Routledge Handbook of Applied Sport Psychology
A comprehensive guide for students and practitioners
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Activation/arousal control

Publication details
https://www.routledgehandbooks.com/doi/10.4324/9780203851043.ch49
Robert Weinberg
Published online on: 13 Oct 2010

Accessed on: 20 Jul 2023
https://www.routledgehandbooks.com/doi/10.4324/9780203851043.ch49

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Routledge Handbook of Applied Sport Psychology

A comprehensive guide for students and practitioners

Edited by Stephanie J. Hanrahan and Mark B. Andersen
I love the pressure. I just look forward to it.

Daly Thompson, Olympic decathlon gold medalist

The thing that always worked best for me whenever I felt I was getting too tense to play good tennis was to simply remind myself that the worst thing – the very worst thing that could happen to me – was that I’d lose a bloody tennis match. That’s all.

Rod Laver, Hall of Fame tennis champion

Most competitive athletes spend a great deal of time physically practising their skills and honing the precise movement patterns necessary to perform at high levels. Sooner or later athletes have to perform their skills in competition where there are usually competitors, spectators, and coaches present. In addition, society places a premium on winning, and there may be high expectations placed on athletes. Expectations usually result in athletes feeling pressure to perform and becoming highly aroused, which often translates into decreases in performance. This scenario, however, does not have to be the case. We all know athletes who seem to thrive under pressure and perform at their best. The two quotes above highlight how athletes may experience and interpret pressure and arousal symptoms differently.

Definitions of arousal and anxiety

The terms arousal and anxiety are often confused and used interchangeably. Although there is some overlap, they are conceptually different. Arousal is defined as a blend of physiological and psychological activity in a person falling along a continuum from deep sleep to extreme excitation. Arousal is not automatically associated with either pleasant or unpleasant events. For example, individuals could become highly aroused winning the lottery or learning about a death in the family. Increases in arousal are intimately associated with sympathetic nervous system activation, whereas it is the parasympathetic nervous system that is engaged when an athlete becomes more relaxed.
Anxiety is defined as a negative emotional state (feeling fearful and uncomfortable, experiencing dread) characterized by nervousness, worry, and apprehension and associated with activation or arousal of the body. Anxiety has a thought component (e.g., worry, apprehension) called cognitive anxiety. It also has a somatic component that is the degree of physical activation (e.g., increased heart rate, generalized muscle tension, galvanic skin response). So, a racing heart and an increased respiration rate could be an increase in arousal or anxiety depending on the context of the situation.

**Assessment of arousal**

The primary way to determine athletes’ arousal levels is to observe or measure their physiological reactions. Athletes can sometimes hide symptoms, making it difficult to determine arousal levels simply by observing athletes’ physical reactions. In addition, sport psychology consultants often do not observe athletes extensively when the latter are actively engaging in their sports, so they do not notice these symptoms if they happen to be there. Despite these limitations it is instructive to know typical physiological reactions to increases in arousal that directly involve the cardiovascular system and the classic “flight or fight” response with blood rushing to the large muscle groups as the body prepares for action. Some typical sympathetic physiological reactions include (a) accelerated heart rate, (b) increases in galvanic skin response (sweating), (c) increased blood pressure, (d) nausea or abdominal distress, (e) shortness of breath, (f) increased generalized muscle tension, (g) trembling or shaking, and (h) feeling dizzy, lightheaded. These symptoms should not be confused, however, with the normal physiological reactions to physical activity. Heart rate monitors, for example, cannot differentiate between increased heart rate as a result of running and rapid heart rate due to perceived excitement or fear. Although not as observable, some cognitive and behavioral symptoms of increases in arousal can include (a) excess worry and apprehension, (b) difficulty concentrating, (c) difficulty making decisions, (d) rumination, (e) withdrawal or isolation, and (f) difficulty staying on task.

**Arousal–performance relationship**

Over the years there have been many theories put forth to explain the relationship between arousal and performance, but one constant has been the idea that there seems to be an optimal level of arousal at which athletes perform their best. Instead of attempting to review all the theories and their different predictions, I will focus on one approach that has practical implications for consulting with athletes.

**Zones of optimal functioning**

Using his initial consulting practice and then conducting supportive empirical research, Hanin (1997) found that different athletes appear to have different optimal levels of arousal (anxiety levels in particular) for their best performances. In essence, Hanin argued for an individual differences approach to finding athletes’ optimal levels of arousal. Instead of athletes comparing themselves to others, they need to become aware of their own individual zones of optimal functioning. We all know some athletes who need to be at high levels of
arousal (pumped up), whereas others need to be at low levels (cool and calm). So, how does one go about finding an athlete’s optimal level of arousal?

Initially, we have to find what level of arousal is most associated with high levels of performance. Hanin (1997) originally attempted this determination using the State Anxiety Inventory (Spielberger, 1966) before several competitions (or retrospectively after several competitions), to find an athlete’s individualized zone of optimal functioning (IZOF). In his more recent work, however, Hanin (2000) has expanded to studying optimal zones for different emotions and feeling states. He has used items from the Positive and Negative Affect Scale (Watson, Clark, & Tellegen, 1988) to measure certain emotional states.

Hanin has argued that there are pleasant states that may have positive influences on performance (e.g., energetic, motivated, charged, confident), pleasant states that may have negative influences on performance (e.g., easygoing, tranquil, relaxed), unpleasant states that may have negative influences on performance (e.g., tired, sluggish, depressed, lazy), and unpleasant states that may have positive influences on performance (e.g., tense, dissatisfied, nervous, angry). Hanin (2000) has focused on the notion of direction (interpretation) of arousal states in addition to the typical focus on intensity (the amount of arousal). Jones and colleagues popularized this concept of direction in the mid-1990s and focused on whether the anxiety felt by a performer was perceived as facilitative or debilitative to performance (Jones & Swain 1995; Jones, Swain, & Hardy, 1993). For example, two athletes listening to the national anthem right before a game might have their hearts start to beat really fast and get queasy feelings in their stomachs. However, one athlete interprets this queasy feeling as facilitative (“I’m ready to go”) whereas the other athlete perceives it as debilitative (“I’m so nervous I hope I don’t mess up”). Alternatively, one athlete might view the emotion of tranquility either positively or negatively. Therefore, athletes might benefit from being taught to interpret their arousal symptoms in a facilitative manner (to help performance) as well as develop techniques that will help them be optimally ready for competitions. These techniques might involve reducing or increasing arousal levels, and they will be the main focus of the remainder of the chapter.

**Matching best performance with arousal levels**

Determining arousal levels is only one part of what is needed; over several competitions, performance should also be assessed. Performance can be measured either objectively or subjectively. For example, in assessing basketball performance, one could simply look at a player’s objective performance in relation to such things as scoring (shooting percentage), assists, rebounds, steals, and so forth and develop a composite performance assessment. Alternatively, the athlete (or the coach) could rate her performance in relation to how she normally plays from “1” (much worse than usual) to “11” (much better than usual). The first way appears to be the more objective, but it is dependent on the performances of teammates and opponents.

After assessing both arousal and performance for several competitions, one is now ready to create a zone of optimal functioning using the best performances and the arousal states that are associated with these top performances. In Hanin’s (1997) original work, he used plus/minus a half of a standard deviation (that was plus or minus 4 on the State Anxiety Inventory). But you can create a zone you want based on scores on a test (e.g., Positive and Negative Affect Scale) or on certain autonomic nervous system reactions such as heart rate or breathing rate. The goal, then, would be to regulate arousal levels so that the desired
optimal levels (associated with top performance) would be achieved at least just prior to performance. It then becomes the athlete’s responsibility to try to maintain this zone throughout competition. The next section contains some techniques and references for regulating arousal levels.

Relaxation strategies

For most athletes, the problem is usually too much arousal as opposed to too little, particularly during important competitions or games. Therefore, the focus has often been on reducing arousal, because the many potential negative effects, both physical (e.g., tight muscles, racing heart) and mental (e.g., inappropriate attentional focus, poor decision making), can produce decreases in performance. The old adage of “giving 110%” does not really work because athletes tend to tense all their muscles in attempting to give 110% effort (not to mention it being impossible to give more than 100%). Skilled performance usually involves an intricate interplay between having some muscles relaxed while others are contracting. Simply trying to relax usually will not work. The relaxation techniques need to be systematically practised so that athletes learn different techniques to achieve relaxation. Consultants working with athletes should always be cognizant of the matching hypothesis, which basically states that an arousal management technique should be matched to meet the needs of the individual. For example, worry and apprehension should be treated with techniques that focus on calming the negative cognitions, and unwanted physiological activation should be treated with physical relaxation (e.g., progressive muscular relaxation, diaphragmatic breathing).

Breath control

One of the easiest but most effective ways to reduce arousal is through breath control. When under pressure, many athletes do not breathe efficiently. All breaths have inhalation and exhalation phases with inhalation producing tension and exhalation producing relaxation. In many relaxation exercises the inhalation phase is be shorter than the exhalation phase (a 1:2 ratio is often used). That is, if athletes inhale for two seconds they should exhale for approximately four seconds, or if they inhale for three seconds they should exhale for six seconds. A final point is that each breath should come from the diaphragm (belly) because this produces deeper and slower breathing by drawing the breath fully into the lower parts of the lungs.

To practise breath control, athletes should take a deep complete breath and imagine the lungs are divided into three levels. They should focus on filling the lower level of the lungs with air, first by pushing the diaphragm down and forcing the abdomen out. Then they should fill the middle portion of the lungs by expanding the chest cavity and raising the rib cage. Finally, the upper level of the lungs should be filled by raising the chest and shoulders slightly. After briefly inhaling, exhale slowly by pulling the abdomen in and lowering the shoulders and chest. By focusing on the lowering (inhalation) and rising (exhalation) of the diaphragm, they will experience an increased sense of stability, centeredness, and relaxation.

Breath control is particularly useful during a break in the action or before performing a specific skill such as serving in tennis, hitting a golf ball, kicking a field goal, taking a penalty shot in soccer, or before starting a gymnastic routine or figure skating program. Finally, although breathing generally is a somatically-based strategy, if athletes focus on their breathing, breath control has the added benefit of reducing negative thoughts because cognitions such as mentally counting the seconds of inhalation and exhalation keep one focused on numbers and breathing so there is little room for other unwanted thoughts.
**Progressive muscular relaxation**

When it comes to relaxation, the “gold standard” is probably progressive muscular relaxation (PMR) originally developed by Jacobson (1938). PMR rests on several basic assumptions: (a) it is possible to learn the difference between tension and relaxation in the muscles; (b) tension and relaxation are mutually exclusive – it is not possible for a muscle to be tense and relaxed at the same time; and (c) relaxation of the body through decreased muscle tension will lead to fewer anxious thoughts because one cannot be worried and relaxed at the same time.

It is called progressive muscular relaxation because one progressively contracts and relaxes each major muscle group until all targeted muscles are relaxed. The tension–relaxation cycles develop an athlete’s awareness of the difference between tension and lack of tension in the muscles. Each cycle involves maximally contracting one specific muscle group and then attempting to relax that same muscle group as much as possible, all the while focusing on the different sensations of tension and relaxation. With practise, athletes can detect tension in a specific muscle or area of the body, and then relax that muscle. Prior to or within competition, if athletes feel that they are tight/tense in certain areas of the body (e.g., many people manifest anxiety in the neck and shoulder areas), then they can scan their bodies for any residual tension and use PMR to relax those specific muscles. The first few sessions of progressive relaxation can take about 30 minutes, although less time is necessary as athletes develop the ability to relax.

Because the original PMR protocol can take some time to learn and implement, Ost (1988) developed a variation of PMR that allows athletes to relax in a shorter time frame. Specifically, the first phase of training involves a 15-minute progressive relaxation session practised twice a day in which targeted muscle groups are tensed. The individual then moves to a relax-only phase that takes 5–7 minutes. The time is next reduced to a 2- to 3-minute version with the use of the self-instructional cue, “relax.” This time is finally reduced until only a few seconds are required, making the technique useful in actual sport situations.

**Relaxation response**

Herbert Benson popularized a clinically validated way of relaxing that he called the relaxation response (Benson & Proctor, 1984). Benson’s method applies the basic principles of meditation, but does not contain any spiritual or religious connotations. The state of mind produced by this technique is characterized by keen awareness, effortlessness, relaxation, spontaneity, and focused attention. The four basic steps include the following (20–30 minutes):

1. Quiet environment: External distractions are at a minimum.
2. Comfortable position: No set position as long as the athletes can hold the position throughout the procedure.
3. Mental device: Focusing on a single thought or word and repeating it over and over. For example, words such as ease, calm, or relax would be repeated in conjunction with exhaling.
4. Passive attitude: If while repeating the mental devices other thoughts enter their minds, the athletes should not attend to them and instead let them simply go out of their minds. Athletes should then refocus attention on the mental devices.
Autogenic training

Schultz developed autogenic training in the 1930s and refined it with the help of Luthe in 1969 (see Schultz & Luthe, 1969). This relaxation process has been used extensively in Europe but less so in North America. Autogenic training consists of a series of exercises designed to produce sensations of warmth and heaviness. Basically it is a technique of self-hypnosis where attention is focused on the sensations one is trying to produce. The autogenic training program is based on six hierarchical stages that usually are learned in the following order: (a) heaviness in the extremities, (b) warmth in the extremities, (c) regulation of cardiac activity, (d) regulation of breathing, (e) abdominal warmth, and (f) cooling of the forehead.

The statements “my right arm is heavy,” “my right arm is warm and relaxed,” “my heartbeat is regular and calm,” and “my forehead is cool” are examples of commonly used verbal cues in autogenic training. It may take several months of regular practice (10 to 40 minutes per day) to become proficient in experiencing warmth and heaviness in the legs along with changes in cardiac and respiratory cycles (that is one reason why it probably did not catch on in time-poor North America).

Pre-competition routines

Two sources that may bring about debilitative arousal in athletes are uncertainty and loss of control. There are many things in athletes’ environments that are out of their control, such as the weather, officials, opponents, spectators, and coaches. These situations and people external to athletes can cause arousal levels to rise past optimal levels. One way to take control of the situation is through the use of pre-competition or competition routines. Routines are structured, systematic ways of thinking and behaving when preparing for competition or for events occurring throughout competition. These routines are within the control of athletes and can be followed regardless of the situation or external events. In addition, routines work by helping athletes divert their attention from task-irrelevant (usually negative thoughts such as “what will my teammates think if I miss this field goal?”) to task-relevant cognitions (“just keep your head down”). Routines may increase the likelihood that athletes will not be distracted internally or externally prior to, or during performance. For example, many athletes have developed specific routines before performance such as serving in tennis, hitting a golf ball, kicking a field goal, shooting a free throw, and taking a penalty shot. See Chapter 56 for more information about pre-performance routines.

Cognitive-affective stress management training (SMT)

SMT is a comprehensive package of techniques designed to produce an integrated coping response (Smith, 1980). SMT offers specific intervention strategies, such as relaxation (PMR), cognitive restructuring (reframing, positive self-talk), and self-instructional training (“keep your head down”). There are four distinct phases: (a) pretreatment assessment – assessing the situations causing stress, the athletes’ reactions to stress, and how stress affects the athletes; (b) treatment rationale – understanding their stress reactions and that the treatment is to assist them in gaining control and coping with stress; (c) skill acquisition – learning different skills including relaxation, cognitive restructuring, and self-instructional cues; and (d) skill rehearsal – deliberately introducing stress so athletes can use the skills acquired to practise coping with the stress.
Imagery

One of the easiest ways for athletes to relax is through imagery. By consciously visualizing a relaxing image, athletes allow their bodies to unwind and relax. For example, athletes can imagine the blood flowing into their muscles to increase their warmth and elasticity or imagine drinking a warm liquid and feeling it seep through their bodies, relaxing their arms, legs, shoulders, necks, backs, and trunk. Furthermore, athletes can imagine a situation that has caused them to become overaroused in the past (e.g., shooting critical free throws at the end of a game) and see themselves coping with this overarousal (by using one of the aforementioned techniques). Imagined events stimulate us, much like real events, so athletes can practise their relaxation through imagining themselves, for example, staying calm in a tense competitive situation. See Chapter 50 for additional information about imagery.

Self-talk

Self-talk is basically a verbal monologue athletes have with themselves that can either be out loud or just inside their heads (auditory imagery). Although self-talk can take many forms, it is usually categorized into three types: positive (motivational) self-talk (e.g., “I can do it”) that focuses on increasing energy and effort and staying positive; instructional self-talk (e.g., “bend your knees”) that helps athletes stay focused on task-relevant cues; and negative self-talk (e.g., “that was a stupid shot”) that usually creates unease and fosters self-doubt. The basic idea of using some sort of positive/instructional self-talk is that athletes gain the ability to talk themselves into calming down, putting forth effort, or staying focused. Words and phrases such as “slow down,” breathe and relax,” and “calm” are self-suggestions that can remind athletes to stay calm and relaxed during critical and stressful points during competition or regularly throughout competition. For example, runners could remind themselves to “keep their shoulders relaxed” or golfers could remind themselves to “relax and take a deep breath” before important shots.

It is often assumed that negative events cause stress. Psychologists, however, have come to understand that it is often the self-talk that comes after the negative event that produces athletes’ stress reactions. For example, after a poor performance, a baseball player might say “I just can’t play in the major leagues,” which could result in the player feeling stressed, anxious, frustrated, and hopeless. Given the same situation, however, another player might say “I just need to work more on being more patient at the plate,” which could result in increased effort, motivation, and optimism. Research (see Weinberg & Gould, 2007 for a review) across a wide variety of sports has consistently revealed that performance is increased after positive and instructional self-talk but decreased after negative self-talk. Changing negative to positive self-talk may not only reduce stress but may also increase performance. See Chapter 53 for additional information on self-talk.

Arousal-inducing techniques

As noted earlier, a major problem for athletes is being over-aroused or being too “pumped up.” There are, however, times when intensity levels need to be increased, such as when athletes are feeling lackadaisical, tired, or possibly overconfident. Under-arousal is usually more of an issue during training than during competition. Whenever it occurs, coaches need
to be careful not to overly psych athletes up with pre-game pep talks and motivational
speeches because these talks can be debilitative for some athletes. So if arousal is going to
be raised, it should be done in a deliberate fashion with awareness of optimal arousal states.
Some signs of being underactivated or underaroused might include (a) constantly wander-
ing thoughts, (b) feeling bored or uninterested, (c) heavy feeling in the legs, (d) moving
slowly, and (e) lack of anticipation/enthusiasm. There are a number of techniques that
athletes can use to become more energized including the following:

Increase breathing rate
Short, quick breaths can help energize athletes. When increasing activation the focus is on
inhalation instead of exhalation. To increase the effect, athletes say “energy in” with each
inhalation and “fatigue out” with each exhalation.

Physical activity
Jumping up and down, slapping thighs, and pumping fists can all stimulate blood flow and
increase activation. For example, tennis players often bounce on the balls of their feet
before serving or receiving serve. In addition, before competition, some athletes like to work
out and get a sweat going to get themselves activated for competition.

Mood words/positive statements
Thinking can certainly affect physiology. For example, saying or thinking mood words
(e.g., hustle, strong, move, tough, quick) can get the athlete activated. In addition positive
self-statements such as “hang in there,” “get tough,” “get going,” and “I can do it” can also
raise arousal levels.

Act energized
Sometimes athletes might not feel energetic and motivated, but if they act pumped up they
can often recapture their high energy levels. Head up, shoulders back, and walking quickly
are some actions that can increase arousal.

Upbeat music
Listening to fast, upbeat music or a favorite tune can sometimes help athletes become
activated, enthusiastic, and ready for competition. Many athletes now use headphones and
iPods to listen to energetic music before competition to help increase arousal and create
positive feelings.

Energizing imagery
As noted earlier, imagery can be used for relaxation. Imagery can also be used to generate
positive feelings and energy. Energizing imagery involves visualizing something that is
exciting to the individual. For example, a sprinter might imagine a cheetah running
swiftly over the plains or a swimmer might imagine moving through the water like a
shark.
**Summary**

In this chapter I have discussed the arousal–performance relationship, with a special focus on ways in which to regulate arousal levels. Box 49.1 summarizes some of the main points from this chapter.

**Box 49.1**

**Main points about arousal control**

- Arousal and affect can be measured through the use of questionnaires (e.g., Positive and Negative Affect Scale) or through physiological reactions (e.g., heart rate, breathing rate).
- Compared to the traditional intensity of anxiety/arousal symptoms, the direction of anxiety/arousal (interpretation as facilitative or debilitative) seems to be more critical to performance.
- All athletes have an optimal level or zone of arousal where they experience their top performances.
- These zones of optimal functioning are different for different athletes.
- Creating an optimal zone requires a number of arousal assessments (either before competition or retrospectively) correlated with performances (subjective or objective).
- Arousal reducing techniques are usually focused on physical relaxation (e.g., progressive muscular relaxation, breath control) or mental relaxation (relaxation response, self-talk).
- Typical arousal-inducing strategies include energizing imagery, mood words/positive statements, physical activity, upbeat music, and increased breathing rate.

**References**


