

Performance Improvements in Swimming: A Multi- Disciplinary Approach

Coaching Application

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Abstract

There are several facets of the training process that have the potential to influence a swimmer's performance. Most coaches realize that it takes a combination of several factors to increase the potential for success in their athletes. However, quite often practice time is emphasized over other variables that can impact performance. The purpose of this review is to introduce a holistic model of performance improvement for swimmers which includes the following four components: training, adequate rest and recovery, proper nutritional habits, and positive psychological mechanisms. At the core of the model is discipline which connects and influences each of the four aforementioned components.

Introduction

Performance improvement is arguably the primary focus of an athlete. Striving to progress in sport is (or at least should be) of paramount importance for the athlete. Proper coaching is instrumental in an athlete's propensity for success. Effective coaching of competitive swimming is a combination of science and art, and for optimal results it is important to identify and implement both into the training process. Even world record holders pursue advances in training techniques and procedures in order to improve their performance. Many sports are skill-based, some technique-based, while others are conditioning driven. Many sports employ different combinations of these three factors, and swimming is a prime example of a sport that utilizes all three components.

Dedicated swimmers will continue to attend practice and "work hard" in an attempt to achieve some measure of improvement. The success they attain is frequently attributed directly to the amount of practice time expended. Conversely, lack of success is often attributed to inadequate practice time. Therefore, undue emphasis may be placed on the continuation of practice at the expense of other important areas. Coaches will work with athletes to correct deficits in their performance, but not all performance problems are related to lack of practice or poor practice skills. Success in the swimming pool is undoubtedly not a factor of practice time alone. Several facets of the training process will influence an athlete's success. Important components include training, adequate rest and recovery time, proper nutritional

habits, and positive psychological mechanisms. The core of the model is the discipline required in each of the different areas; discipline connects and overlaps each of the four aforementioned components (see Figure 1).

Training

The quantity and quality of physical training an individual undergoes has a direct relationship on her/his success in the pool. An individual's training load, based on the frequency, type and intensity of the training sessions will often dictate the athlete's results. The type of stroke and distance swum is influential on the nature of the practice and conditioning session. For example, sprinters will require an entirely different training regimen than distance freestylers. Also, a butterflyer will focus on different aspects in training than a breaststroker.

The combination of both an effective dry-land and in-water training protocol can offer the benefits in swimming improvement. Dry-land training may take several different approaches including the utilization of free weights and machine weights, resistance bands, plyometrics, and body weight exercises. All of the different dry-land techniques have associated positive and negative aspects, and swimmers and coaches would be well advised to research the benefits and potential drawbacks of each of these methods of training.

Proper Nutritional Habits

Proper nutritional practices play an integral role in the athlete's development and improvement. Physical activity, athletic performance and recovery from exercise can be enhanced by optimal nutrition. Both the selection of food and the timing of ingestion are important components in performance. Pre-practice/competition consumption and post- practice/competition consumption are equally important. The nutritional component for energy and recovery after exercise is also extremely important. Care should be taken to properly restore nutrients and electrolytes lost during training and competition, and this component is especially important for athletes training in an outdoor environment.

Factors that affect optimal nutrition intake include the swimmer's training load and the individual's body mass. Swimmers will often consume an overabundance of food, incorrectly assuming that their training load will take care of the exorbitant amount of calories. Even though this intake provides valuable electrolytes to the body, adding sports drinks into a nutritional plan can dramatically increase calories. Therefore, caution is advised on the utilization of sport drinks.

Pre-event/competition nutrition is individualized and depends on the needs and gastrointestinal (GI) tract of each competitor. Many swimmers will want to consume some food before practice and competition, however the timing of ingestion is dependent on the swimmer's digestive capabilities. Often a smaller high carbohydrate containing snack (e.g., power bar, small dish of pasta, fruit) may be beneficial. The intensity and duration of the workout will also dictate pre-event

nutritional needs, as additional digestion time may be required for higher intensity workouts. Frequent feedings may be required for workouts of longer duration.

Adequate Rest and Recovery Time

Athletes often neglect the component of rest and recovery in their training regimen and some coaches will overemphasize the practice component. As a result, athletes will extend their pool and dry-land training in order to satisfy an increased training regimen. Often a “quantity” approach to training is utilized which may lead to less than optimal performance in the pool.

Without sufficient time to recover from strenuous training, the body will begin to breakdown and further training benefits will be compromised. The negative result of overtraining and inadequate recovery is the increased likelihood of illness or injury. A primary component of improvement is adaptation to the stress of training. The body can adapt to increased training and thereby become stronger and more efficient. However, there are limits to how much the body can adapt to increased training. The goal of any training program is to find the optimal distance and intensity of training to assist in performance improvement. If the training program is less than adequate, achieving significant gains will be difficult. Fatigued tissue does not respond to stress as well as healthy tissue and this lack of recovery time may lead to structural damage in the body. While ordinarily the athlete may be able to withstand traumatic or chronic forces on the body, increased fatigue levels may unfortunately result in increased likelihood of structural injury in the swimmer.

Increased training load has also been shown to suppress the immune system. While an athlete may be able to withstand certain bacterial or viral pathogens on a normal basis, immunosuppression may result in an opportunistic infection. The constant cycle of training and recovery can lead the body to breakdown past the point of optimal recovery. Certainly in any sport requiring large volume training this is an ever present risk that should be addressed.

Rest and recovery may take several forms. Immediate recovery (as an athlete proceeds from event to event) is best achieved by performing light activity immediately after an event. Coaches should ensure that the athlete properly swims down after each event, especially when the swimmer has little time between races.

Positive Psychological Mechanisms

Psychological skills are the mental and emotional attributes that affect how an athlete will perform in certain situations. Athletes need psychological conditioning to attain their optimal performance; mind and body need to work together. Excess tension, distractions and misdirected focus are negative factors that psychological skills can help control and, thus, allow athletes to perform at their best.

Psychological skills are similar to physical skills in that they can be developed and improved; they are every bit as important as physical training. In competition, it is often psychological skills which determine who comes closest to her/his potential. Many athletes and coaches are reluctant to include psychological tools in their training and performance regime. Coaches and athletes typically only turn to learning and practicing psychological skills when there is a crisis or a specific problem, even though a preventative approach is considerably more effective.

The importance of psychological skills in the development of athletic performance is widely recognized across various sports and levels of competition. There are a number of psychological skills that an athlete can use to enhance her/his performance, many of which coaches and athletes are already utilizing. Mental imagery, relaxation, goal setting, positive self-talk, and cognitive restructuring are some of the techniques used to enhance athletic performance, readiness and satisfaction.

Discipline

Discipline is often viewed as the deciding factor between wins and losses, perceived successes and failures, and the overall quality of an athlete's athletic experience. Without integrating all four components (i.e., training, nutrition, rest/recovery, psychological) into their competitive routine, athletes are at risk for decreased performance.

The surrounding conditions of an athlete's life also appear to play a role in the different levels of discipline in swimming. An athlete is adhering to the four aspects of swim training by structuring his or her environment in a way that reduces distractions, incorporates rest and recovery, and includes easy access to nutrition that enhances performance. Athletes who "engineer their environments" toward their goals may display more discipline in their behavior towards training. In order to accomplish any athletic task, a level of discipline is required. While individual differences exist, the four noted factors - appropriate practice, adequate recovery, proper nutrition, and the implementation of strong psychological skills - are essential for quality athletic performance.

Summary

As coaches, it is imperative to recognize the strengths and weaknesses of each swimmer. While overall training may be going well, perhaps increased stress at home or at school is slowly robbing valuable energy from the athlete. Or, could poor nutritional habits prevent the swimmer from fully recovering from each workout? While simplistic in this approach, this model should emphasize the importance to coaches to address all of the areas in each athlete, and not solely focus on just one particular area of training. The core of the model is to maintain the discipline necessary to implement each component of performance as needed.

Figure 1. Model of Performance Improvement

