

Development and Implementation of Nature-Based Training Program for Student-Athletes

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Abstract—The purpose of this research was to establish the efficiency of the created book/ manual for nature-based fitness exercise program in developing student-athletes overall fitness level. The following statistical treatment was applied to the data collected; 1) Weighted mean, to determine the pretest and post-test results and establish the outcome of the evaluation, the reliability or internal consistency, and validity of the generated or develop manual; 2) t-test, to detect the significant variances between the pretest and post-test scores of the control; and 3) thematic analysis to analyze the accumulated data gathered from the interview questionnaire. Based on the data gathered in this study, it can be therefore determined that the use of manual/ book entitled nature-based movement fitness exercise program are effective in enhancing student-athletes overall fitness level. Also, the manual was successful since the result of post-test was excellent. The following are hereby recommended: (1) Nature-based movement fitness exercise program shall be appreciated and considered as useful tool in improving fitness level of student-athletes; (2) Coaches and trainers shall encourage the use of nature-based fitness exercise program in order to promote a more interactive, fun and relaxing conditioning workout for student-athletes; (3) Promotion of nature-based movement workout as significant part of curriculum of sports and fitness shall be considered since it is an effective way to develop fitness level of individuals; (4) Professors and Instructor particularly in the field physical education were encourage to include nature-based workout in their syllabus topics which can help student improved their overall fitness; and (5) Institutions may be encouraged to provide adequate funding for the development, promotion and distribution of this created manual that are beneficial to all.

Keywords— Nature-Based; Training Program; Student-Athletes.

I. INTRODUCTION

Coaches' implementation of different innovative programs is in demand nowadays. Training and programs across institutions and universities always focus on the used technologies and modern devices. Technology is essential and plays a vital role in developing the overall performance and fitness level of all student-athletes. However, technology is always partner with an ample amount of expenses which leads to the difficulty of acquiring it for selected state universities or even private institutions. Aside from that some student-athletes that are living in remote areas find difficulty in using some modern devices or even bringing this technology.

Realizing this difficulty, the researcher decided to explore and create alternative way/s to teach, guide, and coach student-athletes in developing their fitness level. According to Sebic et al. (2021), nature-based moment exercise plays a vital role in the development of individuals. The exercise promotes and enhances movement structure, good posture, etc. Health-

related and Skill-related fitness was also developed by consistently doing these exercises.

Moreover, nature-based movement exercises have a long history, it is one the oldest forms of fitness program done to improve overall fitness performance. Primitive people engage themselves in this kind of activity. These activities or workouts help them build their physique and enhance different skills that are vital in their daily activities. According to Corre (2025), physical exercise goes back much further, to the time when people would not have thought

have thought of it as working out, but rather a way of life.

According to a study released by Mathew (2022), humans can improve their performance by imitating animal movement patterns. This includes correcting posture and increasing movement efficiency. Student-athletes' fitness levels will improve if they consistently engage in various nature-based movement exercises. Exercises that involve nature-based movement are adaptable and efficient and have many positive effects on your physical and emotional health. Individuals can increase their mobility, strength, coordination, and general fitness by implementing these primal motions into their workout regimen.

To restore the body to its true, natural functioning, modern exercise trends are turning more and more toward nature and organic movement patterns. By going back to the movement structures that are the foundation of our existence, we are precisely restoring the body to its original, genetically inherited settings. According to a research paper by Ljubojevic et al. (2021), professors at the University of Sarajevo, "Animal Flow" is a functional exercise program that incorporates natural ground-based movement with a focus on enhancing wrist stability, coordination, mobility, muscle strength, and endurance. In contrast to indoor exercise, nature-based exercise demonstrated superior performance and more adaptive movement focused on task goals (Brito et al., 2024).

With all this, the research played a vital role in shaping student-athletes in improving not just their physiques and overall fitness, but also this help and guide them in enhancing skills necessary in their respective sports specialization.

1.1 Statement of the Problem

Specifically, it seeks to answer the following questions:

1. What are the characteristics of the develop nature-based training manual?
2. What is the result of the pre and post-assessment test of the student-athletes in terms of:

2.1 Health-Related Fitness

- 2.1.1 Body Mass Index;
- 2.1.2 Muscular Strength;
- 2.1.3 Cardiorespiratory Endurance;
- 2.1.4 Muscular Endurance; and
- 2.1.5 Flexibility?
- 2.2 Skill-Related Fitness
 - 2.2.1 Power;
 - 2.2.2 Coordination;
 - 2.2.3 Agility;
 - 2.2.4 Reaction Time;
 - 2.2.5 Speed; and
 - 2.2.6 Balance?
- 3. Is there a significant difference between pre-test and post-test results?
- 4. What is the perceived effect of the developed training manual?

II. METHODOLOGY

The researcher used a concurrent mixed method to comprehensively understand, analyze, and interpret the research problem. Concurrent mixed method research design involves collecting both quantitative and qualitative data at roughly the same time. Therefore, the collection of quantitative and qualitative data was independent of each other, and one type of data does not inform the collection of the other type of data.

One of the three pre-experimental design kinds is the one-group pre-test post-test design that was utilized in this study. Pre-experimental design is the simplest form of research design that follows the basic steps in the experiment. Only the experimental group is selected as the study subjects (50 student-athletes). A pre-test of the dependent variable is made before the implementation of the treatment in the selected group. The student-athletes engaged in a series of activities that targeted both health-related and skill-related aspects. Their performance was rated based on the rubrics created by the researcher to identify the level of their performance. Based on their performance the researcher created a manual of nature-based fitness exercise programs that serve as treatment for the poor performance of student-athletes. The post-test is conducted to determine the impact of the treatment on the group after it has been administered. This design measures the effect of the intervention (nature-based movement fitness exercise program) before and after the experiment.

III. RESULTS AND DISCUSSION

This research aims to develop and implement a nature-based movement training program for coaches and student-athletes. This chapter presents the results and discussions based on the data gathered in the study.

Figure 1 shows the cover page of the created manual. It was titled “Nature-Based Movement Fitness Exercise Program.” The manual was focused on the development of fitness levels through natural and animal flow-based exercises. To be universal the researcher used English text and language to discuss the content of the created manual. The researcher also used pictures which serve as visual aids guided by step-

by-step instructions to easily follow every exercise. A user-friendly format was used, the font style was Palatino a suggested font style for this kind of nature-friendly manual, the heading font size was 42 and the size of the text in the discussion was 12.

The book was divided into several topics and parts such as fitness assessment, how to compute your BMI, improving muscular strength, increased endurance, becoming more flexible, it’s all about power, etc. According to Brito et al. (July 2024), exercise in nature showed better performance and more adaptive mobility focused on task goals. As all things were considered, the manual plays a crucial role in helping student-athletes develop the skills required for their particular sports specialty in addition to helping them it also improves their bodies and general fitness.

This set of topics was focused on the development of student-athletes through the assessment of their fitness component which is the health-related and skill-related fitness component. Sebic et al. (March 2021) assert that nature-based moment exercises are essential for personal growth. The workout encourages and improves proper posture, movement structure, etc. Regularly performing these workouts also improved fitness in terms of both health and skill.

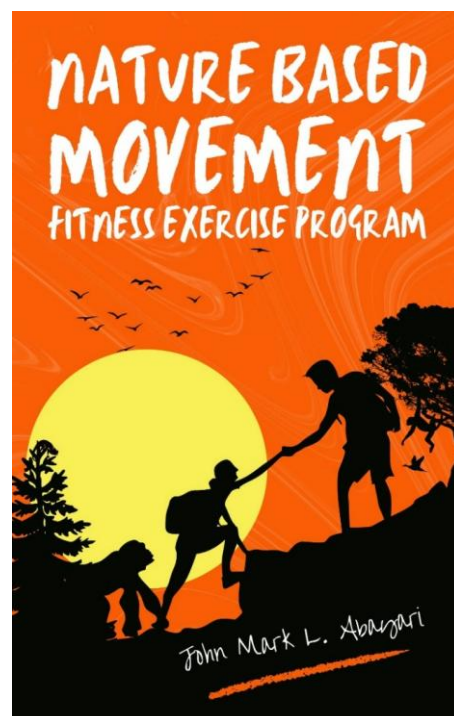


Figure 1. Cover page of the developed manual “Nature-Based Fitness Exercise Program”

Table 1 shows the pre-test and post-test scores of the student-athletes for health-related fitness. Additionally, the table displays how the student-athletes' performance improved following the intervention.

For the pre-test, participants got excellent interpretation for body mass index and squats, average for sit and reach, and below average interpretation for sit-ups and 800-meter run.

The average weighted mean is 2.81, which has a verbal meaning of average. For the post-test, the student-athletes got an excellent verbal interpretation for body mass index, 800-meter run, squats, and sit and reach while an average result for sit-ups. Resulting in an average weighted mean of 3.484 which has a verbal interpretation of excellent.

Student-athletes can achieve health-related fitness objectives by keeping these five components of fitness in mind. They can make sure that a well-rounded exercise program that will improve their health is being followed by creating a fitness regimen that includes all of these components. It is common to be more attracted to one aspect of fitness than another. Maintaining your enthusiasm for fitness requires incorporating elements that fit your objectives and way of life (Williams, 2024).

TABLE 1. Health-Related Fitness Pre-Test and Post-test Score of Student-Athletes

		Health-Related Fitness			
		Pre-Test		Post-Test	
		Mean	Verbal Interpretation	Mean	Verbal Interpretation
1	Body Mass Index	3.69	Excellent	3.86	Excellent
2	Sit-Ups	2.36	Below Average	2.96	Average
3	800 Meter Run	1.96	Below Average	3.26	Excellent
4	Squats	3.32	Excellent	3.88	Excellent
5	Sit And Reach	2.72	Average	3.46	Excellent
	Weighted Mean	2.81	Average	3.484	Excellent

Table 2 shows the pre-test and post-test scores of the student-athletes for skill-related fitness. Additionally, the table lists the improvements in the student-athletes' performance following the intervention.

For the pre-test participants got average verbal interpretation for the vertical jump and alternate hand wall scoring system, and below average verbal interpretation for the hexagon agility test, ruler drop test, straight line sprint, and balance error scoring system. Resulting in an average weighted mean of 2.22 which has a verbal interpretation of below average for the pre-test result.

According to Corbin et al. (2021), skill-related fitness components aid in improving our efficiency in sports and

other physical activities that call for motor skills. So, an intervention was executed to help student-athletes in their development. Resulting in a post-test rate of excellent verbal interpretation for vertical jump, alternate hand wall scoring system, ruler drop test, and straight-line sprint while an average result for hexagon agility test and balance error scoring system. Resulting in an average weighted mean of 3.35 which has a verbal interpretation of excellent.

TABLE 2. Skill-Related Fitness Pre-Test and Post-test Score of Student-Athletes

		Pre-test		Post-test	
		Mean	Verbal Interpretation	Mean	Verbal Interpretation
1	Vertical Jump	3.20	Average	3.66	Excellent
2	Alternate Hand Wall Scoring System	2.54	Average	3.94	Excellent
3	Hexagon Agility Test	1.86	Below Average	2.9	Average
4	Ruler Drop Test	1.86	Below Average	3.32	Excellent
5	Straight Line Sprint	2.10	Below Average	3.32	Excellent
6	Balance Error Scoring System	1.76	Below Average	2.94	Average
	Average Weighted Mean	2.22	Below Average	3.35	Excellent
	Post	3.48	0.39		

Table 3 describes the significant difference between student-athletes' pre-test and post-test results. It also shows that there are significant differences between the pre-test and post-test results under health-related fitness. All of these have a p-value that is less than 0.001, leading to the decision to reject null hypotheses and justify the significant differences between the pre-test and post-test scores. This suggests that the manual/ book "Nature-Based Movement Fitness Exercise Program" aided the student-athletes in the development of their fitness level especially in health-related components.

Exercise in nature demonstrated improved performance and more adaptive mobility focused on task goals (Brito et al., 2024). The handbook is essential for student-athletes to acquire the abilities necessary for their specific sports specialty while also enhancing their physical appearance and overall fitness.

TABLE 3. Difference between the Pre-test and Post-test scores of the student-athletes in health-related fitness

Group	Test	Exercise	Mean	SD	t-value	p-value	Decision	Interpretation
STUDENT-ATHELES	Pre	Body Mass Index	3.69	0.51	-3.06	<0.001	Reject Ho	Significant
	Post		3.86	0.41				
	Pre	Sit-up	2.36	0.72	-6.06	<0.001	Reject Ho	Significant
	Post		2.96	0.64				
	Pre	800-meter run test	1.92	0.83	-10.09	<0.001	Reject Ho	Significant
	Post		3.26	0.80				
	Pre	Squat	3.32	0.84	-5.03	<0.001	Reject Ho	Significant
	Post		3.88	0.33				
	Pre	Sit and Reach	2.72	1.16	-0.65	<0.001	Reject Ho	Significant
	Post		3.46	0.73				
	Pre	Average Weighted Mean	2.8	0.72	-3.57	<0.001	Reject Ho	Significant

Table 4 describes the significant difference between student-athletes' pre-test and post-test results. It also shows that there are significant differences between the pre-test and post-test results under skill-related fitness. All of these have a p-value that is less than 0.001, leading to the decision to reject null hypotheses and justify the significant differences between the pre-test and post-test scores.

This suggests that the manual/ book "Nature-Based Movement Fitness Exercise Program" aided the student-

athletes in the development of their fitness level especially in skill-related components.

According to Brito et al. (2024), exercise outside or mimicking animal movements improved performance and increased task-goal-focused adaptive mobility. When everything was taken into account, the handbook was critical in helping student-athletes not only improve their bodies and overall fitness but also acquire the abilities necessary for their specific sports expertise.

TABLE 4. Difference between the Pre-test and Post-test scores of the student-athletes in skill-related fitness

Group	Test	Exercise	Mean	SD	t-value	p-value	Deci-sion	Inter-pretation
STUDENT	Pre	Vertical Jump	3.20	0.93	-4.13	<0.001	Reject Ho	Significant
	Post		3.66	0.52				
	Pre	Alternate Hand Wall Scoring System	3.54	0.89	-3.4	<0.001	Reject Ho	Significant
	Post		3.94	0.31				
	Pre	Hexagonal Agility Test	1.86	0.76	-10.11	<0.001	Reject Ho	Significant
	Post		2.90	0.54				
Pre	Ruler Drop Test	1.86	1.03	-10.84	<0.001	Reject Ho	Significant	
Post		3.32	0.84					
ATHELES	Pre	Straight Line Sprint	2.10	1.07	-9.98	<0.001	Reject Ho	Significant
	Post		3.32	0.62				
	Pre	Balance Error Scoring System	1.76	1.1	-7.46	<0.001	Reject Ho	Significant
	Post		2.94	1.2				
	Pre	Overall	2.39	0.78	<0.001	Reject Ho	Significant	
	Post	Average Weighted Mean	3.35	0.16				

TABLE 5. Perceived effect of the developed training program

Theme	Category	Sample Statement
Emotional Effect	Emotional response	It makes me feel relaxed after the exercise but somehow it makes me feel soreness. I feel my workout is happy and enjoyable.
	Sense of fulfillment	
Physical Effect	Beneficial to physical and mental health	I feel exhausted because of the workout. By doing this workout I feel changes in my body like my body is in great shape. Overall, this workout helps me to stay shape and healthy. The nature-based fitness exercise program makes me feel energetic and healthy. I'm enjoying this type of exercise that will contribute to my body and health.
	Benefits and improvements	
	Feeling of tiredness and experience pain	
	Beneficial to physical and mental health	

Table 5 shows the accumulated answers of the student-athletes on the interview question that focused on the perceived effect of the developed nature-based fitness exercise program. The answers were interpreted into various codes such as: *feeling tired and experiencing pain* which is the common effect of an effective training program, but even though student-athletes experienced this feeling they were still very eager to participate because of the next code which is having the *sense of fulfillment* saying that the student-athletes enjoy participating in the exercise program and experience the sense of relaxation after the activity, student-athletes also sees that it is *beneficial to physical and mental health* justifying that the program can also improve individuals well-being to stay healthy and fit and lastly, the program helps in the *improvement of health and skill-related fitness* which described that the program helps the student-athletes to improve their overall performance in doing different physical and skill related activities. To simplify the code the researcher divided it into three category which was the *physical reaction* focuses on the response of the body after the fitness program was done, the *emotional response* which was the psychological thinking of the respondents while doing the activity and the *benefits and improvement* that focus on the positive impact of the fitness exercise program.

All in all, the researcher came up with a theme that describe the answers of the respondents based on the category that was created and it was the "*discern effect of the training program.*" Describing how student-athletes respond, think, and act while doing the nature-based movement fitness exercise program. As cited in Total Well Being (2018) animal flow program encourages creativity and enjoyment, it is fundamentally grounded in science. It bases its overall approach to movement and fitness on a number of tried-and-true ideas from kinesiology and exercise science. A number of factors contribute to the program's foundation in scientific research, including its emphasis on multi-planar and functional movement focused on anatomical subsystems, its entire bodyweight training basis, its use of closed-chain exercises to achieve goals, its ability to integrate into a variety of fitness programs and resistance training models, and its provision for assessment, regression, and progression at every stage.

Table 6 shows the collected answers of the respondents in an interview question focused on the immediate result of the effectiveness of developing a nature-based movement fitness exercise training program. The answers were interpreted into various codes to easily discuss the responses of the student-athletes. The respondents said that the program can help in

boosting of energy meaning that after the program, student-athletes became more active and can still do more physical activities, it also made them *lose and gain weight* which helped them to reach the ideal body figure that was needed in their respective sports of specialization and through this, respondents *experience much lighter feeling* while doing difference task and other physical activities, lastly, student-athletes said that after doing the program their *physical fitness level improves* a lot.

The codes were simplified into two categories which were the *physiological and movement enhancement* focus on the

changes to the mobility and activeness of the respondents after the program, the other one was *fitness development* which describes the overall development in the physical body and the performance of the student-athletes to a different task and skill-related activities. The researcher created a theme based on the interpreted categories and came up with the *progressive result of the training program*. Based on the gathered data, the interview shows the high effectiveness of the created training program describing a positive result.

TABLE 6. Immediate result of the developed training program

Theme	Category	Sample Statement
Progressive results in fitness	Physiological and movement enhancement	After the implementation of the program the team became more fun and energized. Felt more active and fun every workout. And became more consistent to attend the sessions because it was fun and helps in the improvements of the body.
	Fitness development	For me my body became more flexible after I exercise and my body felt more energetic. My legs turn to thick and my stamina improved also strength, but felt muscle soreness. Enhanced body and improved muscles. Body recovers easily after exhausting workout.

According to Douse (2020), with locomotion needing a considerable amount of strength, movements like the Travelling Beast, which requires the sustenance of body weight on all four limbs extremely near to the ground, are excellent for doing so. For instance, after performing a Travelling Beast for a few seconds, you could move on to a Lateral Travelling Ape and then a few Side Kick-throughs. This keeps things interesting, improves your general conditioning, and lets you go at your speed and take breaks as needed. You obtain enjoyment, freedom, and fluidity when you combine everything into one flow. Meaning to say animal flow or nature-based fitness exercise programs have a lot of benefits such as building strength, improvements in mobility, increase of cardiovascular endurance, improved coordination, and experience of fun while doing the exercise.

IV. CONCLUSION AND RECOMMENDATIONS

Based on the data gathered in this study, it can be therefore determined that the use of a manual/ book entitled Nature-Based Movement Fitness Exercise Program is effective in enhancing student-athletes' overall fitness level. Also, the manual was successful since the result of the post-test was excellent and there is a significant difference between pre-test and post-test results.

For continuity and sustainability, the following are hereby recommended:

1. Nature-based movement fitness exercise programs shall be appreciated and considered as useful tools in improving the fitness level of student-athletes.
2. Coaches and trainers shall encourage the use of nature-based fitness exercise programs in order to promote a more interactive, fun, and relaxing conditioning workout for student-athletes.
3. The promotion of nature-based movement workouts as a significant part of the curriculum of sports and fitness shall be considered since it is an effective way to develop the fitness level of individuals.

4. Professors and Instructors particularly in the field of physical education were encouraged to include nature-based workouts in their syllabus topics which can help student improve their overall fitness.

5. Institutions may be encouraged to provide adequate funding for the development, promotion, and distribution of this created manual which is beneficial to all.

REFERENCE

- [1]. Agustiningih, D. (2017). Animal studies for effect of exercise to postmenopausal women. *Journal of Yoga and Physiotherapy*, 2(2), 26–29. <https://doi.org/10.19080/jyp.2017.02.555585>
- [2]. Ahmed, T. (2015). Improving musculoskeletal fitness and the performance enhancement of basketball skills through neuromuscular training program. *Journal of Human Sport and Exercise*, 10(3), 795–804. <https://doi.org/10.14198/jhse.2015.103.05>
- [3]. Anonymous. (2018, July 9). Benefits of animal flow. *Total Wellbeing*. <https://totalwellbeing.co.im/benefits-of-animal-flow%EF%B8%8F/>
- [4]. Anonymous. (2020, May 19). How Technology is Revolutionizing Sports Training. *Data Sports Group*. <https://datasportsgroup.com/news-article/117726/how-technology-isrevolutionizingsports-training/>
- [5]. Bakinde, S. T. (2021). Educating Aerobic Exercise and Skill-Related Fitness of Athletes in University of Ilorin. *Indonesian Journal of Multidisciplinary Research*, 2(1), 195–202. <https://doi.org/10.17509/ijomr.v2i1.39746>
- [6]. Bhasin, H. (2024, December 20). What is Training Program? Definition, Meaning and Types. *Marketing91*. <https://www.marketing91.com/training-program/>
- [7]. Bjerklund, M., & Åmot, I. (2023). Outdoor activities promoting mental and physical health and well-being in Sámi early childhood education and care institutions. *Journal of Childhood Education & Society*, 4(3), 261–273. <https://doi.org/10.37291/2717638x.202343287>
- [8]. Britton, Ú., Issartel, J., Fahey, G., Conyngham, G., & Belton, S. (2019b). What is health-related fitness? Investigating the underlying factor structure of fitness in youth. *European Physical Education Review*, 26(4), 782–796. <https://doi.org/10.1177/1356336x19882060>
- [9]. Calcaterra, V., Larizza, D., Codrons, E., De Silvestri, A., Brambilla, P., Abela, S., Arpesella, M., & Vandoni, M. (2012). Improved metabolic and cardiorespiratory fitness during a recreational training program in obese children. *Journal of Pediatric Endocrinology and Metabolism*, 26(3–4), 271–276. <https://doi.org/10.1515/jpem-2012-0157>
- [10]. Caldicott, C. V., & Holsapple, J. W. (2008). Training for fitness: Reconsidering the 80-Hour work week. *Perspectives in Biology and Medicine*, 51(1), 134–143. <https://doi.org/10.1353/pbm.2008.0000>

- [11]. Cepero, M., Romero-Sánchez, D., Rojas-Ruiz, F. J., & De La Cruz-Márquez, J. C. (2012). Differences of functional fitness in adults after 9 months of combined exercise training program. *Journal of Human Sport and Exercise*, 7(1), 321–330. <https://doi.org/10.4100/jhse.2012.7.1.10>
- [12]. Chen, W., Hammond-Bennett, A., Hynnar, A., & Mason, S. (2018). Health-related physical fitness and physical activity in elementary school students. *BMC Public Health*, 18, 195. <https://doi.org/10.1186/s12889-018-5107-4>
- [13]. Christiana, R. W., James, J. J., & Battista, R. A. (2017). Prescribing outdoor physical activity to children: health care providers' perspectives. *Global Pediatric Health*, 4. <https://doi.org/10.1177/2333794x17739193>
- [14]. Claned. (2024, May 21). 10 types of Training Programs: The Top 10 Most In-Demand. <https://claned.com/types-of-training-programs/>
- [15]. Crunch Fitness. (2023, April 6). The 5 Health-Related Components of Fitness. Crunch. <https://www.crunch.com/thehub/health-related-fitness/>
- [16]. De Angelis, K., Rodrigues, B., Zanescio, A., De Oliveira, E. M., De Santa'Anna Evangelista, F., Coelho, H. J., Junior, Delbin, M. A., Brum, P. C., Ramires, P. R., Soares, P. P., Wichí, R. B., Amaral, S. L., & Sanches, I. C. (2017). The importance of animal studies in Exercise Science. *Motriz Revista De Educação Física*, 23(spe). <https://doi.org/10.1590/10.1590-6574201700si0002>
- [17]. De Silva, C., Pullen, J., Northcutt, K., & Jenkins, J. (2019). An authentic research project in animal behavior as an introductory physics laboratory exercise. *The Physics Teacher*, 57(9), 618–620. <https://doi.org/10.1119/1.5135792>
- [18]. DeNysschen, C. A., Cardina, C., Sobol, J. J., Zimmerman, B., & Gavronsky, A. (2018). Health, wellness, and fitness training. *International Journal of Police Science & Management*, 20(1), 66–79. <https://doi.org/10.1177/1461355718756412>
- [19]. Dominelli, P. B., Guenette, J. A., Wilkie, S. S., Foster, G. E., & Sheel, A. W. (2011). Determinants of Expiratory Flow Limitation in Healthy Women during Exercise. *Medicine & Science in Sports & Exercise*, 43(9), 1666–1674. <https://doi.org/10.1249/mss.0b013e318214679d>
- [20]. Douse, L. (2020, April 21). Top 5 benefits of Animal Flow. *Bodyworks Massage and Movement Studio*. <https://bodyworksstudio.co.uk/top-5-benefits-of-animal-flow/>
- [21]. Ekblom, Ö., Oddsson, K., & Ekblom, B. (2004). Health - related fitness in Swedish adolescents between 1987 and 2001. *Acta Paediatrica*, 93(5), 681 – 686. <https://doi.org/10.1111/j.1651-2227.2004.tb02997.x>
- [22]. Frei, L. (2023, October 26). Program Design 101: How to build your own workout program. *TrainHeroic*. <https://www.trainheroic.com/blog/how-to-build-your-own-workout-program/>
- [23]. Fromel, K., Kudlacek, M., Groffik, D., Svozil, Z., Simunek, A., & Garbaciak, W. (2017). Promoting Healthy Lifestyle and Well-Being in Adolescents through outdoor Physical activity. *International Journal of Environmental Research and Public Health*, 14(5), 533. <https://doi.org/10.3390/ijerph14050533>
- [24]. Ganley, K. J., Paterno, M. V., Miles, C., Stout, J., Brawner, L., Girolami, G., & Warren, M. (2011). Health-Related fitness in children and adolescents. *Pediatric Physical Therapy*, 23(3), 208–220. <https://doi.org/10.1097/pep.0b013e318227b3fc>
- [25]. Gatchalian, J. (2023). High-Intensity Interval Training Program: Its Relation To Health-Related Fitness And Attitude Of Grade 12 Students. *International Journal of Research Publications*, 125(1), 43–56. <https://doi.org/10.47119/ijrp1001251520234889>
- [26]. Gerber, M., Lindwall, M., Lindegård, A., Börjesson, M., & Jonsdottir, I. H. (2013). Cardiorespiratory fitness protects against stress-related symptoms of burnout and depression. *Patient Education and Counseling*, 93(1), 146–152. <https://doi.org/10.1016/j.pec.2013.03.021>
- [27]. Gifford, J., Kofoed, J., Leach, O., Wallace, T., Dorff, A., Hanson, B. E., Proffitt, M., Griffin, G., & Collins, J. (2022). Impact of Interrepetition Rest on Muscle Blood Flow and Exercise Tolerance during Resistance Exercise. *Medicina*, 58(6), 822. <https://doi.org/10.3390/medicina58060822>
- [28]. Guerra, L., Luciano, R., Alves, D., Pereira, P., Lauria, T., De Lima, C., Evangelista, A., Rica, R., Bocalini, D., Caio, B., La, C., & Teixeira, S. (2019). A Low-Cost and Time-Efficient Calisthenics Strength Training Program Improves Fitness Performance of Children. *Journal of Physical Education and Sport*, 19(1), 58–64. <https://doi.org/10.7752/jpes.2019.s1009>
- [29]. Haddock, B., Hansen, S. K., Lindberg, U., Nielsen, J. L., Frandsen, U., Aagaard, P., Larsson, H. B. W., & Suetta, C. (2021). Exercise-induced fluid shifts are distinct to exercise mode and intensity: a comparison of blood flow-restricted and free-flow resistance exercise. *Journal of Applied Physiology*, 130(6), 1822–1835. <https://doi.org/10.1152/jappphysiol.01012.2020>
- [30]. Hammami, A., Randers, M. B., Kasmi, S., Razgallah, M., Tabka, Z., Chamari, K., & Bouhlel, E. (2018). Effects of soccer training on health-related physical fitness measures in male adolescents. *Journal of Sport and Health Science/Journal of Sport and Health Science*, 7(2), 169–175. <https://doi.org/10.1016/j.jshs.2017.10.009>
- [31]. Helge, J. W., Damsgaard, R., Overgaard, K., Andersen, J. L., Donsmark, M., Dyrskog, S. E., Hermansen, K., Saltin, B., & Dagaard, J. R. (2007). Low - intensity training dissociates metabolic from aerobic fitness. *Scandinavian Journal of Medicine and Science in Sports*, 18(1), 86–94. <https://doi.org/10.1111/j.1600-0838.2006.00604.x>
- [32]. Hintze, S., & Yee, J. R. (2022). Animals in flow – towards the scientific study of intrinsic reward in animals. *Biological Reviews of the Cambridge Philosophical Society*, 98(3), 792–806. <https://doi.org/10.1111/brv.12930>
- [33]. Hull, E. E., Liu, W., & Kovacs, I. (2017). Physical activity classes Improve Health-Related physical fitness levels. *Medicine & Science in Sports & Exercise*, 49(5S), 611. <https://doi.org/10.1249/01.mss.0000518601.49782.6d>
- [34]. Isojärvi, H., Keinänen-Kiukaanniemi, S., Kallio, M., Kaikkonen, K., Jämsä, T., Korpelainen, J., & Korpelainen, R. (2010). Exercise and fitness are related to peripheral nervous system function in overweight adults. *Medicine & Science in Sports & Exercise*, 42(7), 1241–1245. <https://doi.org/10.1249/mss.0b013e3181cb8331>
- [35]. James, L., Kiernan, N., & Byrnes, J. (2007). Family fitness program: Focus group research. *Journal of the American Dietetic Association*, 107(8), 98. <https://doi.org/10.1016/j.jada.2007.05.270>
- [36]. Janssen, I., & Cramp, W. C. (2007). Cardiorespiratory fitness is strongly related to the metabolic syndrome in adolescents. *Diabetes Care*, 30(8), 2143–2144. <https://doi.org/10.2337/dc07-0734>
- [37]. Kariyawasam, A., Ariyasinghe, A., Rajaratnam, A., & Subasinghe, P. (2019). Comparative study on skill and health related physical fitness characteristics between national basketball and football players in Sri Lanka. *BMC Research Notes*, 12(1), 397. <https://doi.org/10.1186/s13104-019-4434-6>
- [38]. Mackenzie, B. (2001). Training programs. *BrianMac Sports Coach*. <https://www.brianmac.co.uk/trainprog.htm>
- [39]. Mebrat, Y. (2020). Effects of anaerobic exercise on some selected skill related physical fitness components. *International Journal of Yogic, Human Movement and Sports Sciences*, 5(1), 76–79. <https://doi.org/10.22271/yogic>
- [40]. Mehrabani, J. (2018). Participation in educational physical training program: physical fitness, exercise physiology knowledge and fitness satisfaction in inactive male college student. *Journal of Physical Fitness Medicine & Treatment in Sports*, 2(2), 1–7. <https://doi.org/10.19080/jpfmts.2018.02.555581>
- [41]. Mettauer, B., Lampert, E., Schnedecker, B., Frey, M., Geny, B., Eisenman, B., Hoppeler, H., & Lonsdorfer, J. (1993). A short endurance training program increases the physical fitness of heart transplant recipients. *Science & Sports*, 8(1), 25–26. [https://doi.org/10.1016/s0765-1597\(05\)80078-4](https://doi.org/10.1016/s0765-1597(05)80078-4)
- [42]. Mohammed, M. H. H. (2015). Effect of squash training program on health related physical fitness variables of male college students. *Journal of Human Sport and Exercise*, 10(2), 687–691. <https://doi.org/10.14198/jhse.2015.10.proc2.07>
- [43]. Mola, D. W., Rahman, M. H., Uvinha, R. R., Adane, A. K., Tyagi, S., Adili, D., & Islam, M. S. (2025). Effect of 12-week training program on the fitness and performance of long jumpers. *International Journal of Kinesiology and Sports Science*, 13(1), 45–53. <https://doi.org/10.7575/aiac.ijkss.v.13n.1p.45>
- [44]. MyDr. (2024, January 11). Strength training exercises. *myDoctor*. <https://mydr.com.au/sports-fitness/strength-training-exercises/>
- [45]. O'Dair, B. (2020, June 1). What's your strength training hang-up? *AARP*. <https://www.aarp.org/health/healthy-living/strength-training/>
- [46]. Palma, F., III, Rivera, R. A., Belediano-Ellesorio, J. L., Oh, P. M., Doruelo, M. E., Lopez, G. A., Alegarbes, R., & Solidarios, J. (2024). Assessing Health-Related Physical Fitness among Filipino Junior High

School students: Implications for tailored fitness programs. *Psychology and Education: A Multidisciplinary Journal*, 23(9), 1198–1206. <https://doi.org/10.5281/zenodo.13341203>

[47]. Pangrazi, R. (2019, June). Health-Related fitness, Skill-Related fitness, & Manipulative skills. *Human Kinetics*. https://us.humankinetics.com/blogs/physical-education-and-health/health-related-fitness-skill-related-fitness-manipulative-skills?srsltid=AfmBOoqE3an0TgP0sQS7X2nEepz3jU2FGRScJvVktC0QerWnaQ_ZrRk9

[48]. Paoli, A., & Bianco, A. (2015). What is fitness training? Definitions and Implications: A Systematic review article. *Iran J Public Health*, 44(5), 602–614. <https://pmc.ncbi.nlm.nih.gov/articles/PMC4537617/>

[49]. Pate, R., Oria, M., Pillsbury, L., & Board, F. a. N. (2012, December 10). Health-Related Fitness Measures for Youth: Body composition. Fitness Measures and Health Outcomes in Youth - NCBI Bookshelf. <https://www.ncbi.nlm.nih.gov/books/NBK241316/>

[50]. Penn State College of Medicine Research. (2021, August 11). Introduction to strength Training. <https://research.med.psu.edu/oncology-nutrition-exercise/patient-guides/strength-training/>

[51]. Preiato, D. (2024, September 2). Workout Routines for Men: The Ultimate Guide. *Healthline*. <https://www.healthline.com/nutrition/workout-routine-for-men>

[52]. Qi, Y., Zhang, C., & Kameda, H. (2022). Animal exercise: a new evaluation method. *Journal of Computer Science Research*, 4(2), 24–30. <https://doi.org/10.30564/jcsr.v4i2.4759>

[53]. Ribeiro, A., Silva, D., Carvalho, F., Schiavoni, D., Jesus, B., & Cyrino, E. (2013). Health-related physical fitness in men and women aged 17-26 years. *Revista Brasileira De Atividade Física & Saúde*, 18(2), 197–204. <https://doi.org/10.12820/rbafs.v.18n2p197>

[54]. Rieck, T., Jackson, A., Martin, S. B., Petrie, T., & Greenleaf, C. (2013). Health-Related Fitness, Body Mass Index, and Risk of Depression among Adolescents. *Medicine & Science in Sports & Exercise*, 45(6), 1083–1088. <https://doi.org/10.1249/mss.0b013e3182831db1>

[55]. Rubenfire, M., Mollo, L., Krishnan, S., Finkel, S., Weintraub, M., Gracik, T., Kohn, D., & Oral, E. A. (2011). The metabolic fitness program. *Journal of Cardiopulmonary Rehabilitation and Prevention*, 31(5), 282–289. <https://doi.org/10.1097/hcr.0b013e318220a7eb>

[56]. Ruiz, J. R., Castro-Pinero, J., Artero, E. G., Ortega, F. B., Sjostrom, M., Suni, J., & Castillo, M. J. (2009). Predictive validity of health-related fitness in youth: a systematic review. *British Journal of Sports Medicine*, 43(12), 909–923. <https://doi.org/10.1136/bjism.2008.056499>

[57]. Samara, S., Tsanaktsidis, K., Katartzis, E., Kontou, M., Kourtessis, T., & Tzetzis, G. (2022). Health and skill related physical fitness in adolescents with motor difficulties compared to their peers without motor difficulties. *Journal of Advances in Sports and Physical Education*, 5(4), 58–67. <https://doi.org/10.36348/jaspe.2022.v05i04.001>

[58]. Shepherd, H. A., Evans, T., Gupta, S., McDonough, M. H., Doyle-Baker, P., Belton, K. L., Karmali, S., Pawer, S., Hadly, G., Pike, I., Adams, S. A., Babul, S., Yeates, K. O., Kopala-Sibley, D. C., Schneider, K. J., Cowle, S., Fuselli, P., Emery, C. A., & Black, A. M. (2021). The impact of COVID-19 on High School Student-Athlete experiences with physical activity, mental health, and social connection. *International Journal of Environmental Research and Public Health*, 18(7), 3515. <https://doi.org/10.3390/ijerph18073515>

[59]. Stricker, P. R., Faigenbaum, A. D., McCambridge, T. M., LaBella, C. R., Brooks, M. A., Canty, G., Diamond, A. B., Hennrikus, W., Logan, K., Moffatt, K., Nemeth, B. A., Pengel, K. B., & Peterson, A. R. (2020). Resistance training for children and adolescents. *PEDIATRICS*, 145(6). <https://doi.org/10.1542/peds.2020-1011>

[60]. Takada, S., Okita, K., Suga, T., Omokawa, M., Morita, N., Horiuchi, M., Kadoguchi, T., Takahashi, M., Hirabayashi, K., Yokota, T., Kinugawa, S., & Tsutsui, H. (2011). Blood flow restriction exercise in sprinters and endurance runners. *Official Journal of the American College of Sports Medicine*, 44(3), 413–419. <https://doi.org/10.1249/mss.0b013e31822f39b3>

[61]. Thomas, K. N., Kissling, L. S., Gibbons, T. D., Akerman, A. P., Van Rij, A. M., & Cotter, J. D. (2020). The acute effect of resistance exercise on limb blood flow. *Experimental Physiology*, 105(12), 2099–2109. <https://doi.org/10.1113/ep088743>

[62]. Trek. (2018, February 2). What is resistance training? *Translating Research Evidence and Knowledge*. <https://exercise.trekeeducation.org/resistance-training/what-is-resistance-training/>

[63]. Tschakovsky, M. E., Saunders, N. R., Webb, K. A., & O'donnell, D. E. (2006). Muscle Blood-Flow dynamics at exercise onset. *Medicine & Science in Sports & Exercise*, 38(10), 1811–1818. <https://doi.org/10.1249/01.mss.0000230341.86870.4f>

[64]. Tucker, H. J., Bebeley, S. J., & Conteh, M. (2017). Motor skill level of children and adolescents Motivation in physical activity: a major concern for public health and physical education. *International Journal of Science and Research (IJSR)*, 6(12)(2319–7064), 482–486. <https://doi.org/10.21275/ART20178705>

[65]. Voelcker - Rehage, C., Godde, B., & Staudinger, U. M. (2009). Physical and motor fitness are both related to cognition in old age. *European Journal of Neuroscience*, 31(1), 167 – 176. <https://doi.org/10.1111/j.1460-9568.2009.07014.x>

[66]. Vowell, C., Welk, G. J., Saint-Maurice, P., Csányi, T., & Kaj, M. (2015). Distribution of health-related physical fitness in Hungarian youth. *Medicine & Science in Sports & Exercise*, 47(5S), 696. <https://doi.org/10.1249/01.mss.0000478625.79894.07>

[67]. Wackerhage, H., & Schoenfeld, B. J. (2021). Personalized, Evidence-Informed training plans and exercise prescriptions for performance, fitness and health. *Sports Medicine*, 51(9), 1805–1813. <https://doi.org/10.1007/s40279-021-01495-w>

[68]. Waehner, P. (2024, May 20). What a complete workout schedule looks like. *Verywell Fit*. <https://www.verywellfit.com/sample-workout-schedule-1230758>

[69]. Williams, L. W. M. (2024, June 10). 5 Health-Related components of fitness. *Verywell Fit*. <https://www.verywellfit.com/the-components-of-fitness-4154074>