VERSUS

Comprehensive Sport Performance Program

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Physical and mental providers' interests in working with elite performers that have been traditionally dominated by clinical presentations are increasing. This leads many practitioners to wonder how the approach to the elite performer may differ from any other client. The Athlete High Performance team assembled by Red Bull North America demonstrates a model that has a comprehensive and integrative methodology to assess and work toward a goal of allowing an athlete to perform optimally. This brief article provides an introduction to the model.

This brief article has the goal of providing an introduction to the philosophy and general approach of an integrative performance plan for athletes. Each of the authors has described the guiding principles of the application within his area of expertise. A comprehensive and theoretical description from the scientific perspecti e is currently being written and this article is more casual in tone and content. In the clinical applications of mental health it is well recognized that there are multiple contributors to pathology and also multiple contributors to wellness. It isn't uncommon for a mental health provider to work with a medical provider in attempts to reduce symptoms both from the physical and mental domains. Largely in the past, athletic performance has been focused on training the body from an anatomical and muscular performance approach. As understanding and technology have emerged, the focus has broadened from simply being exercise physiology to true sports performance science including physiology, psychology, biomechanics, and nutrition.

In many athletic training programs the physical abilities of the athlete are recorded and finely measu ed. Training proto- cols developed to maximize strength, agility, and endurance, among other basic physical constructs. This same attention to detail in refining the per ormance of the body is utilized with the mind of the athlete. Psychological and psychophysiolog- ical techniques measuring the mindset and brain activity yield understanding of the belief systems and mental capacities of the individual. Once understood, these constructs can be refined o allow participation at the highest level.

As mentioned, a broad care approach is generally agreed to be the most effective approach in healthcare. It is our belief that this same concept of working with the whole person should be applied in sports performance. The model we employ addresses each of the core areas for maximum athlete performance. The body and brain need adequate nutrition in order to supply cells with fuel. In addition to assuring the intake of the optimal nutrients, it is critical to limit exposure to toxins and allergens that may be contained in food or other substances ingested. Physical capabilities also have to be measured and trained. Sports psychology techniques measuring the mindset yield an understanding of the intrinsic belief systems of the individual that are refined o allow participation at the highest level. The specific brain electrical activity measurements that can be acquired from quantitative electroencephalographic (QEEG) techniques have been well established to reflect l vels of cognitive engagement and arousal (Duff , McAnulty, Jones, Als, & Albert, 1993). Engagement and arousal are critical among the many variables that contribute to brain states, and an athlete who can exercise volitional control of these aspects of brain state has a supreme

advantage during competition. Through the use of neurofeedback training, our model teaches athletes that they can call upon the most beneficial brain state to perform under the environmental circumstances presented. In combination, the four areas mentioned contribute to a model that is designed to address each core aspect of the individual athlete to allow absolute maximum performance, so we'll narrow our discussion to the programs of neurofeedback, sports psychology, and nutrition.

The evaluation for our sport and performance-specific application is probably very similar in concept to other applications of evaluation and neurofeedback. However, our desire to understand, measure, quantify, and train an individual's ability to achieve optimal performance has fueled our pursuit of reliable and accurate metrics. For decades, neuropsychological testing, quantitative electro- encephalography, and conditioning of the EEG have been used effectively for evaluation and intervention with clinical mental health clients. We have the interest of understanding the elite performer's brain and helping the healthy individual achieve maximal performance. To accomplish this goal, we first collected over 1,000 evalua- tions on elite athletes. We have tested and trained with the top athletes in every sport (baseball, football, soccer, hockey, tennis, golf, lacrosse, Olympic sports, auto and motor racing, and miscellaneous action and adventure sports). By understanding the brain states of the individ- uals who are top performers in the most hostile environ- ments, we have been able to develop techniques to help the elite performer. These techniques can also be applied to the healthy person allowing them to train their brain to achieve at their highest potential.

Currently we continue to test our evaluation metric, the NeuroPerformance Profil , and validate its reliability and utility. The profile is designed o measure key elements that contribute to the mental/cognitive aspects of athletic perfor- mance. The indices and scales provide an easy to understand quantitative value for otherwise complicated constructs. The profile m y be utilized by individuals, coaches, trainers, psychologists, and others as a tool for identifying mental strengths and weaknesses. Identified trengths and weakness- es can be enhanced or minimized through the use of Performance Brain Training. It is important to gather both behavioral and physiological data. The combination of behavioral and physiological data increases the sensitivity of the profil . This combination is a unique application in athlete performance evaluation. As the evaluation is validated, further updates and scientific articles will ollow.

Neurofeedback techniques for optimal performance have primarily focused on the attempt to identify clinical or pathological patterns in the individual and take corrective action or to train basic protocols associated with decreased arousal/increased relaxation (alpha–theta type training) or attention regulation (theta–beta type training). These basic applications have been reported to have positive effects and there are a number of studies that have described such results.

In the scientific literature, the EEG has been demonstrated repeatedly to

respond to operant and classical conditioning. Specificall , neurofeedback is a technique in which the electrical activity of the brain is trained based on the operant conditioning learning theory. The developments of computer technology and electronics utilized to record the subtle signals of the EEG have advanced, allowing scientists and clinicians to use complicated designs with multiple parameters and elaborate graphics as reward signals to support the conditioning of the EEG.

The aim is to train the individual to gain learned control over a particular component of brain activity. Typically, a representation of the chosen frequency bands to be enhanced and inhibited is projected in visual and/or auditory format. Although the visual and auditory feedback can be a variety of possibilities, our paradigm is developing as close to virtual reality training space in order to provide ecological validity and to transfer learning to the sport performance context more effectively. Previous research has shown that the brain electrical activity of experts shows distinct differences relative to nonexperts (Vernon, 2005). Knowing that physiology is connected to performance, it is not a stretch to assume that Performance Brain Training offers the potential to provide performance improvements by training an individual's EEG.

High Performance Psychology is centrally focused on understanding the factors that allow world-class performers and organizations to excel consistently. The growth of this field has eme ged primarily from the study of performance excellence in sports, as well as the fields of busine s, military pursuits, and the performing arts. Historically, traditional psychology has focused on research, under- standing, and preventing and/or relieving psychological distress, dysfunction, or illness. In contrast, high perfor- mance psychology has primarily explored the characteris- tics of high-achieving individuals and organizations. The applied nature of this emerging discipline involves a collaborative exploration of the finely tuned p ychological, emotional, and physiological strengths of elite performers.

While many world-class performers and organizations have aligned characteristics, by definition th y stand alone in their unique performance signature. In this respect, when working with such individuals, it typically requires a curiously tailored investigation to understand the nuances of ‘‘what makes them great.’’ From that appreciation, a framework can be developed to (a) enhance their strengths, and (b) increase the proficien y of relative weaknesses.

When working with individual performers, a typical introduction to a high performance psychology program involves a handful of objective assessments of their psychological characteristics, as well as conversations that lead to clarific tion of their innermost strivings. For the most part, high performance psychology approaches involve (a) assessments, (b) psychological training sessions, and (c) clarific tion of success-orientated plans to enhance already existing world-class performances. The effort to enhance performance for high-level performers is rarely done in a vacuum. The environmental, interpersonal, physiological, technical, nutritional, and psychological var- iables that impact high performance are often fluid and ertainly dynamic. In an effort to enhance elite performance, a team approach tends to yield favorable outcomes. To illustrate this point, the above authors have incorporated a team approach to working with an open-wheel race car driver who regularly finds himself on the podium

Each practitioner has administered performance-based assessments, including nutritional, blood analysis, psycho- logical inventories, in-depth interviews, and brain map- ping. From this profil , we are able to have a better understanding of the nuanced elements that, to date, have supported their performance efforts and subsequent high achievements. As an example of the application of this collaborative profiling, e were able to cross reference neuropeptides such as tryptophan/tyrosine with attention, reaction

time, mood, sleep quality, effort, sense of psychological well-being, and his self-determined ultimate goals in his sport. The understanding of these factors has created a platform to enhance performance in a collective fashion.

It is important for the performers to have a clear sense of direction and vision, as well as concrete goals. It is equally important for them to master their internal dialog, and for each practitioner to provide the performers with the neuro- logical, psychological, and nutritional tools that support their often-lofty goals and desires for mental and physical mastery.

Nutritional science has become such a large area of study that it's impossible to be a "specialist" in the entire field. Among t the sub-studies, there are vast areas that cover pathological conditions, hereditary concerns, deficie - cy states, and performance-enhancing applications. Some of our experts have specialized in the area of performance enhancement for more than two decades, so they've had the opportunity to witness the amazing changes the field has unde gone during that time span. Unfortunately, this sub- study is also the one that's filled with serious mis oncep- tions, half-truths, and scams that are designed to turn a quick profit. Our philosop y on nutrition has always been to correct deficiencies or oxicities before moving on to "the tricks." Because we've seen nutritional blood work and urinalysis on thousands of elite athletes, we have a unique data set to which we're able to compare and contrast each individual. We have found that returning an athlete's nutritional status to what can be referred to as "healthy baseline" provides a much greater boost in athletic performance than grabbing an armful of supplements off the health- ood store shelf. Most athletes have no idea that they're in a state of nutritional deficien y, and it's sometimes shocking to hear what the top male and female athletes eat on a regular basis. When you get an elite

performer to take ownership of their basic nutritional well being, performance improvements are virtually guaranteed. Most of the athletes we work with perform complete blood and urine analysis before we get started. In addition to a CBC, sex hormone panel, and basic lipoprotein screening, this analysis involves testing for a large number of common allergies, fatty acids and their derivatives, amino acids, vitamins/minerals, heavy metal toxicities, impaired detox- ific tion indicators, and gut microbial imbalances. Genetic testing can also be run, though there is still much to sort out in regard to the direct effect each SNP (Single Nucleotide Polymorphism) has on performance. Most nutritionists too often overlook the nonessential fatty acids and nonessential amino acids, as these results can indicate SNPs that are inhibiting an athlete's performance without the need for advanced genetic screening. With all of our testing, we've found erythrocyte analysis (when applicable) to be a more effective indicator of nutritional status than plasma analysis. With erythrocyte analysis, we create a 3–4 month window to examine an athlete's dietary intake, versus the 5–7 day window with plasma analysis. What typically happens with plasma analysis is that the athlete knows they are going to be doing a nutritional blood test the following week, so they clean up their diet. With the 3–4 month window that erythrocyte testing provides, they are not rewarded for several days of good behavior.

Nutritional testing by itself is not sufficient o make any meal-planning or supplement adjustments sight-unseen. Feedback from the athlete is always required because you have to work around the nutrients missing from the foods that they just will not eat. In our experience, athletes can be some of the most finic y eaters you'll encounter. Also, by reviewing the test results with the athlete, we find th t we can motivate them to make a lifestyle change that they would be unlikely to make by saying, ''You need to eat some high-fat cold-water fish '' Athletes are very competitive with anything that generates a score, so getting someone to eat herring or sardines is much easier when they see their results and understand why they need a missing nutrient.

We have witnessed some amazing results from our work in the field of th- letic performance. The integration of performance psychology and nutrition is illustrated well by our work with a heavyweight boxer who was a fantastic figh er for the fir t two rounds, but ran out of energy soon afterward. Before starting with us, he was somewhat depressed, lazy, distracted, and extremely difficult o manage. He had resisted intervention every step of the way, until he finally ag eed to have a laboratory nutritional analysis run. His results came back showing serious allergies to milk, eggs, and mustard, a frank vitamin D deficien y, a nearly complete absence of omega-3 fatty acids, heavy metal scores that were well above normal levels, and a significant gut microbial imbalance. Sitting down with the athlete and working through it, we made a few additions to his diet (working around the foods that he absolutely refused to eat), chelated out the heavy metals, and eliminated the foods to which he was allergic. With the help of all aspects of the program, he fully adhered to the dietary changes. Within 6 weeks he went from struggling to go two rounds to literally dancing around the ring for 6 to 8 rounds. There was a demonstrable change in personality, and the depressed, lazy, and distracted athlete became a manageable, driven, and happier individual. Though he already looked the part when he walked in the door, his body responded with an extra 8 pounds of fat free mass, while losing 4 pounds of body fat. The fact that his training routine was exactly the same before and after the intervention made the improve- ments in body composition all the more impressive. We believe that the combination of psychophysiological evalu- ation and performance brain training, performance psychol- ogy, and dietary modific tion worked extremely well together, allowing him to achieve results that were greater than any of the interventions could have achieved if we had worked independently. We feel that, in combination with the other mentioned modalities, the performance-enhancing effects of achieving baseline nutritional status could be multiplied several-fold.

The process introduced here is relatively simple in concept. As in most settings, we set up an initial consultation where we basically talk about what the long-term vision or aspirations of the athlete are in terms of both career and life in general. Once we have an understanding of the larger motivations we are then able to review more specific goals in erms of their actual athletic targets. Our role is to then to evaluate and design an appropriate strategy of perfor- mance support to meet these goals and develop a systematic approach to help them achieve. This typically requires coordinating a group of specialists in a wide variety of performance disciplines (i.e., coaches, psychologists, nutri- tionists, technologists, medical support, strength and conditioning experts, etc.) to deliver a holistic and inte- grated program of performance support.

Having over 20 years experience in this industry, we have seen numerous programs put in place. The individuality of the program cannot be underestimated. This in turn impacts the outcomes we have observed in terms of success. In short, the most successful athletes are wholly committed to their craft and are willing to do whatever it takes to succeed. In practice, the reasons they are able to deliver over and over again comes down to a combination of talent, physical capacity, and most importantly, a mindset that allows them to perform under pressure. A clear under- standing of the integration of the components of perfor- mance is becoming more and more critical. For example the interaction of nutrition on both the physical and psychological performance metrics and importantly the ability to measure these in a functional manner is just beginning to be more fully realized. None of the components of performance can be considered in isolation any longer and the interrelationships of these core areas is the space in which many of the next the steps of improvement will be made.

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