



RELATIONSHIP BETWEEN GRIT  
PERSONALITY AND ANAEROBIC  
CAPACITY IN AMERICAN  
TAEKWONDO SPORTSMEN

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**DOI: [10.32540/2071-1476-2022-1-173](https://doi.org/10.32540/2071-1476-2022-1-173)**

**Annotation**

**Introduction:** sports performance is influenced by multiple factors, among them, psychological traits, which have been shown to be fundamental for increasing sports performance **Objective:** to determine the relationship between the grit personality and anaerobic capacity in American taekwondo players. **Method:** a quantitative approach study with a descriptive-correlational scope, carried out in a population of (N = 121) male and female taekwondo players, belonging to the youth category, linked to Taekwondo camps associated with the American National Taekwondo Federation of the year 2019. Grit personality was measured using the Grit scale, anaerobic capacity using the run-based anaerobic sprint test (Rast) for its acronym in English. **Results:** the average anaerobic capacity obtained was 4716.15 ( $\pm$  2265.80) in men and 3863.42 ( $\pm$  1593.72) in women. The Grit personality in men and women was 3.96 ( $\pm$  0.51) and 3.89 ( $\pm$  0.39) respectively. It was possible to determine a strong positive and directly proportional relationship between the Grit personality and the anaerobic capacity corresponding to 0.384 \* ( $P > 0.001$ ) in men and 0.265 ( $P > 0.051$ ) in women, this result being significant only in the male sex. **Conclusions:** it was possible to identify that a greater determination of the athlete can improve performance in running tests as in the case of the RAST, which suggests that an athlete with greater perseverance and passion for sports discipline can favor their physical performance.

**Keywords:** sports training, factors, perseverance, personality, taekwondo.

**Анотація**

На спортивні результати впливають численні фактори, включаючи психологічні риси, які, як було показано, є основоположними для підвищення спортивних результатів **Мета:** визначити взаємозв'язок між стійкістю особистості та анаеробними можливостями в тхеквондо. **Метод:** кореляційний аналіз був застосований щодо спортсменів, які займаються тхеквондо (чоловіки та жінки, N = 121), які належать до молодіжної категорії (17-21 років). Характер особистості виміряли за шкалою Grit, анаеробну здатність – за допомогою анаеробного спринтерського тесту, на основі бігу (RAST). **Результати:** середня отримана анаеробна ємність складала 4716,15 ( $\pm$  2265,80) – у чоловіків і 3863,42 ( $\pm$  1593,72) – у жінок. Особистість Grit у чоловіків і жінок становила 3,96 ( $\pm$  0,51) і 3,89 ( $\pm$  0,39) відповідно. Вдалось визначити сильну позитивну і прямо пропорційну залежність між особистістю і анаеробною здатністю, що відповідає 0,384 ( $p > 0,001$ ) – у чоловіків і 0,265 ( $p > 0,051$ ) – у жінок, цей результат є значущим тільки для чоловічої статі. **Висновки:** виявлено, що більша цілеспрямованість спортсмена може покращити результативність у бігових тестах, як у випадку RAST, – що свідчить про те, що спортсмен із більшою наполегливістю до спортивного тренування

може мати більшу фізичну працездатність.

**Ключові слова:** спортивна підготовка, чинники, наполегливість, особистість, тхеквондо.

#### Аннотация

На спортивные результаты влияют многочисленные факторы, включая психологические черты, которые, как было показано, являются основополагающими для повышения спортивных результатов. **Цель исследования:** определить взаимосвязь между устойчивостью личности и анаэробными возможностями в тхэквондо. **Материал и методы:** корреляционный анализ был проведен на спортсменах, занимающихся тхэквондо (мужчины и женщины, N = 121), относящихся к молодежной возрастной категории (17-21 лет). Характер личности измеряли по шкале Grit, анаэробные возможности – с помощью анаэробного спринтерского теста на основе бега (Rast). **Результаты:** средняя полученная анаэробная емкость составила у мужчин 4716,15 ( $\pm 2265,80$ ) и у женщин 3863,42 ( $\pm 1593,72$ ). Личность Grit у мужчин и женщин составляла 3,96 ( $\pm 0,51$ ) и 3,89 ( $\pm 0,39$ ) соответственно. Удалось определить сильную положительную и прямолинейную пропорциональную зависимость между личностью Grit и анаэробными возможностями, соответствующей 0,384 ( $p > 0,001$ ) – у мужчин и 0,265 ( $p > 0,051$ ) – у женщин. Этот результат является значимым только для мужского пола. **Выводы:** можно было определить, что большая целеустремленность спортсмена может улучшить результативность в беговых тестах, как в случае RAST, что свидетельствует о том, что спортсмен с большей настойчивостью и решительностью к спортивной тренировке может владеть большей физической работоспособностью.

**Ключевые слова:** спортивная подготовка, факторы, упорство, личность, тхэквондо.

**Introduction.** The different articles that we can find in the literature regarding psychology and physical capacities are predominantly associated and correlated in order to know their relevance regarding different problematic situations in sport.

One of the major variables that have been related to sports performance has been psychological factors, which with great evidence have shown that they intervene in sports performance and performance. According to the above, not only the factors have been part of the increase in performance and performance, biopsychosocial aspects have been key to determine the psychological trait that affect sports performance [13,20].

Therefore, the psychological factor as a fundamental tool for decision-making pertinent when establishing the sports field, has been a factor considered as a mediator of physical, technical and tactical capacities, therefore, athletes have had an association direct relationship between psychological factors, as well as functional physical development in the different aspects of competence [23,28].

Therefore, it is necessary to reaf-

firm that the role of psychology has been crucial and fundamental in the correlation with sports performance [1,8,9]. Therefore, it is necessary to establish these variables, in order to better direction of research processes in order to establish concrete improvements in sport [27].

**Research objectives.** Different authors determine that athletes and coaches ensure that the effectiveness of the sport is directly associated with the mental aspect, assuming a quantifiable posture between 40 and 90% of the different occasions, this will depend on the sport and the situation or moment in question [24]. Some articles determined that physiological variables explained 45 and 48% of sports performance, however psychological variables explained between 79% and 85% of success in the fighting specialty [26,33].

In 2007, authors such as [13,14,15,16], they proposed a non-cognitive instrument that finally had as consideration to determine the potential in the prediction of performance called Grit. This set of knowledge would determine why some individuals show different behavior and are capable of exponen-

tially increasing their performance, despite the various adversities that may develop during sport. For authors such as [32], this knowledge would refer to the effort deployed by each athlete, with the focus of persisting with the purpose towards the fundamental objective, in addition to the consistency and interest that the athlete has to reach the goal "Grit:" is defined as the perseverance and passion of an individual for a long time [13], it has been awarded the credit of playing an important way in the search for various achievements can generate in people the ability to pursue personally meaningful goals for an extended time, despite setbacks, failures and boredom [14,15]. Although the Grit personality determines characteristics of resilience, representing the ability to regain motivation in times of adversity or failure. Duckworth [16] noted that the Grit also reflects the tendency of people to maintain "consistent interests" or "focused passions" on specific tasks / goals for long periods of time, regardless of if failure or adversity is encountered. This variable is considered as a higher order, which is characterized by two labeled lower order

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2022

facets, consistency of interests and Perseverance of effort [13]. Coherence of Interests (CI) reflect the tendency of individuals to endure commitment and maintain focus on achieving goals / tasks for long periods of time. Effort perseverance (PE) reflects the persistence of various long-term goals with sustained effort despite obstacles and setbacks [14].

Grit Scale from Duckworth et al [13] and its successor, the Short Grit Scale [16]: have been widely used by researchers [11]. Concluding through different studies, that determination and a multitude of effective, cognitive and performance aspects are correlated in a variety of performance, social and vocational settings, including academia, competitive sport, marital, military selection / training, teaching and business / entrepreneurship [15]. According to the original conceptualization of Duckworth et al. [13,29], most researchers have treated Grit as a global construction process representing the tendency of individuals "to act, think and feel in ways that are relatively stable in time and in situations" [36]. Due to the above, [17,20].

Consequently, physiological capacities have always been an essential determinant for the understanding of aerobic and anaerobic capacity, it is ultimately defined by maximum efforts which depend on maintaining that intensity for a few seconds, logic tells us that it is a fundamental part of the development of our sport taekwondo , as well as different sports disciplines. Anaerobic capacity is expressed in taekwondo as a means of accelerations, movements, kicks, blows, jumps and changes of direction. [3,30] as well as taekwondo athletes usually generate contractions for a very short time at a very high intensity, allowing the confrontation in a more competitive way [30].

During the taekwondo combat, the athletes raise the heart intensity to very high points, this respond-

**Characteristics of the population**

Characteristics	N	%
Sex		
male	66	54.54
female	55	45.45
	Media	DE
Age	14.19	±0.95
Athlete experience (Number of championships)	13.95	±7.54

Note: SD = standard deviation

ing to various confrontations during the combat, in which during it the pseudopauses are considered from 1 to 5 seconds, meaning that at all times the athlete must practically be in intention or defense of the fight [4,5,6,7] corresponding to a high degradation of phosphagens and glucose, as sources for obtaining energy [31,34].

Likewise, the reflection of the competitions, they reach cardiac peaks of 90% of the maximum heart rate and lactate concentrations on average of 12.2 mmol • l-1, common values given the dynamics of the taekwondo combat [4,7,25,34].

In different articles, aerobic capacity is determined as anaerobic power, which within the taekwondo regulations expresses the maximum need to move, because the adversary will try to anticipate effectively in the combat score. For all the above, the objective The purpose of the study is to determine the relationship between perseverance and passion measured by the Grit scale and anaerobic capacity in American taekwondo players.

**Material and methods.** Study with a quantitative approach and descriptive-correlational scope, carried out in a population of (N = 119) male and female Taekwondo players of the youth category belonging to Taekwondo camps associated with the United States National Federation during the period between December 2018 as of November 2019. The sample was taken for the

convenience of the researchers and those who voluntarily authorized their participation by signing the informed consent and assent were selected.

For data collection, permission was formally requested through a letter addressed to each of the directors in charge of each taekwondo camp. Once authorized, a meeting was held where the objectives and procedures of the study were shared with each of the participants; Likewise, they were provided with the consent document and the informed assent (in the case of underage athletes) for their respective completion. In addition, some sociodemographic data such as age, sex, group, competition experience, national ranking and the total American ranking were taken.

**Organization of the study.** In this study, two fundamental variables were evaluated, which are: anaerobic capacity and Grit personality. To measure anaerobic capacity, we proceeded to evaluate using the Run-Based Anaerobic Sprint test (RAST) for its acronym in English, which is a test designed to evaluate anaerobic power, through a protocol of repeated speed [21].

For the RAST test calculations, it is necessary to obtain the body weight, the weight was taken using a TANITA brand scale. In taking this measurement, the athletes were placed on the scale without shoes and with loose clothing and it was carried out 3 times to avoid

**Anaerobic capacity and average Grit of the youth taekwondo population**

Characteristics	N	Media	DE
Anaerobic capacity (W)			
male	66	4716.15	±2265.80
female	55	3863.42	±1593.72
GRIT personality			
male	66	3.96	±0.51
female	55	3.89	±0.39

Note: SD = standard deviation, N = population number, W = watts

measurement biases. Subsequently, the respective warm-up was carried out to carry out the Test, which, according to the participants, corresponded to an intensity of 2 to 3 on the Borg scale of perceived exertion. Afterwards, the speed test was applied with the athletes, who performed six (6) maximum sprints adapted to a distance of 20 yards or 18.22 meters with 10 seconds of recovery between each sprint. The distance was determined and marked with two cones to differentiate their ends, there were several evaluators who timed the time of each sprint to corroborate and confirm the measurements, in addition an evaluator recorded the time used to cover each of the speed races, (scoring down to the hundredth of a second). Finally, after obtaining the necessary data, the calculations were carried out to obtain the anaerobic capacity.

Initially it is necessary to obtain the maximum power output, which is obtained by the following formula:  $\text{Body mass (kg)} * \text{Distance (mts)}^2 \div \text{Time (s)}^3$ . After obtaining the 6 maximum power outputs of each of the sprints, the anaerobic capacity was calculated, which is obtained by means of the total work completed during the duration of the test; that is, the sum of all the maximum power outputs.

On the other hand, the Grit personality was measured using the Grit scale which measures deter-

mination [13,18]. This instrument contains 10 items in total that are equally distributed in two subscales: passion and perseverance. For each item there is a 5-point Likert-type scale that scores the extent to which one agrees with each statement (that is, 5 = not at all, 1 = a lot). The Grit scale has a maximum score of 5 (highly determined) and a minimum of 1 (very poorly determined). To obtain the average of the Grit personality, all the scores were added and divided by the number of items on the scale [16].

This study was carried out respecting at all times the rights protected by the Declaration of Helsinki 2013. [12,19]. In this sense, through the signing of the informed consent, the participants were informed of the objective of the study, the procedures that would be carried out, the voluntary participation and the confidentiality of the information. The participants were identified with codes in the analyzed database.

For the statistical analysis, all the information was entered into an Excel file and later transferred to the SPSS Version 25 Statistical Software. The categorical variables were described in percentages and frequencies. Continuous variables with normal distribution were expressed as mean and standard deviation (SD) and those that presented the opposite as Median and interquartile range (IR). For the corre-

Table 2

lation between the Grit personality variables and anaerobic capacity, which are continuous variables, the Pearson correlation coefficient test was applied, in this sense, the established level of significance was  $p \leq 0.05$ . It should be noted that in this study the Grit personality is a numerical variable, but not a categorical one.

**Results.** The total population was 121 participating taekwondo players, of which 54.54 (N = 66) were male and 45.45 (N = 55) were female. The mean age of the participants was 14.19 years ( $\pm 0.95$ ) and the athlete's experience expressed in the number of championships was 13.95 ( $\pm 7.54$ ) (Table 1.).

The average Anaerobic capacity obtained through the Run-Based Anaerobic Sprint test was higher in men corresponding to 4716.15  $\pm 2265.80$  compared to 3863.42  $\pm 1593.72$  in women, also the male sex obtained a higher score on the personality scale grit 3.96  $\pm 0.51$  vs 3.89  $\pm 0.39$  (Table 2.).

Table 3 shows the relationship between grit personality and anaerobic capacity. The correlation obtained through the analyzes was positive and directly proportional, that is, a higher score on the Grit scale of perseverance and passion translates as a higher result of anaerobic capacity in the RAST test; however, this result was only statistically significant in men.

Also, the correlation interconnection of indicators between personality variables of persistence and anaerobic abilities was determined. Simple variance allows us to identify variables with high correlation, which indicates a linear relationship between the two variables. A strong positive correlation can be observed between personality endurance and anaerobic capacity in men. With 0.384 \* ( $P > 0.001$ ) specifying that if one variable increases, the other will also exhibit it.

Discussion. The purpose of this study was to determine

Table 3

**Correlation by sex between Grit personality and anaerobic capacity in taekwondo players**

Characteristics	Anaerobic Capacity Male		Anaerobic Capacity Female	
	Pearson's coefficient (r)	value (p)	Pearson's coefficient (r)	value (p)
Grit Personality	0,384*	0,001	0.265	0,051

the relationship between Grit personality (determination) and anaerobic capacity in American taekwondo players. The present study provided several important findings, as the main result it was possible to determine a positive and directly proportional relationship between these two variables in both men and women, 0.384 \* ( $P > 0.001$ ) and 0.265 ( $P > 0.051$ ) respectively, which can go so far as to suggest that perseverance and passion play a fundamental role in the performance of anaerobic capacity.

Although the results of the present study indicated that the Grit personality (Perseverance and passion) is related to a higher performance in anaerobic capacity, they differ from what has been stated in other investigations [10,35]. A study conducted in Japanese athletes determined that the Grit personality was not significantly associated with competitive performance regardless of gender, age, years of athletic experience, and sporting events [35]. In addition, in another study conducted on a sample of ( $N = 178$ ) athletes, they revealed that there was no significant association between grit and performance [2]. However, the studies found in the literature relate the GRIT personality to the performance and sporting achievements of the sports in question, and not specifically in physical tests.

On the other hand, it was found within the literature that passion, a variable that is evaluated within the Grit personality, was positively

associated with competitive levels in sports that were based on closed skills, while a negative association between the two was found. observed in open skills sports [22]. Although Taekwondo is a predominantly open skills sport, that is, it is performed under changing conditions (different tatami mats, places, positions, etc.) within this research the ability test anaerobic using the RAST, they were performed under homogeneous conditions, and with closed abilities, which could explain the positive relationship between the two variables.

Certainly the approach of this study is novel because it is the first attempt to explore the personality trait of determination or also called GRIT personality, in specific tests and specific physical abilities, since multiple previous studies are based on associations between other character variables psychological or competitive performance.

The results of this study are supported by previous findings based on determination, in which it was found that more determined individuals or with higher Grit scores accumulate more time in specific activities of each sport, compared to less determined individuals [16]. From the above statement, we could deduce that more determined athletes are more likely to endure long periods dedicated to specific taekwondo training activities for performance enhancement. On the contrary, less determined taekwondo players may be less inclined to participate in extended

periods of participation in training and / or physical preparation, so they are less likely to maintain long periods of practice.

Within the limitations of this study, the lack of a detailed analysis for each subscale could be found, to determine which of these two most influences performance in anaerobic capacity; In addition to analyzing the grit or determination personality with sociodemographic variables such as sex, age, category or sports experience, which could generate more forceful results.

Another limitation is the scope of the research, as it is descriptive and correlational, only the results are presented, but the causalities of the findings are not explained and therefore the reason why the grit personality improves performance in the anaerobic capacity test.

Finally, the discussions are limited by the null or scarce literature about the determination or Grit personality in relation to the physical variables of sports performance such as anaerobic capacity.

**Conclusion.** It was possible to identify that a greater determination of the athlete can improve performance in running tests, as in the case of RAST, which suggests that an athlete with greater perseverance and passion for sports discipline can favor her physical performance.

**Sources of funding.** None.

**Conflicts of Interest.** The authors declare that they have no conflict of interest.

### References

1. Abdullah, MR, Musa, RM, Maliki, ABHMB, Kosni, NA y Suppiah, PK (2016). Papel de los factores psicológicos en el desempeño de futbolistas de élite. *Revista de Educación Física y Deporte*, 16 (1), 170.
2. Akiba, S., & Tsunoda, N. (2016). Factors related to the grit of collegiate athletes. *The Annual Reports of Health, Physical Education and Sport Science*, 35, 63-66.
3. Barbero, JC, Méndez Villanueva, A., y Bishop, D. (2006). La capacidad para repetir esfuerzos máximos intermitentes: aspectos fisiológicos (I). *Arco. medicina deporte*, 299- 303.
4. Bridge, C. A., Jones, M. A., & Društ, B. (2009). Physiological responses and perceived exertion during international taekwondo competition. *International Journal of Sports Physiology and Performance*, 4(4), 485-493.
5. Bridge, C. A., Jones, M. A., & Društ, B. (2011). The activity profile in international taekwondo competition is modulated by weight category. *International journal of sports physiology and performance*, 6(3), 344-357.
6. Bridge, C. A., McNaughton, L. R., Close, G. L., & Društ, B. (2013). Taekwondo exercise protocols do not recreate the physiological responses of championship combat. *International journal of sports medicine*, 34(07), 573-581.
7. Campos, F. A. D., Bertuzzi, R., Dourado, A. C., Santos, V. G. F., & Franchini, E. (2012). Energy demands in taekwondo athletes during combat simulation. *European journal of applied physiology*, 112(4), 1221-1228.
8. Castilla, J. F., & Ramos, L. C. (2012). Rendimiento deportivo, estilos de liderazgo y evitación experiencial en jóvenes futbolistas almerienses. *Revista de Psicología del Deporte*, 21(1), 137-142.
9. Chiodo, S., Tessitore, A., Cortis, C., Lupo, C., Ammendolia, A., Iona, T., & Capranica, L. (2011). Effects of official Taekwondo competitions on all-out performances of elite athletes. *The Journal of Strength & Conditioning Research*, 25(2), 334-339.
10. Cosgrove, J. M., Chen, Y. T., & Castelli, D. M. (2018). Physical fitness, grit, school attendance, and academic performance among adolescents. *BioMed research international*, 2018.
11. Credé, M., Tynan, M. C., & Harms, P. D. (2017). Much ado about grit: A meta-analytic synthesis of the grit literature. *Journal of Personality and social Psychology*, 113(3), 492.
12. Declaración Helsinki, D., & World Medical Association. (1975). Declaracion de Helsinki. Principios éticos para las investigaciones médicas en seres humanos. Tokio- Japón: Asociación Médica Mundial.
13. Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: perseverance and passion for long-term goals. *Journal of personality and social psychology*, 92(6), 1087.
14. Duckworth, A. y Gross, JJ (2014). Autocontrol y determinación: determinantes del éxito relacionados pero separables. *Direcciones actuales en la ciencia psicológica*, 23 (5), 319-325.
15. Duckworth, A., 2016. Grit: The power of passion and perseverance. New York: Scribner, p. 55 57.
16. Duckworth, AL y Quinn, PD (2009). Desarrollo y validación de la Escala de grano corto (GRIT – S). *Revista de evaluación de la personalidad*, 91 (2), 166-174.
17. Eskreis-Winkler, L., Shulman, E. P., Beal, S. A., & Duckworth, A. L. (2014). The Grit effect: Predicting retention in the military, the workplace, school and marriage. *Frontiers in Psychology*, 5 (36), 1-12.
18. Ford, P., Ward, P., Hodges, Nueva Jersey y Williams, AM ( 2009 ). El papel de la práctica y el juego deliberados en la progresión de la carrera en el deporte: la hipótesis del compromiso temprano . *Estudios de alta capacidad*, 20, 65 - 75 .
19. Ford, P. y Williams, AM (2012). Las actividades de desarrollo en las que participaron los jugadores de fútbol juvenil de élite que progresaron a un estado profesional en comparación con los que no lo hicieron . *Psicología del deporte y el ejercicio*, 13, 349 - 352 .
20. Griffin, ML, McDermott, KA, McHugh, RK, Fitzmaurice, GM y Weiss, RD (2016). Arena en pacientes con trastornos por uso de sustancias. *La revista estadounidense sobre adicciones*, 25 (8), 652-658.
21. Keir, D. A., Thériault, F., & Serresse, O. (2013). Evaluation of the running-based anaerobic sprint test as a measure of repeated sprint ability in collegiate-level soccer players. *The Journal of Strength & Conditioning Research*, 27(6), 1671-1678.
22. Larkin, P., O'Connor, D. y Williams, AM (2016). ¿Influye el valor en el compromiso específico del deporte y la experiencia perceptivo-cognitiva en el fútbol juvenil de élite? *Revista de psicología deportiva aplicada*, 28 (2), 129-138.
23. Mahamud, J., Tuero, C., & Márquez, S. (2005). Características psicológicas relacionadas con el rendimiento: comparación entre los requerimientos de los entrenadores y la percepción de los deportistas. *Revista de Psicología del deporte*, 14(2), 237-251.

24. Martínez Ferreiro, J. (2016). Inteligencia emocional y rendimiento deportivo en el fútbol femenino de alta Competición.
25. Matsushigue, K. A., Hartmann, K., & Franchini, E. (2009). Taekwondo: Physiological responses and match analysis. *The Journal of Strength & Conditioning Research*, 23(4), 1112-1117.
26. Nagle, FJ, Morgan, WP, Hellickson, RO, Serfass, RC y Alexander, JF (1975). Detectar rasgos de éxito en los contendientes olímpicos. *El médico y la medicina deportiva*, 3 (12), 31-34.
27. Olmedilla, A., & Dominguez-Igual, J. (2016). Entrenamiento psicológico para la mejora de la atención y la autoconfianza en un futbolista.
28. Pazo, C. I., Sáenz-López, P., y Fradua, L. (2012). Influencia del contexto deportivo en la formación de los futbolistas de la selección española de fútbol. *Revista de Psicología del Deporte*, 21(2), 291-299.
29. Perkins-Gough, D. (2013). El significado de la determinación: una conversación con Angela Lee Duckworth. *Liderazgo educativo*, 71 (1), 14-20.
30. Pieter, W. (2010). Detección de talentos en practicantes de taekwondo. *Journal of Asian Martial Arts*, 19(3), 8-29.
31. Santos, V. G., Franchini, E., & Lima-Silva, A. E. (2011). Relationship between attack and skipping in taekwondo contests. *The Journal of Strength & Conditioning Research*, 25(6), 1743-1751.
32. Schmidt, F. T. C.; Fleckenstein, J.; Retelsdorf, J.; Eskreis-Winkler, L., & Möller, J. (2017). Measuring Grit. A German validation and a domain-specific approach to Grit. *European Journal of Psychological Assessment*.
33. Silva III, J. M., Shultz, B. B., Haslam, R. W., & Murray, D. (1981). A psychophysiological assessment of elite wrestlers. *Research Quarterly for Exercise and Sport*, 52(3), 348-358.
34. Tornello, F., Capranica, L., Chiodo, S., Minganti, C., & Tessitore, A. (2013). Time- motion analysis of youth Olympic Taekwondo combats. *The Journal of Strength & Conditioning Research*, 27(1), 223-228.
35. Ueno, Y., Suyama, S., & Oshio, A. (2018). Relation between grit, competitive levels, and athletic events in Japanese athletes. *Journal of Physical Education and Sport*, 18(4), 2253-2256.
36. Von Culin, K. R.; Tsukayama, E., & Duckworth, A. L. (2014). Unpacking grit: Motivational correlates of perseverance and passion for long-term goals. *The Journal of Positive Psychology*, 9(4), 306-312.

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