was to establish which of three training programs would best improve explosive leg power in athletes. Forty-eight participants were divided into three training programs and a single control setting. The three programs observed in the study were squat, plyometric, and squat-plyometric training. The control group was not subjected to any treatment. Each of the groups trained twice a week for six weeks with the first week being utilized as a technique learning period. The researchers tested for hip and thigh power prior to and after training. The hip and thigh power production was measured through vertical jump activities. The findings showed significant improvements in hip and thigh power production across all groups. However, the optimal difference was observed in the squat-plyometric training group. This shows that the best program for enhanced hip and thigh power production is a combined squat and plyometric training program.

The parameters of the study broadened the participant base and provided for a control group thus serving to increase reliability of the results. However, there was no control for previous exposure to plyometric training. Individuals who had prior experience in plyometric training were permitted to participate in the experiment. Granted, the exposure was limited to a

minimum. However, the entire subject pool was composed of individuals who already had experience in lifting. It can thus be seen that these individuals had already been exposed to various training programs. The inattention to these previous programs may have caused an imbalance in the resultant effects observed in the squat and plyometric programs. Looking at the results however it may be observed that stark differences were seen in the data.

The squat training program yielded an improvement in vertical jump by 3.30 centimeters, the plyometric training program showed a 3.81 centimeter increase and the squat-plyometric training program showed a 10.67 centimeter increase. There is thus no doubt that the combined squat and plyometric program indeed served to enhance hip and thigh power production resulting in enhanced vertical jump performance. However, future research should look into the more beneficial training program when comparing only squat training and plyometric training, not the combination of the two. The current results show that plyometric training may improve vertical jump height significantly more than squat training. For those not interested in or without the luxury of engaging in a combination program, the isolated training programs should be studied as well. Furthermore, an in-depth study of the isolated training programs would serve to identify what each program contributes to the increased hip and thigh power production.

Acute Effects of Plyometric Exercise on Maximum Squat Performance in Male Athletes

The study focuses on the measurement of 1 repetition maximum (RM) tests, which measures the maximum amount of weight that a person can lift once in a specific exercise. Athletes often engage in some form of training prior to this test. However, little research has shown the effect of strong movements prior to testing on 1RM measurements. In the current study twelve participants were recruited. Plyometric exercises were used prior to 1RM assessment, measured through squat performance of athletes lifting weights. Three sessions were held with the participants performing the same warm-up procedure prior to 1RM assessment. The second and third sessions were altered however with half the participants performing tuck jumps (TJ) before depth jumps (DJ) and the other half performing the reverse. The results of the study reflected that DJ performed thirty seconds prior to 1RM assessment results in improved squat performance.

The scope of the study was able to broaden the knowledge base on 1RM testing and powerful training programs prior to assessment. The significant findings of the study thus serve to justify the need to understand the role that plyometrics plays in 1RM measurement through squat performance. However, the treatment groups established in the study may still be improved to further ensure the control for extraneous variables. In the current study no clearly defined treatment groups were made. There was thus no consistency in the trainings undergone by the participants. The limited number of participants by itself may have resulted in individual differences affecting the data. Furthermore, the small number caused the researchers to concentrate two treatments as well as the control group in one undivided mass. The twelve participants were thus exposed to three

treatments, the control which was the first training session, as well as the TJ and DJ treatments in the first and second training sessions. The causal relationship of the training and the increased squat performance as evidenced by 1RM tests would have been better established with three clearly delineated groups. The first group would be the group practicing TJ before DJ prior to testing. The second group would practice DJ before TJ prior to testing. The last group would be the control group with the first week of training's exercise program as a drill prior to testing. Such a set-up would serve to better show the direct relationship between the plyometric training and the squat performance.

Effects of Sprint and Plyometric Training on Muscle Function and Athletic Performance

Plyometric training is often applied to improve leg power. It thus poses practical applications for athletic performance particularly so in competition with sprint training. In this study, the comparative benefits derived from sprint and plyometric trainings were considered through the effects on muscle function and the explosiveness and dynamic performance of athletes. Ninety-three male participants were involved in the study. These participants were distributed to three treatment groups: the sprint training group, the plyometric training group and the control group. The control group had three participants more than the other groups. The sprint group performed sprints over distances while the plyometric group performed bounce-type hurdle jumps and drop jumps. Muscle strength, muscle power, and athletic movement performance were all measured. The results of the study showed that exposure to sprint training, even for a short-term period, <https://assignbuster.com/the-effect-of-plyometric-training-on-athletic-performance-essay-sample/>

led to equivalent or enhanced muscle function and athletic performance as classic plyometric training.

The parameters of the study took into consideration alternative training programs geared towards the development of explosive athletic performance. The study therefore presented novel methods by which enhanced performance might be obtained. The practical application of sprint training in events other than sprint running has shown to be of relevance. The study has shown that the muscle characteristics developed through sprint training are competitive of the characteristics developed through plyometric training. However, given the assessment of the different muscle characteristics developed when comparing sprint and plyometric training, a broader application discussion should have been carried out. Taking into consideration the many applications of plyometric training, the further application of sprint training may be analyzed through the deconstruction of the muscle characteristics and athletic skills required in the events utilizing plyometric training.

Improvement in Running Economy after 6 Weeks of Plyometric Training

Long-distance running is quite involved in the preservation of oxygen costs of runners or what is otherwise referred to as the running economy. This study focuses on the effects, if any, of short-term plyometric training on running economy of average distance runners. Involved in the experiment were eighteen individuals, ten of whom were women and eight men. There were only two treatment groups: experimental and control. The subjects for both groups were instructed to undergo regular running exercises for the six

weeks. However, the experimental group participants were also instructed to perform plyometric training as well. A treadmill was used to measure the running economy of both groups. Tests of muscular ability to store and return elastic energy, tests of VO₂ max and measurement of VO₂ were obtained as well. The study reflected that indeed plyometric training serves to improve running economy and thus enhances performance of runners.

The study served to clarify the importance of running economy in athletic events faced by an average runner. Particularly so, the research was able to communicate the role that running economy has in the success of distance running. The number of participants included as well as the treatment groups formed enabled the straightforward analysis of the variable plyometric training as related to the independent variable running economy. It was thus clearly shown what plyometric training contributed to the equation. It was also a good aspect of the experiment to control for sex differences. In most studies concerning athletic performance only male subjects were recruited. The inclusion of sex bias controls presents a more externally valid result.

However, it should be noted that the participants taken on for the experiment already had experience in running, more particularly in distant running. Although none of the runners were highly trained or professional runners, the nature of previous training programs enrolled in was not divulged. Considering the short-term study, only six weeks, of the effect of plyometric training, the impact of past long-term training should have been controlled for. Furthermore, the research should have considered taking on a comparative approach to the significance of plyometric training. Plyometric
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training is not the usual training program of distance runners attempting to enhance running economy. Thus the significance of the current study only finds basis when establishing the comparative advantage of shifting training to plyometric training. In order to be able to study this, another treatment group may be added with a training routine focused on the regular running economy training of distance runners.

Short-term Plyometric Training Improves Running Economy in Highly Trained Runners

Running economy is most often an associated skill of long distance runners. However, given that running economy is the capacity of an athlete to maintain oxygen consumption while running, this is a valuable skill for even middle runners. Furthermore, running economy is held to be invaluable by professional and highly trained runners. Without a highly enhanced running economy, runners would not be able to participate competitively in highly aggressive events. In the study, fifteen participants were divided into two groups: a plyometric training group and a control group. All the participants exercised their regular training programs. The plyometric group however added plyometric training to their routine. Running economy, muscle power characteristics, average power, and time required to reach maximal dynamic strength were measured. It was shown that plyometrics improved running economy by 4.1%. The results reflect that plyometric training serves to improve running economy in highly trained runners.

The study appropriately focused on highly trained runners when considering the effect of plyometrics on running economy. The ability to consume less

oxygen when running is a skill best applied in competitions. Thus, the research was perceptive to consider the effect of modified trainings to those runners most benefited by running economy - highly trained runners. The sample size was rather small but this issue might only be addressed should it be answered what the qualitative definition of highly trained is. Considering that the terms highly and regular trained athletes have not been defined, then there should have been no scarcity of training-familiar people to draw from and thus broaden the target population group. However, the means through which data was obtained was well established. The consideration of muscle characteristics helped the researchers to take note of the possible bases of improved running economy resulting from plyometric training. The set-up of the study thus served to give a jump off point for future research inspecting the potential causes of the change brought about by an inclusion of plyometric training in an athlete's regular exercise. Since a significant effect was shown regarding the effect of regular training combined with plyometric exercises, another treatment group should be observed. The possibility of enhanced muscle strength and running economy in highly trained runners exposed only to plyometric training should also be studied.

Short-term Effects of Strength and Plyometric Training on Sprint and Jump Performance

The purpose of the study was to determine the effects of strength training on particular strength measures. More specifically, it assessed the effect of combined strength and plyometric training as opposed to strength training coupled with low-intensity exercises. Twenty-one soccer players belonging to a Premier League soccer team comprised the participant pool. They were <https://assignbuster.com/the-effect-of-plyometric-training-on-athletic-performance-essay-sample/>

divided into three treatment groups: the strength-plyometric group, heavy-strength group, and control group. All three groups performed their designated training programs in addition to six or seven soccer sessions a week for seven weeks. Sprint performance was measured using photocells, jumping ability through a force plate, and peak power performance through loaded barbell squat jumps. In addition, maximal strength in leg extensors was measured through 1 RM testing. It was found that the intervention treatments improved the studied strength measures. However, no significant difference was observed when plyometric training was merged with the standard strength training.

The study provided adequate means of controlling for the effects of previous training undergone by the chosen participants. The period of training using the study-delegated exercises allowed for the shift in the body systems of the participants. Furthermore, enlisting the volunteer participation of members of one soccer team helped to ensure that any previous training undergone over the past year was uniform. Therefore, any changes to be presented by the change in training program would be easily discernable. However, the study did not measure muscle characteristics and thus the nature of the enhanced jump and sprint performance in the intervention groups could not be attributed to any one associated effect of strength or plyometric training.

This leads to the inability to determine what precise contribution, if any, was provided by the integration of plyometric training. The results show that there is no significant difference between the strength-plyometric group and the strength-low-intensity group. However, without a proper assessment as <https://assignbuster.com/the-effect-of-plyometric-training-on-athletic-performance-essay-sample/>

to what changes were brought about by each component treatment, there can be no accurate conclusion regarding the relevance of introducing any particular one. Thus, it would be too early to conclude that the plyometric training did not help to improve the performance of the athletes. In order to further validate this claim, the presentation of another treatment group, namely a plyometric-low-intensity group, is needed. Otherwise, the mere inclusion of muscle characteristic measures should be included.

Low to Moderate Plyometric Training Frequency Produces Greater Jumping and Sprinting Gains

Three frequencies of plyometric training were studied in order to assess its effects on athletic performance. Particularly so, the different frequencies were observed to show variations on vertical jump, sprint gains, maximal dynamic and maximal isometric force. This would serve to show the optimal value level at which plyometric training should be practiced. For the study, forty-two participants were enlisted, none of whom had previous plyometric training experience. Three treatment groups were formed and one control group maintained. The first group was instructed to conduct plyometric training for one day in a week. The second group conducted plyometric training two days a week. The third group conducted plyometric training four days a week. The results reflect that an increase in volume of plyometric training does not translate to greater jumping and sprinting gains. However, the mere introduction of plyometric training increases force production as shown by increased 1 RM performance.

The study presented an interesting perspective on increasing frequency of plyometric training. This view took into consideration previously established effects of plyometric training and instead focused on enhancing such effects. It was shown that low to moderate levels of plyometric training per week served to enhance jump performance and sprinting gains. Thus, it is not necessary to introduce high frequencies of training in order that performance improvement might be observed. An obscure trait regarding the study was the previous experience of the participants included. Although professional athletes were not recruited as participants, the enrollment in physical education classes shows that the participants may have had previous exposure to other forms of training. Yet the control for previous training exposure was only provided in answer to previous plyometric training. One possible answer for the attribution of effects to the plyometric training performed would be the gradual introduction of plyometric training prior to the observed weeks. Furthermore, given the reflected enhanced performance in the group practicing plyometric training four times in a week, albeit not significantly different, there is a need to explore means by which this difference might be made significant. One way is by observing the long-term effect of high frequency plyometric training. Continued training past the seven week observation period may show that the minimal changes effected by high frequency training accumulate to significant changes.

Effect of Plyometric Training on Running Performance and Vertical Jumping

Plyometric training is a high-intensity exercise program and has thus been applied mainly to seasoned athletes. The goal of this study was to find out the applicability of plyometric training to prepubertal boys. It was observed <https://assignbuster.com/the-effect-of-plyometric-training-on-athletic-performance-essay-sample/>

whether or not plyometric training practiced at young ages would serve to enhance running velocity. Thirty nonathletic boys were recruited as participants and were divided into two treatment groups. The first group was the experimental group and boys engaged in a plyometric program for a duration of ten weeks. The second group was the control group wherein the boys engaged in the standard physical education program. The running performance of the participants was observed through participants' distance running. Furthermore, vertical jumping was analyzed by having participants perform sixty jumps per session, this number increased gradually throughout the ten weeks. The results show that running velocity and vertical jump improved significantly for the plyometric group.

The study served to show that indeed plyometric training may be applied to improve running velocity, more specifically, that it may be applied to prepubertal boys with no previous athletic training. However, it should be noted that the nature of the physical education training of the control group was not disclosed. This may have been the regular physical education program engaged in previously by the nonathletic boys. If so, then the changes in the experimental group may have resulted not from the specific introduction of plyometric training but simply from the introduction of high-intensity power training. This would cast aspersions as to the reliability of the findings to reflect that plyometric training itself improves running velocity and jumping gains. However, there is no doubt that plyometric training may indeed be used in populations of young or prepubertal boys, particularly so even in populations with no previous athletic experience. In this regard, the study served to broaden the range of applications for which plyometric

training might be utilized. Other research studies have shown that other strength trainings may serve to improve running economy and other running skills more efficiently than plyometric training. However, such heavy training may not be advisable when applied to young trainees. This study thus serves to support the use of plyometric training as a less harmful and equally effective means of improving running performance.

Comparing Plyometric Techniques for Improving Vertical Jump Ability and Energy Production

The purpose of the study was to determine which type of plyometric training technique would serve to best enhance jump performance, positive energy production and elastic energy use. This was established through the performance of squat jumps, depth jumps and countermovement jumps. Twenty-eight participants were recruited for the experiment - fourteen males and fourteen females. There were three experimental groups established: the control group, depth jump training group, and the countermovement jump training group. Each participant was enrolled in a twelve-week training program where the first two weeks was used as a familiarization phase for the program. Vertical ground reaction force data was used to determine the vertical jump height using projectile equations and time in the air. Positive energy and elastic energy were computed using Komi and Bosco methods. The results of the study reflect that pretest-posttest comparisons verify that the depth jump and countermovement jump groups improved in performance.

The study was innovative in its attempt to deconstruct the various plyometric techniques available. This served to show the relative strengths of each plyometric technique and the precise contribution of each in power production and elastic energy. Given that muscle contraction and elasticity are key characteristics when taking into consideration jump performance, the study employed an objective focus. Furthermore, the study controlled for gender bias by including an equal number of female participants in the population. Although the distribution of female and male participants across groups was not specified so there is some doubt as to the effectiveness of gender bias controls. Apart from the study design, there are also some observed inconsistencies as regards the method of analysis of data gathered.

The researchers analyzed the pretest-posttest improvements or differences in performance. However, there was no provision for between-groups comparison of improved performance. Although the objective of the study was not to determine the most effective technique afforded by plyometric technique, the strength of each technique would more adequately be reflected if there was a comparison across treatment conditions. The researchers established the difference between the experimental and control groups. However, there is also a need to establish whether there are significant differences between the depth jump and countermovement jump groups in the performance of the three jump tasks, power production and elastic energy. Such a comparison would serve to deepen the knowledge as regards the most effective application of these aspects or techniques of plyometric training.

The Effectiveness of a Modified Plyometric Program on Power and the Vertical Jump

Plyometric training has been identified as a flawed system of training. This study thus introduced modifications to the program by focusing on previously pinpointed inconsistencies in the depth jump technique of plyometric training. Fifty-one male participants were divided into five groups: control, countermovement jump training, weight training, conventional plyometric depth jump training, modified plyometric depth jump training. The modified depth jump utilized the ankle depth jump, wherein the force of the jump is absorbed more by the ankles; the knee depth jump where upon landing there is a required flexing of the knees by 90°; and the hip depth jump where upon landing there is a required trunk flex by 45°. The test jumps were the countermovement jump and the static jump. The results did not show any significant difference between training groups although vertical jump, peak power, and countermovement jump improved for all treatment groups.

The study took on a daring stand in attempting to provide improvements to identified flaws in the plyometric training program. The researchers further provided a reliable system of modification by drawing upon previously established novel depth jump techniques. However, the study failed to appropriately identify the non-beneficial effects of the standard depth jump technique in plyometric training. The purpose of the study was to improve the flawed system in the plyometric training program - particularly in depth jump. However, the focus on enhanced power and vertical jump performance detracted from the original goal.

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The researchers should have first identified in what ways the conventional depth jump technique provided adverse effects. Upon identifying the negative consequences, the introduction of modifications should have been in answer to such. The comparisons on effectiveness should thus have been in answer to the specified flawed areas and only subsidiary consideration should have been made regarding improved vertical jump performance. As it is, the lack of difference in power and in vertical jump performance between the experimental groups failed to reflect whether or not the effects of conventional depth jump techniques were improved. In order to have better assessed this, muscle characteristics might have been taken note of as well as elastic energy. The modifications may have served to provide a safer method of practice as compared to the conventional methods.

Evaluation of Plyometric Exercise Training and Weight Training

Vertical jump is important in the explosive performance of many athletes. Plyometric training is an associated program with high power exercises however it is not linked with enhanced vertical jump. The purpose of this study is to compare the effects of plyometric training and weight training on vertical jump. Forty-one male volunteers comprised the subject pool of the experiment. The participants were divided into four training groups: plyometric, weight, combined plyometric and weight, and control. All groups except for the control group trained thrice a week for twelve weeks. Vertical jumping performance, flight time, leg power, and maximal leg strength were measured for each participant. The first two measurements were found to be significantly higher for the combination plyometric and weight training group. However, for the latter two measurements, the combination group

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was only significantly higher than the plyometric group but not the weight group.

Given the value of vertical jump in numerous sporting events, it is essential to note which training program would better serve to enhance the same. Thus, the simple comparison of plyometric training and weight training as to utility in improving vertical jump has significant implications on athletic trends. The subject pool established, although not providing controls for gender bias, was sufficient in accounting for individual differences, through the adequate number of participants and the background of each participant. Furthermore, the establishment of treatment groups adequately accounted presented the range of scenarios that could produce effects on vertical jump. The presence of both the plyometric and weight training only groups would provide insight as to how the trainings when presented in isolation would affect the athletic performance of the participants.

The inclusion of the combination group also served to broaden the area of study to account for changes that could be affected through introduction of both training programs. Despite the reliable experimental set-up, the statistical analysis performed was not clearly explained or discussed. A table was used to present all the relevant data gathered after analysis. Instead of facilitating comparisons of treatment effects however, the table only made it harder to reflect the comparative advantages of each treatment. More direct comparisons should have been made between the plyometric group and the weight group and between each isolation group and the combination group. These comparisons should have been presented linearly and discussed under the results section of the paper. Furthermore, the discussion section of the <https://assignbuster.com/the-effect-of-plyometric-training-on-athletic-performance-essay-sample/>

paper should have discussed more the linear effects of each training program on the particular measurements made. Studies supporting these findings or giving justifications as to why the results reflected such relationships should have been provided in relation to such discussion.

Effects of Plyometric Training and Recovery on Vertical Jump and Anaerobic Power

The purpose of the present study was to ascertain whether a short or long duration plyometric program would better improve the power output and vertical jump. Furthermore, a four-week recovery period was used to ascertain the long-term effects of the training. In order to study this, thirty-eight male participants were recruited and divided into two treatment groups: the four-week training group and the seven-week training group. Body composition, vertical jump height, and power were measured to analyze overall improvements in the athletic state of the participants. There were no significant differences between groups. Within groups analysis showed that vertical jump height decreased from pre- to post-test but this decrease was significantly less for the 7-week group after the recovery period. The power output increased significantly after training and more so for the 4-week group after the training period although after recovery the 7-week group reflected better gains.

The inclusion of a four-week recovery period was an interesting and innovative twist to the study conducted. It reflected more accurately the longitudinal effects of the two training programs. However, the distribution of participants across the treatment groups was not equivalent. The four-week

group was observed to be younger and leaner than the seven-week group. Although the distribution was randomized, there should have been controls set in order that the variances in age and other potentially confounding characteristics could have been distributed across groups.

This would have served to lessen the influence of individual differences and the effect of extraneous variables in the study observations. Although the study provided clear parameters as to the establishment of treatment groups utilized; the reason for the exclusion of the control group grounded on the reliability of numerous studies showing the effectiveness of plyometric training in both power output and vertical jump. However, considering that recovery period was analyzed in the study and less literature is available for the effects of such, the inclusion of a control group may have presented a clearer picture for discussion. Furthermore, the control group would not only have served to support the fact that plyometrics indeed influences power output and vertical jump but it would also have served to ground the discussion on improvements observed after the four- and seven-week trainings. More so, the presence of a control group would have served to adequately determine the relation of the data obtained after the recovery period in relation to no-training scenarios.

Comparison of Land- and Aquatic-based Plyometric Training on Vertical Jump Performance

The present study attempted to ascertain the difference made when performing plyometric training on land or in water. Twenty-one male participants were recruited for the experiment and were divided into three

groups: control, land, and aquatic. The control group engaged in no training at all. The land and aquatic groups performed identical plyometric exercises. The only variation in treatment was the location wherein training was performed. For the aquatic group performed plyometric in knee-deep water. In order to maintain the levels for each participant, the water was adjusted for every individual so that it would reach up to the knee joint. Vertical jump height was measured prior to and after the six-week training period. The data reflected that no significant difference was effected between the aquatic and land groups. This shows that plyometric training may be performed when in the water, thus reducing harmful effects of land plyometrics.

The presentation of an alternative venue for performing plyometric training provided a refreshing perspective as to modifications that could answer for the harmful side effects of plyometrics. It has been observed in previous studies that the high impact of plyometric training causes greater injury potentials for athletes. The attempt to lessen the impact by utilizing the buoyancy characteristics of aquatic environments is a worthwhile research goal and investment. Having found that indeed the effects of plyometric training are not hampered when performed in aquatic environments, there is now area for study regarding the characteristics of aquatic environments and the effects these have on muscle characteristics and body states during and after training. However, it should be noted that the researchers merely measured improvements in vertical jump in the current study. This may have been a limiting perspective and opens up the current study to future expansions. Considering that plyometric training is related more to

enhancement of power output as well as to muscle elasticity, these should also have been measured. The consideration of the latter two measurements would have broadened the application of aquatic training as well as ensured that plyometric training is indeed constant across environments.

The Effect of Plyometric Training on Athletic Performance

Plyometric training is a training program that is centered more on the development of explosive and power athletic performance. Plyometrics involves the working of leg muscles and particularly focuses on the stretching and of muscles in order to limit the elongation and contraction pauses (Holcomb, Lander, Rutland & Wilson, 1996). It is important to limit the period of shifting from elongation to contraction in order that performance might be enhanced. As Holcomb and associates (1996) stated it, the shorter period between these two phases would allow for the more work to be done in less time. The elongation phase has been more appropriately deemed the eccentric phase and the contraction phase the concentric phase (Holcomb et al., 1996). The pause observed between these two phases is known as the amortization phase (Holcomb et al., 1996). This paper will discuss how the effects of plyometric training in the muscular level improves key competencies needed for explosive athletic performances in many athletic events.

In several athletic events, most of them quite popular, such as basketball, volleyball, soccer and the like, the ability of an athlete to shift effortlessly from concentric and eccentric phases is an essential skill. This paper will outline the different beneficial effects of plyometric training by presenting

the varying parameters, such as vertical jumping, distance running, and power output, which are enhanced by plyometric exercise. Despite the beneficial effects of plyometric training there have been identified flaws to the program. This is particularly so with the high impact environment that is promoted while engaging in plyometric training. Thus a discussion will also be carried out regarding potential modifications to the training which will account for less harmful dispositions. By the end of this paper, it will have been shown that indeed plyometric training is an essential program for the development of explosive athletic performance. Both the advantages and disadvantages of such training will be discussed along with suggested improvements to the program.

Muscle Characteristics and Power Output

Plyometric training is related most strongly with greater power output. This is grounded on an analysis in the muscle changes that occur when undergoing plyometric training. As previously discussed, the muscle undergoes a process of elongation and contraction. The period of elongation relaxes the muscle which allows for more forceful performance during periods of contraction (Potteiger, Lockwood, Haub, Dolezal, Almuzaini, Schroeder & Zebas, 1999). This force is what gives more power output to the performance of athletes and individuals who undergo plyometric training. Considering the prolonged high energy states that are required in athletic events, it is important to have a training regimen that provides for more efficient utilization of potential energy.

Potteiger et al. (1999) also discuss the growth of the muscle fiber as individuals undergo plyometric training. The average training duration is seven weeks but in the six weeks that the study was conducted enhanced fiber size was already observed to be significant (Potteiger et al., 1999). The increase in muscle fiber size allows for the individual's capacity to generate greater force in athletic events. Larger muscle fiber sizes would also give the individual the capacity to withstand greater pressure on his legs. In the case of distance runners, this is a desirable characteristic as the leg muscles are exposed the body weight of the runner relying on the leg muscles sporadically yet constantly. Furthermore, the leg muscles are exposed to the incessant and repeated need to contract and elongate in short periods of time. Thus, training that produces effects such as enlarging muscle fibers and allowing for briefer amortization periods would indeed be beneficial to the seasoned athlete.

As a result of these muscle characteristics, there is an observed enhancement of leg power. The enhancement of amortization time and muscle fiber size allows for greater performance in explosive athletic activities, such as vertical jumping (Potteiger et al., 1999). As is shown in the study of Potteiger et al. (1999), there is an improvement in vertical jump performance as well as broad and depth jumping after six weeks of plyometric training. Thus, the improvement of leg power is made apparent. The faster eccentric movement and shift to concentric phase creates a reflex to stretch. The more the muscle is stretched the greater force is produced and thus the greater the power of the corresponding muscle movement (Saunders, Telford, Pyne, Peltola, Cunningham, Gore & Hawley, 2006).

Also, in studies focusing on improved jump and sprint performance through the utility of plyometric training, there is always a corresponding improvement in power output that is noted. The mere improvement in performance of vertical jump and sprinting is indicative of a change in explosive power that is manifested by the athlete. It should therefore be noted that studies and experiments have served to support the positive effects of plyometric training on power output. Apart from enhanced power output, there is also a need to analyze in what manner plyometric training enhances particular athletic competencies.

Running Economy and Distance Running

Running economy is an important skill in numerous athletic activities. Running economy is the energy expended by an average runner. It is characterized by the oxygen consumption levels of the average runner (Saunders et al., 2006). Enhanced running economies are related with greater utility of oxygen stores. This is an important determinant of the performance of runners, particularly so of distance runners. Given the long stretches that distance runners have to cover in as little time as possible, the ability to optimize the utility of oxygen stores so that the essential muscle functions are maximized affords the edge that distance runners need in competitions. Not only this but runners with enhanced running economy use less oxygen than runners who Saunders et al. (2006) found that running economy is improved when medium and highly trained distance runners are exposed to plyometric training.

The improvement in running economy as a result of plyometric training may be related to the changes introduced by the latter in muscle characteristics and power output. The lower amortization time between elongation and contraction allows for muscles to increase the work output generated. Alternatively, plyometric training increases power output of the leg muscles. These effects of plyometric training bring about increased leg muscle performance without the need to increase metabolic processes (Saunders et al., 2006).

In effect, what is afforded by plyometric training is a reallocation of already utilized metabolic and oxygen stores. Wasteful processes, such as amortization periods, or more costly muscle characteristics, such as slim muscle fibers, are addressed by plyometric training. The modification of these characteristics allows for the maximal utility of undergone metabolic processes. Thus, for the same amount of oxygen consumed in these processes, there is more force, power and work generated. This is how running economy is improved through plyometric training.

With the improvement of running economy, the medium or highly trained runner would thus be able to withstand greater distances using the same oxygen store as used in previous runs. For the same distance, the runner undergoing plyometric training would be using less oxygen than the runner without plyometric training. Alternatively, for the same amount of oxygen, the runner undergoing plyometric training would be able to run greater distances than the runner without the benefit of plyometrics.

Vertical Jump Performance

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Apart from running, another common focus of the effects of plyometric training is vertical economy. The techniques involved in plyometric training utilize various leg muscles and there are various jump techniques integrated into the training which might serve as enhancers of the athlete's vertical jump. Vertical jump is another explosive athletic skill often used by athletes – such as in shooting during basketball events, or in passing for soccer, or answer hits for volleyball. Enhanced vertical jump performance would thus entail the improvement in game performance of the athlete in question.

A key indicator of performance is elastic energy. Elastic energy is utilized by muscles and determines the extent at which it can stretch, the speed at which this can be done, the duration for which it can maintain the stretch, and the force exerted at the end of the stretch (Gehri, Ricard, Kleiner & Kirkendall, 1998). These characteristics of the muscle determine to some extent the vertical jump height of an individual. More importantly, these characteristics are addressed by plyometric training.

Plyometric training has been associated with lesser amortization time between stretch and contract phases to ensure that greater power is demonstrated during the concentric phase – addressing two of the characteristics of elastic utility. However, there is need for further study in order to ascertain whether plyometrics indeed improves the extent at which an individual is able to stretch his or her leg muscles as well as the duration for such stretching. Given the need for muscle elasticity during vertical jump events, the greater ability of an individual to utilize elastic energy would serve to improve vertical jump. This is the basis for the relation between plyometrics and vertical jumping.

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Gehri et al. (2006) studied the techniques of plyometric training and found that several techniques improve vertical jump height of athletes. In particular, what was found as significant were the introduction of depth jumping and countermovement jumping in the training programs of the participants (Gehri et al., 2006). Although their (Gehri et al., 2006) study showed no change in the utilization of elastic energy as a means of improving vertical jump, the characteristics which were attributed as causes of the enhancement were correlates of the characteristics of elastic energy.

Further research should thus be conducted regarding the nature of the improvement. More specifically, closer attention should be made as to the facets of elastic energy. By closely examining these characteristics, a parallel may be made with the corresponding effects that plyometric training affords. Elastic energy speaks of muscle tendencies and capacities. These should thus be contrasted against the muscle characteristics improved by plyometric training in order to qualitatively observe how plyometric training precisely improves vertical economy.

Disadvantages and Modifications

Although plyometric training has significant advantages in athletic skills and performance, there have been some observed flaws in the training program. As has been supported by the inconsistent studies, it is not always that plyometric training provides significant improvements in performance. Moreover, comparative assessment of various training procedures in contrast to plyometrics often results in the preference of the other training procedure.

There are thus aspects of plyometric training which require modification and change.

Holcomb and associates (1996) observed two potential sources of disadvantage in plyometric training with particular application to vertical jump improvement. First, the hip movement in the depth jump technique which is most often utilized in training is not enhanced enough (Holcomb et al., 1996). Also, the volume of training required in plyometric training is often less than that required in other training programs (Holcomb et al., 1996). Apart from these delineated potential flaws, there is also the matter of muscle strength. Plyometric training pushes muscle boundaries to the extreme in order to further develop muscle fibers and characteristics. However, this is a potential problem with the tendency for greater injury being introduced into the equation.

Plyometric has been considered a high intensity activity and it has not been uncommon to find muscle strain, muscle sores and muscle damage in plyometric trainees (Stemm & Jacobson, 2007). The force that is exerted by and upon the muscles of plyometric trainees sometimes goes unchecked and thus leads to the injurious consequences mentioned. Interval rest periods from and frequency of training have been suggested as answers to this problem. However, the strain complaints and injury cases have not been alleviated with such advice.

These two problems have been met with several modification suggestions.

The problem with the hip movements and the volume of training as compared to other training programs has been studied by different

researchers. As modifications for the lack of hip movements, depth jump was improved by integrating ankle twisting, knee bending, and hip bending movements upon landing from a height (Holcomb et al., 2007). These did not reflect any significant changes however, nor did an increase in volume of training better the situation.

However, the harmful effects of high-impact plyometric training have been addressed through the suggested modifications of Stemm and Jacobson (2007). A simple procedure of changing the training environment from a land-base to an aquatic-base showed significant changes. Although there were no significant improvements in performance, there was an observed effect of the buoyancy of the water on the stress experienced by the muscles during training (Stemm & Jacobson, 2007). Thus, training in an aquatic medium produces the same beneficial effects as land-training yet also relieves the force exerted upon leg muscles.

Conclusion

It has thus been shown that plyometric training is a high-impact and high-intensity training program concentrated mainly in the development of leg muscles. Plyometric training focuses on the eccentric and concentric characteristics of leg muscles. By minimizing the amortization time between these two phases, plyometric training provides more force expendable during the concentric phase. This added force storage allows for more powerful performances by trainees. Thus, there is a faster shift from a preparatory stage and a sudden release of energy in the concentric stage – appropriately called explosive performance of athletes.

The power output enhanced by plyometric training has been shown to be derived from the shorter amortization phase as well as the thicker muscle fibers developed. Because of this enhanced power measurement, athletic performances such as running or sprinting and vertical jumping are observed as more explosive. The ability of the body to produce more force without altering the regular metabolic processes involved reflects how plyometric training increases performance. Because of the high levels of strain that an athlete undergoing plyometric training must endure, modifications as to the training procedure and characteristics are being explored. With the novel innovations to procedure, there is a broadened application for plyometric training.

References

Adams, K., J. P. O'Shea, K. L. O'Shea, and M. Climstein (1992). The Effect of Six Weeks of Squat, Plyometric and Squat-Plyometric Training on Power Production. *Journal of Applied Sport Science Research* , 6(1), 36-41.

De Villarreal, E. S. S., J. J. Gonzalez-Badillo, and M. Izquierdo (2008). Low and Moderate Plyometric Training Frequency Produces Greater Jumping and Sprinting Gains Compared with High Frequency. *Journal of Strength and Conditioning Research*, 00(0), 1-11.

Gehri, D. J., M. D. Ricard, D. M., Kleiner, and D. T. Kirkendall (1998). A Comparison of Plyometric Training Techniques for Improving Vertical Jump Ability and Energy Production. *Journal of Strength and Conditioning Research*, 12(2), 85-89.

Burgess, K. E., M. J. Connick, P. Graham-Smith, and S. J. Pearson (2007).

Plyometrics vs Isometric Training Influences on Tendon Properties and Muscle Output. *Journal of Strength and Conditioning Research*, 21(3), 986-989.

Holcomb, W. R., J. E. Lander, R. M. Rutland, and G. D. Wilson (1996). The Effectiveness of a Modified Plyometric Program on Power and the Vertical Jump. *Journal of Strength and Conditioning Research*, 10(2), 89-92.

Fatouros, I. G., A. Z. Jamurtas, D. Leontsini, K. Taxildaris, N. Aggelousis, N. Kostopoulos, and P. Buckenmeyer (2000). Evaluation of Plyometric Exercise Training, Weight Training, and Their Combination on Vertical Jumping Performance and Leg Strength. *Journal of Strength and Conditioning Research*, 14(4), 470-476.

Kotzamanidis, C. (2006). Effect of Plyometric Training on Running Performance and Vertical Jumping in Prepubertal Boys. *Journal of Strength and Conditioning Research*, 20(2), 441-445.

Luebbers, P. E., J. A. Potteiger, M. W. Hulver, J. P. Thyfault, M. J. Carper, and R. H. Lockwood (2003). Effects of Plyometric Training and Recovery on Vertical Jump Performance and Anaerobic Power. *Journal of Strength and Conditioning Research*, 17(4), 704-709.

Markovic, G., I. Jukic, D. Milanovic, and D. Metikos (2007). Effects of Sprint and Plyometric Training on Muscle Function and Athletic Performance. *Journal of Strength and Conditioning Research*, 21(1), 543-549.

Masamoto, N., R. Larson, T. Gates, and A. Faigenbaum (2003). Acute Effects of Plyometric Exercise on Maximum Squat Performance in Male Athletes.

Journal of Strength and Conditioning Research, 17(1), 68-71.

Potteiger, J. A., R. H. Lockwood, M. D. Haub, B. A. Dolezal, K. S. Almuzaini, J. M. Schroeder, and C. J. Zebas (1999). Muscle Power and Fiber Characteristics Following 8 Weeks of Plyometric Training. *Journal of Strength and*

Conditioning Research, 13(3), 275-279.

Rønnestad, B. R., N. H. Kvamme, A. Sunde, and T. Raastad (2008). Short-term Effects of Strength and Plyometric Training on Sprint and Jump Performance in Professional Soccer Players. *Journal of Strength and*

Conditioning Research, 00(0), 1-8.

Saunders, P. U., R. D. Telford, D. B. Pyne, E. M. Peltola, R. B. Cunningham, C. J. Gore, and J. A. Hawley (2006). Short-term Plyometric Training Improves Running Economy in Highly Trained Middle and Long Distance Runners.

Journal of Strength and Conditioning Research, 20(4), 947-954.

Stemm, J. D. and B. H. Jacobson (2007). Comparison of Land- and Aquatic-based Plyometric Training on Vertical Jump Performance. *Journal of Strength and Conditioning Research*, 21(2), 568-571.

Turner, A. M., M. Owings, and J. A. Schwane (2003). Improvement in Running Economy After 6 Weeks of Plyometric Training. *Journal of Strength and*

Conditioning Research, 17(1), 60-67.