Research on Improving the Psychological Adaptability of Sports Athletes in the Process of Track and Field Training

Xiaoguang Guo[1]*

Abstract

After conducting in-depth research on a huge number of runners, we could determine the direct relationship between the psychological qualities of athletes and the aspects that influence the good performance of track and field events. After extensive research on a large number of runners, we did the mathematical-statistical analysis and then applied a body shape index to the data of many athletes. The ratio of the athlete's lower body length to height and activity may be determined by examining the specific lower body length index. This model determines the relationship between the athlete's body size, physical function, mental quality, and other indications. The study determined that psychological training is essential to athletic training. Male athletes possess superior psychological qualities over their female counterparts. The association between paranoid factors and sports performance is weakly positive. Each category and the total mental health score were weakly linked with athletic performance. In terms of psychological quality, men's desire to win is somewhat greater than women's, and men's will be slightly lower than women's. Performance goals have a substantial effect on the mental health and athletic performance of athletes.

Keywords: track and field team; endurance; body shape; physical function; psychological quality

Introduction

This work uses questionnaires to examine further and determine the optimal mental state dimension of Chinese track and field players. We investigated the significance and defining aspects of each aspect of optimal mental state for athletes in different sports.

The practical value of this study is that the model testing scholars who investigate the contributing components proposed the dimension of this group of athletes' optimal psychological state. The substance of the dimensions comprises the balance between task difficulty and personal capacity, concentration on the current task, the experience of self-goal, a sense of control, the fusion of action and awareness, clear feedback, clear goals, and loss of self-awareness. In addition, they highlighted the numerous dimensions of significance and the connection between athletic performance. The majority of this question's research has been on skill-based categories. Nevertheless, mental and intellectual confrontation is prevalent among elite athletes (Thomas et al., 2021). However, the development of mental capacity has always been a challenge that many efforts have failed to address. This is also one of the primary elements that make it difficult for this form of a project to become the dominant project type in China.

This paper discusses the practical difficulty that researchers requested individuals to recall their most memorable sporting events (Criticos et al., 2020). In the end, the researchers discovered six factors that define excellent exercise ideals: physical relaxation, mental peace, low anxiety, high energy, optimism, happiness, ease, automaticity, alertness, concentration, self-assurance, and a sense of control. The fitness-oriented category has fallen into disuse. In particular, track and field According to the training theory of the project team, the project is primarily a single-action, periodic sports project. The primary characteristic of the program is the rapid improvement in physical fitness. Prior research in this field has primarily focused on regulating athletes' physical fitness. Only in this manner will we be able to play with the greatest competitive ability in the competition and attain improved athletic performance. In addition, training emphasizes physical fitness and talents.

Some academics have undertaken specialized research on the mental condition of athletes' fluency, which poses a theoretical difficulty for this paper's research. They administered the Athlete Fluency Mental State Inventory to athletes (Aletta, 2020). Further questionnaire design and confirmatory factor analysis were conducted based on the "fluency questionnaire" component (Close et al., 2019). Fluency Questionnaire dimensions included difficulty and skill balance, integration of action and awareness, clear goals, emotional feedback, preoccupation with the current activity, a strong sense of control, loss of self-consciousness, time changes, and positive experiences.

[1] Chifeng University, Chifeng, 024000, China
Corresponding Author's Email: guoxiaoguang18@163.com

Methodology

These research methods: This study sampled 176 track & field athletes from the province of Qinghai. The fundamental details are provided in Table 1. The province of Qinghai is a goldmine for identifying and training long-distance endurance athletes. By examining athletes' physical and mental features, the physical fitness of adolescents in the context of endurance track and field sports can be intuitively studied (Peeling et al., 2019). Table 1 Statistics of basic physical information of athletes (N=176)

Gender	Sample size/person	Age	Height/cm	Weight/kg
Male	103	14.87±1.31	166.3±8.23	53.77±8.34
Female	73	14.54±1.42	158.9±5.76	49.11±6.28

The physical form of endurance track and field athletes

Following is the justification behind the study's design: Different sports have distinct selection criteria for athletes. As an illustration, basketball players are often tall. Additionally, endurance track and field have distinct qualities. Height-related contents are often compact and lightweight. Indicators of specific body types are provided in Table 2. According to Table 2, the body types of endurance track and field competitors exhibit distinct characteristics. We have chosen track and field competitors more suited for long-distance and endurance events. (Hsu et al., 2020). The data management concept is as follows: Compared to the body size measures of their counterparts, endurance track and field players are distinguished by their thinner physique. Its bottom limbs are significantly longer than those of its peers. Athletes have elevated arches and excellent suppleness. They feature large shoulders, robust chests, narrow pelvises, and tiny knee and ankle circumferences. We have a preliminary understanding of the external body shape of endurance track and field competitors, thanks to Table 2. However, the selection criteria for endurance track and field athletes cannot be intuited from various multidimensional factors. This method cannot scientifically determine which body type is best suited for long-distance endurance sports. Inability to objectively explain the decision-making process Perera (2020).

Table 2

Endurance track and field athletes

Body index classification	Indicator name	Male	Female
body shape indicator	wingspan	169.76±9.38	161.19±6.63
	Leg length A	99.56±6.47	94.56±4.14
	Leg length B	84.45±5.13	81.99±3.69
	Calf length ± foot height	47.96±3.97	44.89±2.27
	Achilles tendon length	25.71±2.47	23.25±2.14
	medial ankle length	6.23±1.73	5.98±1.61
	Outer ankle length	5.33±1.52	5.25±1.51
	foot length	24.34±1.21	22.74±1.99
	high dorsum	7.14±1.58	6.77±1.52
	hip width	28.86±3.17	29.26±1.56
	ankle width	7.19±2.35	6.3±1.34
Skinfold Thickness Indicator	upper arm	8.41±3.85	14.32±4.39
	subscapular angle	11.21±3.85	14.61±4.21
	abdomen	11.41±4.26	15.41±8.71
	Chest	7.22±3.99	11.18±15.91
	iliac	11.5±3.92	13.57±4.11
	thigh	15.66±5.12	21.96±5.42
Girth index	abdominal circumference	69.14±6.39	65.86±5.41
	hip circumference	86.16±5.25	85.51±4.89
	thigh circumference	46.26±6.82	47.17±3.81
	Calf circumference	32.53±2.91	32.19±2.63
	Knee Wai	34.29±4.41	33.18±2.65
	Ankle	21.98±1.63	21.19±1.51

The article more objectively reflects the differences between the various indicators of the body. We ensure that endurance track and field athletes are selected based on the same objective criteria. We select athletes scientifically and reasonably and introduce the body shape index. Specific lower limb length index = lower limb length A/height × 100%. The ratio of the length of the calf = (the length of the lower limb B - the length of the calf A) / the length of the calf × 100%. Specific Achilles tendon length index = ankle circumference / Achilles tendon length × 100% Joaquim, Juzwiak, and Winckler (2019).

The specific lower body length index might show an athlete's lower body length to height ratio. The greater the value, the longer the athlete's lower limbs and the larger their stride during the activity. Then the weight will become lighter. During the workout, retaining maximal speed advantage with minimal energy expenditure is easier. Consequently, the greater the index, the better.

The proportionate relationship between the upper and lower legs is intuited from the length ratio of the thigh to the lower leg. When the thigh fraction is relatively small, the swing range and swing radius will be substantially less. According to the relationship between swing amplitude and swing speed, the swing speed will be relatively quick, and athletes with relatively short thighs will have a higher stride frequency. In contrast, if the proportion of the thigh is increased, the swing range will expand. At this point, the swing radius of the athlete's thigh expands, and the swing velocity slows down. However, its stride will lengthen. Therefore, a smaller index is preferable Tsushima et al. (2019).

Data collected from here: The length index of the Achilles tendon directly indicates calf muscle strength. The shorter the index, the longer the Achilles tendon of the athlete. Lesser the ankle circumference, the greater the muscular strength of the athlete. Its strength is concentrated. The more the athlete's explosiveness, the easier he or she is to push and stretch.

Consequently, the lower the index, the better. We additionally processed Table 2's data. The outcomes of the data operation are presented in Table 3 and Figure 1. Homan, Crowley, and Sim (2019).

Table 3

Derived Metrics Statistics

Gender	Male	Female
N	100	68
Quotlet Index	311.41±40.16	308.48±31.73
Lower limb length A/height × 100%	59.85±1.09	59.51±1.35
(Leg Length B - Calf Length A) / Calf Length A × 100%	76.59±9.58	80.47±4.85
Ankle circumference/Achilles tendon length×100%	86.11±9.04	91.33±9.53

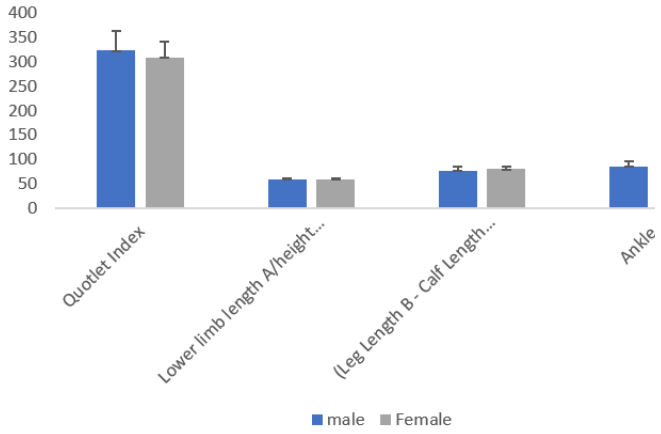

Figure. *1* Derived Metrics Statistics.

We compare the statistical outcomes of Table 3's developed indicators to the "Scientific Selection of Athletes." The study indicated that the lower limb length index of endurance track and field competitors was much higher than the minimum criterion for "scientific selection of athletes." Its particular calf-length index and specific Achilles' tendon-length index are significantly below the minimum criteria established by "Scientific Selection of Athletes." This demonstrates that endurance track and field competitors typically possess longer lower limbs. The ratio of thigh-length to calf-length is low, but calf length is long. Athletes have a longer tendon length and a smaller ankle size, and their body structure is more mechanistically sound Onate (2019).

Modeling analysis of long-term effects of explosive leg force on track and field athletes

The article has realized the modeling of the long-term effect of the explosive leg force of track and field athletes. We first need to combine the Coriolis force and centrifugal force modeling methods to build a dynamic model of the explosive leg force of track and field athletes. At the same time, we give the initial configuration $\theta_{start} \in C_{free}$ (free Lebesgue space) of the track and field athlete's leg. We determine a virtual intercept point p_{obj} and a set of kinetic distributions g_c for the explosive leg force of track and field athletes. Assuming that the resultant force on the rigid body of the track and field athlete's leg is denoted as

$\{A^0, A^1\}$. The homogeneous matrix $i-1T_i(q_i)$ between the coordinate systems i $i-1$ can be expressed as formula (1):

$$i-1T_i(q_i)=\begin{bmatrix} c_i & -c_{ai}s_i & s_{ai}s_i & a_ic_i \\ s_i & c_{ai}c_i & s_{ai}c_i & a_is_i \\ 0 & s_{ai} & c_{ai} & d_i \\ 0 & 0 & 0 & 1 \end{bmatrix} \quad (1)$$

We obtain the equations of longitudinal motion of the track and field athlete's leg as:

$$m\frac{dV}{dt}=P\cos\alpha-X-mg\sin\theta \quad (2)$$

$$mV\frac{d\theta}{dt}=P\sin\alpha-Y-mg\cos\theta \quad (3)$$

$$J_z\frac{d\omega_z}{dt}+(J_y-J_x)\omega_y\omega_x+J_{xy}(\omega_y^2-\omega_x^2)=M_z \quad (4)$$

$$\frac{dx}{dt}=V\cos\theta \quad (5)$$

$$\frac{dy}{dt}=V\sin\theta \quad (6)$$

$$\frac{d\vartheta}{dt}=\omega_z \quad (7)$$

$$\alpha=\vartheta-\theta \quad (8)$$

$$\delta_z=f(e_1) \quad (9)$$

Formula (2) - formula (9) x, y represents the torque vector enslaved person coordinate system. ω_x, ω_y represents the moment about the Ox_1, Oy_1 axis of the body coordinate system of the track and field athlete's legs, respectively. δ_z represents the resultant force/torque vector experienced by the rigid body. e_1 represents the control system error. m represents the mass of the track and field athlete's leg. X, Y represents the Coriolis force and centrifugal force term matrix obtained by decomposing the power acting on the leg of the track and field athlete along with the velocity coordinate system. The track and field athlete's leg's skeletal coordinate is regarded as the kinematic chain's root. The forward kinematics (FK) equations for the lower extremities of the track and field athlete's legs can be expressed in a right-handed coordinate system. The content includes six rotational degrees of freedom, such as the declination angle α_0 , the rigid body velocity feedback control function β_0 , and the shadow angle γ_0 , which describe the motion of the knee joint of track and field athletes. We convert the motion modulus between different coordinate systems to obtain the potential kinetic energy at the virtual dynamics node as:

$$P=\sum_{i=0}^{6} m_i g z_i \quad (10)$$

We construct the Lagrange function according to the motion inertia feature of the explosive force of the track and field athletes' legs as follows:

$$L=K-P \quad (11)$$

Thus, the dynamic equation of the explosive leg force of the track and field athlete is obtained as follows:

$$\frac{d}{dt}\left[\frac{\partial L}{\partial \dot{q}_i}\right]-\frac{\partial L}{\partial q_i}=T_i,(i=1,2,\cdots,6) \quad (12)$$

The above formula T_i is the acting torque of the leg explosive force model of the track and field athlete. We use M it to denote the lower limb mass matrix. According to the above analysis, a model of the explosive leg force of track and field athletes was constructed. At this time, we can improve the quantitative analysis ability of the explosive leg force of track and field athletes.

Results and Discussion

Respiratory muscle strength and aerobic capacity

Long-distance endurance track and field competitions place great demands on various physical abilities, including respiratory muscle strength and aerobic capacity (Seyedi et al., 2022). These two factors are crucial for selection and training. We shall evaluate the aerobic and respiratory capacities. Several measures of muscular strength were tallied. Table 4 and Figure 2 detail the particular statistical results. The vital capacity/weight markers and VO2max/body weight reveal the athlete's aerobic ability. Endurance track and field events need a great deal of time and energy. Thus they place a premium on aerobic capacity. We found that endurance track and field players have the greater respiratory muscle strength and aerobic capacity than the minimum parameters outlined in "Scientific Selection of Athletes." During aerobic exertion, the athlete must breathe rapidly and briefly (Perera, 2020). At the same time, athletes preserve their endurance and aerobic capability. However, it is important to note that their lung capacity/body weight index is below the minimum requirement outlined in "Scientific Selection of Athletes" (Alexe et al., 2022). Based on its findings, this study concludes that the athletic team may be temporarily organizing training camps. This is due to the lack of structured training and inadequate training of athletes during times of peace.

Table 4

Statistical results of physical function indicators (Mean±SD)

Gender	Male	Female
Chest circumference	78.22±9.24	78.38±5.02
Chest maximum inspiratory circumference	85.24±5.72	83.79±5.02
maximum expiratory circumference of the chest	77.40±5.93	77.39±5.23
lung capacity/weight	54.77±9.96	46.07±8.96
VO2 max/body weight	0.84±0.23	0.79±0.22

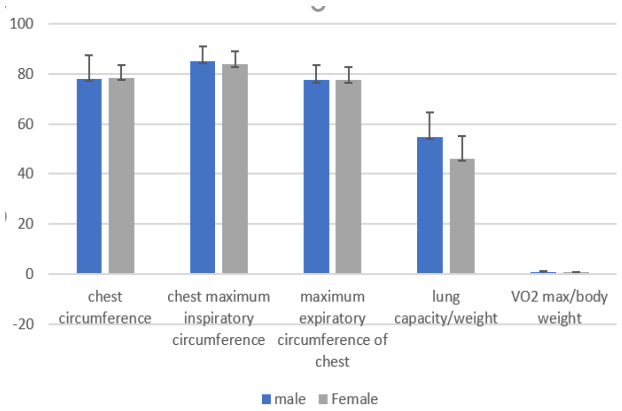

Figure. *2* Statistical results of physical function indicators.

Cardiovascular function

Long-distance track and field competitions have always utilized cardiopulmonary function as an essential study indication. Improvements in aerobic capacity must be accompanied by enhancements in cardiovascular function, according to Gute, Schlögl, and Groth (2022). We examined a variety of cardiovascular skill indicators in track and field athletes with endurance. The results of the measurements are presented in Table 5. All indicators fall within the range of normality for "Scientific Selection of Athletes." Effective training can increase an athlete's cardiorespiratory capacity. The stroke volume gradually increased as a result of consistent training enhancements. This produces a progressive drop in resting heart rate. The lower an athlete's resting heart rate, the greater his or her mental reserve and inherent aerobic ability Kearney, Comyns, and Hayes (2020); Pavlenko et al. (2019).

Table 5

Statistical results of physical function indicators (N=176, Mean±SD)

Gender	Male	Female
Resting heart rate/(beats/min)	77.1±12.7	77.7±10.7
SpO2/%	93.8±1.9	94.8±2.8
Systolic blood pressure/mmHg	112.7±13.9	107.8±11.7
Diastolic blood pressure/mmHg	73.8±10.5	77.4±9.4
Pulse pressure difference/mmHg	48.9±11.5	40.3±8.7
Vital capacity/mL	2927.7±723.1	2553.5±577.8

Hemoglobin and serum testosterone levels

The cardiopulmonary function indicates an athlete's capacity to produce oxygen. Its hemoglobin level must indicate its ability to transport oxygen and carry oxygen. Testosterone serum is a male hormone. It has a significant effect on the health of athletes, and its level is a significant indicator of their physical growth. Table 6 contains statistics on the various physical functions of athletes.

Table 6

Statistical results of physical function indicators (N=176, Mean±SD)

Gender	Male	Female
Red blood cell RBC/(10^{12}/L)	5.21±0.40	4.73±0.39
Hemoglobin HGB/(g/L)	161.6±12.5	144.9±11.9
WBC/(10^{9}/L)	7.02±1.59	6.93±1.66
Hematocrit HCT/%	47.75±3.67	42.70±3.32
Mean red blood cell volume MCV/fL	99.63±9.14	90.59±6.55
Serum testosterone T/(Ng/dL)	521.3±199.9	43.2±21.6

Endurance track and field athletes have higher blood levels, as seen in Table 6. Specifically, the indicators of red blood cells and hemoglobin were significantly higher than those of "Scientific Selection of Athletes." This is because all of the endurance track and field athletes hail from the province of Qinghai. It has adapted its physical abilities to its environment. These athletes' oxygen-carrying ability has been considerably enhanced by growing up in such an environment. Their physical fitness outperforms even low-altitude sportsmen by a wide margin. This is another advantage inherent to regionally selected track and field athletes. Our serum testosterone levels. Studies have indicated that endurance track and field competitors have lower serum testosterone levels. The rationale stays tied to the region to which they belong geographically.

Athletes in the region are often diminutive in stature and grow slowly (Manninen et al., 2022). The primary cause of this is the low serum testosterone concentration. In addition to boosting the growth of muscle fibers and bones, serum testosterone can also enhance athletes' metabolic capacity and post-exercise recovery. Ability, When blood testosterone levels are higher in the body, athletes can handle more intense and higher training loads. Additionally, it recovers faster after exercise. We further confirmed the efficacy of testosterone serum. These athletes were routinely tested across and back 20 meters. Indicators of specific results are presented in Table 7. The results indicate that endurance track and field athletes have a good oxygen intake capacity but a weak capacity for recovery. Serum levels are lower, but blood levels are greater Kearney et al. (2020).

Table 7

Statistics of physical fitness indicators (N=176, Mean±SD)

Gender		Male	Female
Repeatedly traverse		11.11±1.41	9.58±1.14
20m round trip	Number of round trips/times	78.63±15.59	54.92±13.76
	VO2max/(mL/kg·min)	43.71±4.41	38.38±3.19
	Recovery heart rate after one minute	23.28±4.89	23.11±5.14
	Recovery heart rate after three minutes	18.13±4.14	18.75±4.11

Psychological quality of endurance track and field athletes

The psychological quality of endurance track and field athletes is equally as significant as psychological quality research. Occasionally, psychological variables can even impact the outcome of a game, particularly the participants' will to win or lose. Athletes with a strong desire to win or lose can generate higher potential in the game. As a result, we first employ the "Expectation to Win Scale" to measure the desire of athletes to win or lose. Table 8 presents the test findings. It is important to note that the whole scale of this scale has 14 points. However, Table 8 reveals that the endurance track and field athletes participating in the measurement have relatively low Expectation to Win scale ratings. The scores are even lower than the median. This demonstrates that they lack a strong drive to win. In addition, men have a little greater desire to win than women (Helsen et al., 2020). After investigation, it can be concluded that the majority of the athletes in this group of endurance track and field events are younger. They lack sufficient training time. As Jeong, Shim, and Shin (2022); Stieler et al. (2022) discuss, as a result, they have not yet formed the psychological qualities required for the competition and do not have adequate drive to win and a strong sense of honor (2022).

Table 8

Expect to Win Scale Score Statistics

Gender	Sample size (N)	Score
Male	103	6.32±2.04
Female	73	6.29±2.04

Track and field endurance competitions are long-distance sports (Sim et al., 2022). The athlete's will is equally crucial in influencing the outcome. The greater one's willpower, the greater one's ability to win lengthy, difficult, and significant contests. We administered the Advanced Athlete Willpower Scale to athletes (Casa et al., 2019). Table 9 presents the test findings. Observing Table 9, there was no discernible discriminating index discovered. However, it can be seen from the scores of each dimension that men will score slightly lower than women.

Table 9

Willpower Statistical Results

Gender	Male	Female
Toughness	38.92±6.61	38.96±6.59
Tenacity	39.23±5.75	39.33±5.68
Decisive	26.26±3.99	26.27±4.11
Self-control	27.23±4.96	27.25±4.96
Self-confidence	22.57±4.69	22.59±4.68
Target clarity	22.85±3.71	22.86±3.71
Total Willpower Score	177.17±21.34	177.27±21.24

Conclusion

Endurance athletics is a long-distance, cyclical sport. The sport places more demands on athletes. The limitation of this research is that the outcome of a game is frequently determined by the athlete's physical and psychological attributes. Therefore, this study's implication is that current research focuses on choosing elite athletes in advance for specialized training. This article samples 176 track and field team members from Qinghai Province. We assessed their bodily size, physical function, psychological quality, and additional signs. The lower limb length index is greater for endurance track and field athletes in terms of body size. The length indexes for the calf and Achilles tendon were shorter. This shows longer lower extremities overall and a smaller proportion of thigh length. The calf-length is proportionally greater, but the tendon length and ankle circumference are longer and smaller, respectively. (2) In terms of physical function, endurance track and field competitors have stronger respiratory muscles. However, the aerobic capacity of athletes is inadequate. Normal cardiovascular function and high blood concentrations are seen. However, testosterone levels in serum were lower. This indicates that the athlete has a good ability to absorb oxygen but a limited capacity for recovery. Men's desire to win is marginally greater than women's, while men's will be marginally less than women's. We expect that in the future, with the study presented in this paper, we will be able to effectively direct the scientific training of athletes to obtain greater results.

Theoretical Implications

This work has substantial theoretical implications because no prior research has been undertaken on enhancing the psychological adaptability of track and field players during training. This study contributes significantly to the body of knowledge by illustrating the relationship between several variables and the psychological adaptability of athletes. In this approach, the management and trainers of the athletes must design the proper policy to increase their productivity for enhanced learning and performance. Athletes are responsible for continuously enhancing their practice through proper training. The psychological flexibility of athletes is crucial since it aids in perceptual development and supports productivity and performance enhancement. In this regard, management and coaches must establish an effective working plan for athletes that enables them to think critically and analyze situations to facilitate the development of the best plans.

Practical Implications

This work has major practical applications that enhance athletes' training efficiently and practically. First and foremost, it is the role of the coaches to motivate the athletes to improve their learning, as the athletes' performance contributes to their understanding of sports adaptation. Similarly, athletes are responsible for enhancing their self-learning through creativity, adaptation, and a better learning environment. In this way, the athletes' performance would be enhanced, and they would also do well in national and international competitions. However, this improvement must be ongoing for athletes to develop more effectively. The role of the coaches is to ensure that the athletes working effectively enhance their performance efficiently, which can be accomplished by collaborative activities taken by the athletes and coaches. However, modern coaches must pay attention to the impact of technology because it influences human behavior and intention. In this sense, the ramifications of this study are not confined to the study's intended population; rather, they contribute to enhancing the performance of national and international athletes. Therefore, it is necessary to modify the behavior and work performance of athletes in light of this study's substantial and plausible findings.

Future Directions

This study explored research into enhancing the psychological adaptability of track and field players during training. Thus, future research must concentrate on the function of mental capacity in enhancing self-learning. Second, future research must concentrate on the impact of competent management in enhancing athlete performance. Finally, future needs will focus on players' perceived behavior for improved training and performance.

References

Aletta, C. O. O. (2020). Sports-media reports as correlates of perceived performance among female track and field athletes in Ibadan metropolis. *African Social Science and Humanities Journal, 1*(1), 7-12. https://journals.jozacpublishers.com/asshj/article/view/8

Alexe, D. I., Abalasei, B. A., Mares, G., Rata, B. C., Iconomescu, T. M., Mitrache, G., & Burgueño, R. (2022). Psychometric Assessment of the Need Satisfaction and Frustration Scale with Professional Romanian Athletes. *International Journal of Environmental Research and Public Health, 19*(3), 1696. https://doi.org/10.3390/ijerph19031696

Casa, D. J., Cheuvront, S. N., Galloway, S. D., & Shirreffs, S. M. (2019). Fluid needs for training, competition, and recovery in track-and-field athletes. *International journal of sport nutrition and exercise metabolism, 29*(2), 175-180. https://doi.org/10.1123/ijsnem.2018-0374

Close, G. L., Sale, C., Baar, K., & Bermon, S. (2019). Nutrition for the prevention and treatment of injuries in track and field athletes. *International journal of sport nutrition and exercise metabolism, 29*(2), 189-197. https://doi.org/10.1123/ijsnem.2018-0290

Criticos, M., Layne, T., Simonton, K., & Irwin, C. (2020). Gender differences with anxiety, perceived competence, and grit in collegiate track and field throwers. *Journal of Physical Education and Sport, 20*(5), 2751-2759. https://doi.org/10.7752/jpes.2020.05374

Gute, D., Schlögl, S., & Groth, A. (2022). Keep on Running! An Analysis of Running Tracking Application Features and Their Potential Impact on Recreational Runner's Intrinsic Motivation. (pp. 359-373). Springer. https://doi.org/10.1007/978-3-031-05412-9_25

Helsen, W. F., Medic, N., Starkes, J. L., & Williams, A. M. (2020). The constituent year effect in European track and field masters athletes: Evidence of participation and performance advantages. *Journal of Aging and Physical Activity, 28*(1), 63-72. https://doi.org/10.1123/japa.2018-0439

Homan, K. J., Crowley, S. L., & Sim, L. A. (2019). Motivation for sport participation and eating disorder risk among female collegiate athletes. *Eating Disorders, 27*(4), 369-383. https://doi.org/10.1080/10640266.2018.1517527

Hsu, S.-C., Kuo, C.-C., Ni, Y.-L., & Chen, L. H. (2020). The power of gratitude in sports: A qualitative exploration of Olympic athletes' gratitude experiences. *International Journal of Sport Psychology, 51*(1), 47-68. https://doi.org/10.7352/IJSP.2020.51.047

Jeong, J., Shim, Y., & Shin, M. (2022). Exploring the Effects of Coaching Behavior on the Mental Conditioning Process of Taekwondo Poomsae Athletes: A Moderated Mediation Effect of Psychological Needs and Gender. *International Journal of Environmental Research and Public Health, 19*(12), 7016. https://doi.org/10.3390/ijerph19127016

Joaquim, D. P., Juzwiak, C. R., & Winckler, C. (2019). Diet quality profile of track-and-field Paralympic athletes. *International journal of sport nutrition and exercise metabolism, 29*(6), 589-595. https://doi.org/10.1123/ijsnem.2018-0361

Kearney, P. E., Comyns, T. M., & Hayes, P. R. (2020). Coaches and parents hold contrasting perceptions of optimal youth development activities in track and field athletics. *International Journal of Sports Science & Coaching, 15*(2), 157-169. https://doi.org/10.1177/1747954119900052

Manninen, M., Deng, Y., Hwang, Y., Waller, S., & Yli-Piipari, S. (2022). Psychological need-supportive instruction improves novel skill performance, intrinsic motivation, and enjoyment: a cluster-randomised study. *International Journal of Sport and Exercise Psychology, 20*(1), 122-146. https://doi.org/10.1080/1612197X.2020.1826999

Onate, J. (2019). Depression in ultra-endurance athletes, a review and recommendations. *Sports Medicine and Arthroscopy Review, 27*(1), 31-34. https://doi.org/10.1097/JSA.0000000000000233

Pavlenko, T., Tamozhanska, G., Pavlenko, Y., & Nevelika, A. (2019). Special Running Exercises in Track and Field Athletics Training Program for Pupils with Special Needs. *International Journal of Applied Exercise Physiology, 8*(3), 72-83. https://doi.org/10.26655/IJAEP.2019.9.10

Peeling, P., Castell, L. M., Derave, W., de Hon, O., & Burke, L. M. (2019). Sports foods and dietary supplements for optimal function and performance enhancement in track-and-field athletes. *International journal of sport nutrition and exercise metabolism, 29*(2), 198-209. https://doi.org/10.1123/ijsnem.2018-0271

Perera, D. S. L. (2020). A Study of Task and Ego Goal Orientation of Gold Medal Winning Athletes of Sri Lanka. *IOSR Journal of Sports and Physical Education (IOSR-JSPE), 7*(6), 07-10. http://dx.doi.org/10.9790/6737-07060710

Seyedi, M., Mohammadi, F., Dana, A., & Esmaeili, M. (2022). A Comparison Between Sports Motivation and Social Physique Anxiety between Blind and Visually Impaired Elite Athletes in Individual and Team Sports. *International Journal of Motor Control and Learning, 4*(2), 26-30. https://doi.org/10.52547/ijmcl.4.2.26

Sim, Y. K., Kim, H. H., Shin, J. H., Seo, E. C., & Ha, M.-S. (2022). Importance of Perception of Errors and Challenges for Improving Psychological Conditioning: Mediating Effect of Expectancy-Value Using the Phantom Model for Taekwondo Athletes. *International Journal of Environmental Research and Public Health, 19*(10), 6112. https://doi.org/10.3390/ijerph19106112

Stieler, E., Costa, V. T. d., Lôbo, I. L. B., Noce, F., Esteves, A. M., Mello, M. T. d., & Silva, A. (2022). Training load, stress, recovery, mood, and motivation of athletes with spinal cord injury in wheelchair rugby during a competitive preseason. *Motriz: Revista de Educação Física, 28*. https://doi.org/10.1590/s1980-657420220006821

Thomas, C. E., Gastin, P. B., Abbott, G., & Main, L. C. (2021). Impact of the talent development environment on the wellbeing and burnout of Caribbean youth track and field athletes. *European Journal of Sport Science, 21*(4), 590-603. https://doi.org/10.1080/17461391.2020.1775894

Tsushima, W. T., Ahn, H. J., Siu, A. M., Yoshinaga, K., Choi, S. Y., & Murata, N. M. (2019). Effects of repetitive subconcussive head trauma on the neuropsychological test performance of high school athletes: a comparison of high, moderate, and low contact sports. *Applied Neuropsychology: Child, 8*(3), 223-230. https://doi.org/10.1080/21622965.2018.1427095