

Arousal, Stress, and Anxiety

After reading this chapter, you should be able to

1. discuss the nature of stress and anxiety (what they are and how they are measured),
2. identify the major sources of anxiety and stress,
3. explain how and why arousal- and anxiety-related emotions affect performance, and
4. compare and contrast ways to regulate arousal, stress, and anxiety.

Jason comes to bat in the bottom of the final inning with two outs and two men on base. With a hit, his team will win the district championship; with an out, his team will lose the biggest game of the season. Jason steps into the batter's box, his heart pounding and butterflies in his stomach, and has trouble maintaining concentration. He thinks of what a win will mean for his team and of what people might think of him if he does not deliver. Planting his cleats in the dirt, Jason squeezes the bat, says a little prayer, and awaits the first pitch.

If you're involved in athletics, you have probably faced the elevated arousal and anxiety of situations such as Jason's. Consider the following quote from Bill Shankly, former manager of Liverpool Football Club, regarding the importance of winning and losing in competitive sport:

“Some people think football is a matter of life and death. I don't take that attitude. I can assure them it is much more serious than that. (Shankly, 1981)”

Although pressure is all too real in military and emergency services settings, where life and death can

truly rest on one's decisions, coping skills, and eventual performance (e.g., Janelle & Hatfield, 2008), success and failure in competitive sport—especially at high levels—can also produce extreme anxiety. History is replete with athletes who have performed exceedingly well under pressure (see chapter 11 for a discussion of mental toughness) and those who have performed exceedingly poorly (see chapter 17 for a discussion of choking). It is no surprise that the relationship between competitive anxiety and performance has been one of the most debated and investigated topics in sport psychology (for reviews, see Hanton, Neil, & Mellalieu, 2008, 2011). Sport and exercise psychologists have long studied the causes and effects of arousal, stress, and anxiety in the competitive athletic environment and other areas of physical activity. Many health care professionals are interested in both the physiological and psychological benefits of regular exercise. Does regular exercise lower stress levels? Will patients with severe anxiety disorders benefit from intensive aerobic training and need less medication? Consider how stress provoking learning to swim can be for people who have had a bad experience in water. How can teachers reduce this anxiety?

Defining Arousal and Anxiety

Although many people use the terms *arousal*, *stress*, and *anxiety* interchangeably, sport and exercise psychologists find it important to distinguish between them. Psychologists use precise definitions for the phenomena they study in order to have a common language, reduce confusion, and diminish the need for long explanations.

Arousal

Arousal is a blend of physiological and psychological activity in a person, and it refers to the intensity of arousal falls along a continuum (figure 5.1) ranging from not at all aroused (i.e., comatose) to completely aroused (i.e., frenzied; see Gould, Greenleaf, & Krane, 2002). Highly aroused individuals are mentally and physically activated; they experience increases in heart rate, respiration, and sweating. Arousal is not automatically associated with either pleasant or unpleasant events. You might be highly aroused by learning that you have won \$10 million. You might be equally aroused by learning of the death of a loved one.

Anxiety

In a general sense, **anxiety** is a negative emotional state characterized by nervousness, worry, and apprehension and associated with activation or arousal of the body. Although anxiety is perceived as negative or unpleasant, it does not necessarily affect performance negatively; this is discussed later in the chapter. In sport settings, anxiety refers to “an unpleasant psychological state in reaction to perceived stress concerning the performance of a task under pressure” (Cheng, Hardy, & Markland, 2009, p. 271). Anxiety has a thought component (e.g., worry and apprehension) called **cognitive anxiety**. It also



FIGURE 5.1 The arousal continuum.



Low (coma)
High (frenzy)

has a component called **somatic anxiety**, which is the degree of physical activation perceived. In addition to the distinction between cognitive and somatic anxiety, it is important to distinguish between state and trait anxiety.

Key Points

- Arousal is a general physiological and psychological activation that varies on a continuum from deep sleep to intense excitement.
- Anxiety is a negative emotional state in which feelings of nervousness, worry, and apprehension are associated with activation or arousal of the body.

State Anxiety

At times we refer to anxiety as a *stable* personality component; other times we use the term to describe a *changing* mood state. **State anxiety** refers to the ever-changing mood component. It is defined more formally as an emotional state “characterized by subjective, consciously perceived feelings of apprehension and tension, accompanied by or associated with activation or arousal of the autonomic nervous system” (Spielberger, 1966, p. 17). For example, a player’s level of state anxiety changes from moment to moment during a basketball game. She might have a slightly elevated level of state anxiety (feeling somewhat nervous and noticing her heart pumping) before tip-off, a lower level once she settles into the pace of the game, and then an extremely high level (feeling very nervous, with her heart racing) in the closing minutes of a tight contest.

Cognitive state anxiety concerns the degree to which one worries or has negative thoughts, whereas **somatic state anxiety** concerns the moment-to-moment

changes in perceived physiological activation. Somatic state anxiety is not necessarily a change in one's physical activation but rather one's perception of such a change. Research also suggests that there is a **perceived control** or regulatory component of state anxiety; that is, the degree to which one believes one has the resources and ability to meet challenges is an important component of state anxiety as well (Cheng et al., 2009).

Key Point

State anxiety is a temporary, ever-changing emotional state of subjective, consciously perceived feelings of apprehension and tension associated with activation of the autonomic nervous system.

Trait Anxiety

Unlike state anxiety, **trait anxiety** is part of the personality, an acquired behavioral tendency or disposition that influences behavior. In particular, "trait anxiety predisposes an individual to perceive as threatening a wide range of circumstances that objectively may not actually be physically or psychologically dangerous. The person then responds to these circumstances with state anxiety reactions or levels that are disproportionate in

intensity and magnitude to the objective danger" (Spielberger, 1966, p. 17).

For instance, two field-goal kickers with equal physical skills may be placed under identical pressure (e.g., to kick the winning field goal at the end of the game) yet have entirely different state anxiety reactions because of their personalities (i.e., their levels of trait anxiety). Devante is more laid back (low trait-anxious) and does not perceive kicking the game-winning field goal as overly threatening. Thus, he does not have more state anxiety than would be expected in such a situation. Elija, however, is highly trait-anxious and consequently perceives the chance to kick (or, in his view, to miss) the winning field goal as very threatening. He has tremendous state anxiety—much more than we would expect in such a situation.

Key Point

Trait anxiety is a behavioral disposition to perceive as threatening circumstances that objectively may not be dangerous and to then respond with disproportionate state anxiety. People with high trait anxiety usually have more state anxiety in highly competitive, evaluative situations than do people with lower trait anxiety.

Emotions and Sport and Exercise Psychology

Although the focus of this chapter is on arousal and anxiety, it is important to note that many sport and exercise psychologists have begun to study various emotions in athletes and exercisers. For example, in chapter 18 we examine how participation in physical activity influences a range of participant emotions such as depression, anxiety, and pleasure; later in this chapter we discuss how arousal- and anxiety-associated emotions are related to performance. For example, a physical therapist applies too much pressure during a rehabilitation session and the client complains to the manager. This might make the physical therapist anxious and more tentative in helping the next client.

The leading researcher in this field, psychologist Richard Lazarus (2000), defined **emotion** as "an organized psychophysiological reaction to ongoing relationships with the environment, most often, but not always, interpersonal or social," involving subjective experiences, observable actions or impulses to act, and physiological changes (p. 230). Finally, emotions can be both positive (e.g., pleasure) and negative (e.g., shame). Common emotions include anger, anxiety, fright, guilt, shame, sadness, envy, jealousy, happiness, pride, relief, hope, love, gratitude, and compassion (Lazarus, 2000).

Research has provided preliminary support of the idea that different emotions can affect performance in either a positive or negative way. Specifically, Rathschlag and Memmert (2013) found that self-generated emotions of happiness and anger facilitated performance (compared to either a neutral condition or one in which the emotions of anxiety and sadness were generated) on physical tasks requiring high levels of effort (e.g., weightlifting). In another study, Rathschlag and Memmert (2015) found that generating the emotion of happiness before a sprint race also enhanced performance. From a practical point of view, teaching athletes to generate certain emotions before performance could enhance their abilities to perform the task more effectively and efficiently.

Measuring Arousal and Anxiety

Sport and exercise psychologists measure arousal, state anxiety, and trait anxiety in various physiological ways and through psychological measures. To measure arousal they look at changes in these physiological signs: heart rate, respiration, skin conductance (recorded on a voltage meter), and biochemistry (used to assess changes in substances such as catecholamines). These psychologists also look at how people rate their arousal levels using a series of statements (e.g., "My heart is pumping," "I feel peppy") and numerical scales ranging from low to high. Such scales are referred to as **self-report measures** of arousal and anxiety.

To measure state anxiety, psychologists use both global and multidimensional self-report measures. In the global measures, people rate how nervous they feel using **self-report scales** from low to high. Summing the scores of individual items produces a total score. The multidimensional self-report measures are used in about the same way, but people rate how worried (cognitive state anxiety) and how physiologically activated (somatic state anxiety) they feel, again using self-report scales ranging from low to high. Subscale scores for cognitive and somatic anxiety are obtained by summing

scores for items representing each type of state anxiety. Sport-specific scales that measure state anxiety in sport have been developed to better predict one's anxiety state in competitive sport settings. One example is the widely used Competitive State Anxiety Inventory-2 (CSAI-2) (Martens, Vealey, & Burton, 1990), displayed here. Interestingly, besides having cognitive and somatic anxiety subscales, the CSAI-2 also has a subscale of self-confidence, which is inversely related to cognitive and somatic anxiety.

In terms of measuring competitive trait anxiety, the first scale that was developed was the Sport Competition Anxiety Test (SCAT; Martens, 1977). This is an unidimensional measure with only a single score ranging from 10 to 30. Although this is one of the most popular personality measures in sport psychology, sport psychologists now tend to use global and multidimensional self-reports to measure trait anxiety. The formats for these measures are similar to those for state anxiety assessments; however, instead of rating how anxious they feel right at that moment, people are asked how they typically feel. For example, the Sport Anxiety Scale originally developed by Smith, Smoll, and Schutz (1990) and updated and extended to young athletes as the Sport Anxiety Scale-2 (SAS-2; Smith, Cumming, & Grossbard, 2006) is

Competitive State Anxiety Inventory-2

Following are several statements that athletes have used to describe their feelings before a competition. For the purposes of this exercise, think of a competition in which you have participated. Read each statement and then circle the appropriate number to the right of the statement to indicate how you felt at that moment. There are no right or wrong answers. Don't spend too much time on any one statement, but choose the answer that best describes your feelings at that particular time.

Statement	Not at all	Somewhat	Moderately so	Very much so
1. I am concerned about this competition.	1	2	3	4
2. I feel nervous.	1	2	3	4
3. I feel at ease.	1	2	3	4
4. I have self-doubts.	1	2	3	4
5. I feel jittery.	1	2	3	4
6. I feel comfortable.	1	2	3	4
7. I am concerned that I may not do as well as I could in this competition.	1	2	3	4
8. My body feels tense.	1	2	3	4
9. I feel self-confident.	1	2	3	4

one of the more widely used measures in the field and breaks trait anxiety into three components as well as a total score. The three components included somatic state anxiety (e.g., the degree to which one experiences heightened physical symptoms such as muscle tension), cognitive state anxiety (the degree to which one typically worries or has doubts) and concentration disruption (e.g., the degree to which one experiences concentration disruption during competition). See figure 5.2 for a summary of the relationships between arousal, trait anxiety, and state anxiety. In addition, to better understand the differences between cognitive state anxiety, somatic state anxiety, and competitive trait anxiety in sport, complete the sample questions from the CSAI-2 and SAS-2 self-report scales.

Activity 5.1 measures your trait and state anxiety.

A direct relationship exists between a person's levels of trait anxiety and state anxiety. Research has consistently shown that those who score high on trait anxiety measures also have more state anxiety in highly competitive,

evaluative situations. This relationship is not perfect, however. A highly trait-anxious athlete may have a tremendous amount of experience in a particular situation and therefore not perceive a threat and the corresponding high state anxiety. Similarly, some highly trait-anxious people learn coping skills to help reduce the state anxiety they experience in evaluative situations. Still, generally speaking, knowing a person's level of trait anxiety is usually helpful in predicting how that person will react to competition, evaluation, and threatening conditions.

To make matters more complex, we know from anecdotal reports as well as research (e.g., Butt, Weinberg, & Horn, 2003) that anxiety can fluctuate throughout competition. For example, we often hear football players say that they felt very anxious before competition but settled down after the first hit. (Interestingly, it appears that somatic anxiety levels decrease rapidly when competition starts, and that cognitive anxiety levels change throughout competition.) Soccer players have reported that they did not feel anxious during a game, but that their anxiety level went "sky high" when they had to take a penalty kick at the end of the game. Future measures need to assess these changes in anxiety, although it is difficult to do so during a competition. One possible

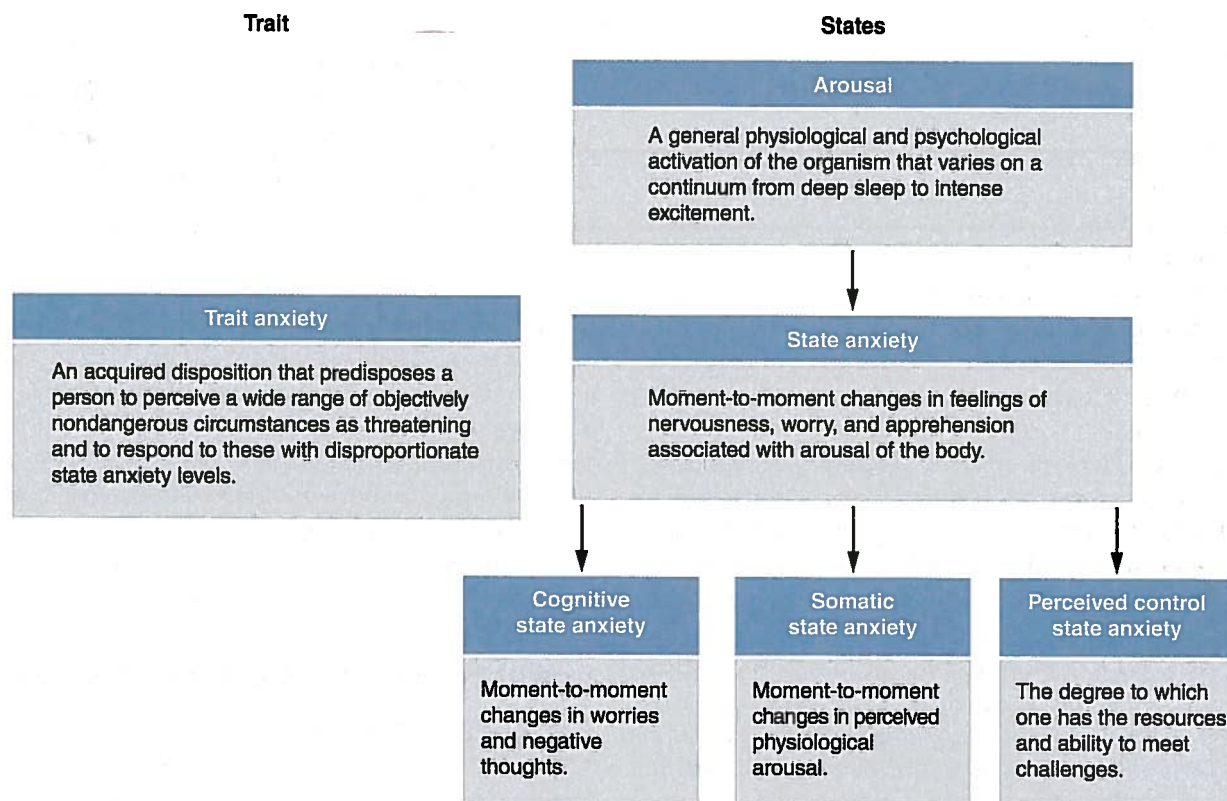


FIGURE 5.2 The interrelationships among arousal, trait anxiety, and state anxiety.

Sport Anxiety Scale-2 (SAS-2): A Measure of Trait Anxiety

Following are several statements that athletes have used to describe their thoughts and feelings before or during competition. Read each statement and then circle the number to the right of the statement that indicates how you usually feel before or during competition. Some athletes feel they should not admit to feeling nervous or worried, but such reactions are actually quite common, even among professional athletes. To help us better understand reactions to competition, we ask you to share your true reactions. There are no right or wrong answers. Do not spend too much time on any one statement.

Statement	Not at all	Somewhat	Moderately so	Very much so
1. My body feels tense.	1	2	3	4
2. I worry that I will play badly.	1	2	3	4
3. I cannot think clearly during the game.	1	2	3	4
4. My stomach feels upset.	1	2	3	4
5. It is hard to concentrate on the game.	1	2	3	4
6. I worry that I will let others down.	1	2	3	4

Research has indicated that athletes are quite good at assessing their state anxiety levels after the fact (Hani & Syja, 1996). For example, athletes could be asked within an hour of finishing a game how they felt at different times during the game.

To explore emotions and stressors throughout a competitive contest, Neil, Bowles, Fleming, and Hanton (2016) used reflective diaries to help cricket players remember specific stressful situations, their appraisal of the situation, and reactions to it for five different games so that they would be able to respond with specifics during an in-depth interview. Results revealed that at the heart of the cricketers' appraisal of potentially stressful and threatening situations were their perceived stress levels and emotional state. In addition, the appraisal process was closely attached to players' personal values, beliefs, and commitment to achieving personal goals. For example, if a cricketer had performed well in the past in getting a specific batsman out, he appraised his chances of achieving personal goals as high in facing the same batsman again. In essence, he felt confident (not stressed) in attempting to attain his goals. Conversely, another bowler (pitcher) appraised facing a particular batsman as threatening if he had been unsuccessful in the past and therefore would feel stressed facing this batsman again.

Besides investigating changes in stress and emotions throughout a competition, researchers have also assessed changes in stress and subsequent coping strategies leading up to a competition. Specifically, Miles, Neil, and Barker (2016) investigated changes over a 7-day period before the first cricket game of the season. During this time, players were evaluated to determine who would make the starting lineup for the first competition. Results revealed the major competitive stressor for players early in the week was whether they would be selected to play (the need to display competence), but as players were selected, the stress on competition day shifted to performing well for their team. In addition, across the week before competition, the players continued to experience stressors that emanated from outside the sporting environment, which were termed organizational (e.g., team issues) and personal (e.g., relationships). Some of the major coping strategies used to deal with these stressors were social support, precompetition routines, self-talk, and humor (see chapter 11 for a detailed discussion of coping strategies).

Defining Stress and Understanding the Stress Process

Stress is defined as "a substantial imbalance between demand (physical and/or psychological) and response

capability, under conditions where failure to meet that demand has important consequences” (McGrath, 1970, p. 20). It is a process or a sequence of events that will lead to a particular end. According to a simple model that McGrath proposed, stress consists of four interrelated stages (figure 5.3):

1. Environmental demand
2. Perception of demand
3. Stress response
4. Behavioral consequences

Key Point

Stress occurs when a substantial imbalance exists between the physical and psychological demands placed on an individual and that person's response capability under conditions in which failure to meet the demand has important consequences.

Stage 1: Environmental Demand

In the first stage of the stress process, some type of demand is placed on an individual. The demand might be physical, such as when a physical education student has to execute a newly learned volleyball skill in front of the class, or psychological, such as when parents are pressuring a young athlete to win a race.

Stage 2: Perception of Demand

The second stage of the stress process is the individual's perception of the physical or psychological demand. People do not perceive demands in exactly the same way. For instance, two eighth graders may view having to demonstrate a newly learned volleyball skill in front of the class quite differently. Maya may enjoy the attention of being in front of the class, whereas Issaha may feel threatened. That is, Issaha perceives an imbalance between the demands placed on him (having to demonstrate in front of the class) and his ability to meet those demands. Maya perceives no such imbalance or perceives it only to a nonthreatening degree.

A person's level of trait anxiety greatly influences how that person perceives the world. Highly trait-anxious people tend to perceive more situations—especially evaluative and competitive ones—as threatening than people with lower trait anxiety do. For this reason trait anxiety is an important influence in stage 2 of the stress process.

Stage 3: Stress Response

The third stage of the stress process is the individual's physical and psychological response to a perception of the situation. If someone's perception of an imbalance between demands and his response capability causes him to feel threatened, increased state anxiety results, bringing with it increased worries (cognitive state anxiety), heightened physiological activation (somatic state anxiety), or both. Other reactions, such as changes in concentration and increased muscle tension, accompany increased state anxiety as well.

Stage 4: Behavioral Consequences

The fourth stage is the actual behavior of the individual under stress. If a volleyball student perceives an imbalance between capability and demands and feels increased state anxiety, does performance deteriorate? Or does the increased state anxiety increase intensity of effort, thereby improving performance?

The final stage of the stress process feeds back into the first. If a student becomes overly threatened and performs poorly in front of the class, the other children

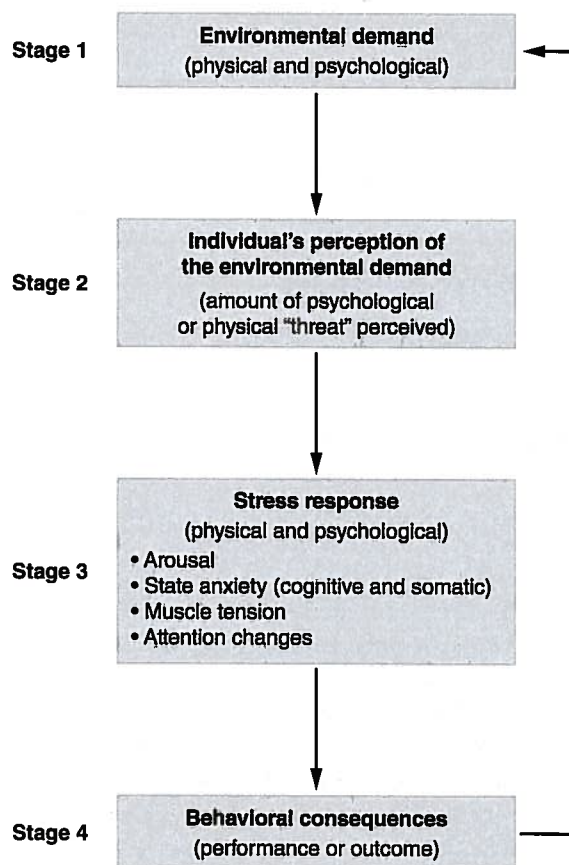


FIGURE 5.3 The four-stage stress process.

may laugh; this negative social evaluation becomes an additional demand on the child (stage 1). The stress process, then, becomes a continuing cycle (figure 5.3).

Implications for Practice

The stress process has a number of implications for practice. If a corporate fitness specialist is asked by her company's personnel director to help develop a stress management program for the company's employees, for example, stage 1 of the model suggests that she should determine what demands are placed on the employees (e.g., increased workloads, unrealistic scheduling demands, hectic travel schedules). An analysis of stage 2 might lead her to question who is experiencing or perceiving the most stress (e.g., individuals in certain divisions or with certain jobs, or those with certain personality dispositions). Stage 3 would call for studying the reactions the employees are having to the increased stress: somatic state anxiety, cognitive state anxiety, or attention–concentration problems. Stage 4 analysis would focus on the subsequent behavior of employees feeling increased stress, such as greater absenteeism, reduced productivity, or decreased job satisfaction. By understanding this stress cycle, the fitness director can target her efforts to reduce stress. She might suggest physical activity (most likely in stage 3) or other means of stress management (e.g., time management seminars, restructured work schedules). She now has a better grasp of the specific causes and consequences of stress, which allows her to design more effective stress management activities.

Identifying Sources of Stress and Anxiety

There are thousands of specific sources of stress. Exercise psychologists have also shown that major life events such as a job change or a death in the family, as well as daily hassles such as an auto breakdown or a problem with a coworker, cause stress and affect physical and mental health (Berger, Weinberg, and Ekblund, 2015). In athletes, stressors include performance issues such as worrying about performing up to capabilities, self-doubts about talent, and team selection; environmental issues such as financial costs, travel, and time needed for training; organizational issues such as coaching lead-ership and communication; physical danger; negative personal rapport behaviors of coaches; and relationships or traumatic experiences outside of sport, such as the death of a family member or negative interpersonal

relationships (Noblet & Gifford, 2002; Woodman & Hardy, 2001a). McKay, Niven, Lavallee, and White (2008) concluded that athletes experience a core group of stress or strain sources that include competitive concerns, pressure to perform, lifestyle demands, and negative aspects of personal relationships. Gould, Uddy, Bridges, and Beck (1997) also found that injured elite athletes had psychological (e.g., fear, shattered hopes and dreams), physical, medical, or rehab-related, financial, and career stress sources along with missed opportunities outside the sport (e.g., inability to visit another country with the team). Researchers have also examined sources of stress for coaches; these include such issues as communicating with athletes, recruiting, the pressure of having so many roles, and a lack of control over their athletes' performance (Frey, 2007). Stress sources in physical therapists include high caseload, staff shortages, complexity of patient issues, and constant excessive workload (Lindsay, Hanson, Taylor, & McBurney, 2008). Finally, parental pressure (especially with young athletes) has been a traditional source of stress, although a study found that the climate in which the pressure is perceived can alter its effects (O'Rourke, Smith, Smoll, & Cumming, 2011). Specifically, researchers found that high pressure in a highly ego motivational climate (i.e., focus on outcome) increased perceptions of anxiety but high pressure in a highly mastery motivational climate (i.e., focus on improvement) decreased perceptions of anxiety. The many specific sources of stress for those participating in sport and physical activity contexts fall into some general categories determined by both situation and personality.



Activity 5.2 helps you identify potential stress sources you may encounter in your sport and exercise science career.

Situational Sources of Stress

Two common sources of situational stress exist. These general areas are the importance placed on an event or contest and the uncertainty that surrounds the outcome of that event (Martens, 1987).

Event Importance

In general, the more important the event, the more stress provoking it is. Thus, a championship contest is more stressful than a regular-season game, just as taking college boards is more stressful than taking a practice exam. Little League baseball players, for example, were

observed each time they came to bat over an entire baseball season (Lowe, 1971). The batters' heart rates were recorded while they were at bat and their nervous mannerisms on deck were observed. How critical the situation at bat was in the game (e.g., bases loaded, two outs, last inning, close score) and how important the game was in the season standings were both rated. The more critical the situation, the more stress and nervousness the young athletes exhibited.

Key Point

The more important an event, the more stress provoking it will be. The greater the degree of uncertainty an individual feels about an outcome or others' feelings and evaluations, the greater the state anxiety and stress.

The importance placed on an event is not always obvious, however. An event that may seem insignificant to most people may be very important for one particular person. For instance, a regular-season soccer game may not seem particularly important to most players on a team that has locked up a championship. Yet it may be of major importance to a particular player who is being observed by a college scout. You must continually assess the importance participants attach to activities.

Uncertainty

Uncertainty is a major situational source of stress; the greater the uncertainty, the greater the stress. Often we cannot do anything about uncertainty. For example, when two evenly matched teams are scheduled to compete, there is maximum uncertainty but little can or should be done about it. After all, the essence of sport is to put evenly matched athletes and teams together. However, at times teachers, coaches, and sports medicine professionals create unnecessary uncertainty by not informing participants of things such as the starting line-ups, how to avoid injury in learning high-risk physical skills (e.g., vaulting in gymnastics), or what to expect while recovering from a serious athletic injury. Trainers, teachers, and coaches should be aware of how they might unknowingly create uncertainty in participants.

Uncertainty is not limited to the field or the gym. Athletes and exercisers can have stress as a result of uncertainty in their lives in general. For example, a study of Australian football players found that uncertainties about one's career, one's future after football, relocation, and work and nonwork conflicts were major

stress sources (Noblet & Gifford, 2002). Similarly, many physical therapists and health and wellness professionals feel stressed because of the long hours and time away from family.

Personal Sources of Stress

Some people characterize particular situations as important and uncertain and view them with greater anxiety than other people do. Two personality dispositions that consistently relate to heightened state anxiety reactions are high trait anxiety and low self-esteem (Scanlan, 1986). A third important anxiety disposition in the context of exercise is social physique anxiety.

Trait Anxiety

As previously discussed, trait anxiety is a personality factor that predisposes a person to view competition and social evaluation as more or less threatening. A highly trait-anxious person perceives competition as more threatening and anxiety provoking than a lower trait-anxious person does. In fact, research shows that individuals with high trait anxiety have a cognitive bias to pick out more threat-related information in the same situation than their peers with low trait anxiety do.

Key Point

High trait anxiety and low self-esteem are related to heightened state anxiety reactions in athletes.

Self-Esteem

Self-esteem is also related to perceptions of threat and corresponding changes in state anxiety. Athletes with low self-esteem, for example, have less confidence and more state anxiety than do athletes with high self-esteem. Strategies for enhancing self-confidence are important means of reducing the amount of state anxiety that individuals experience.

Social Physique Anxiety

Social physique anxiety is a personality disposition defined as the degree to which people become anxious when others observe their physiques. It reflects people's tendency to become nervous or apprehensive when their body is evaluated (Eklund, Kelley, & Wilson, 1997). Compared to people without this kind of anxiety, people with high social physique anxiety report experiencing more stress during fitness evaluations and

experiencing more negative thoughts about their bodies. It has also been found that a negative relationship exists between social physique anxiety and exercise behavior and perceived physical ability (Hausenblas, Brewer, & Van Raalte, 2004) and that social physique anxiety is related to need satisfaction, physical activity motivation, and behavior (Bruner & Sabiston, 2009). People with high social physique anxiety, then, are likely to avoid fitness settings or struggle with motivation when they participate because they fear how others will evaluate their physiques. Women in particular are susceptible to social physique anxiety because today's culture places a tremendous emphasis on the body and female attractiveness. An encouraging finding is that physical activity interventions can reduce social physique anxiety in participants (Hausenblas et al., 2004). For example, if you can reduce people's social physique anxiety by having them exercise in less revealing shorts and T-shirts instead



Can the uniforms popular with a sport discourage participation? Can they lead to anxiety?

Connecting Arousal and Anxiety to Performance

of tight-fitting clothes, you can increase their participation in physical activity (Crawford & Eklund, 1994).

One of the most compelling relationships that sport and exercise psychologists study is the relationship (positive or negative) between arousal, anxiety, and emotional states on one hand and performance on the other. Most of us recognize readily enough when our nerves make us feel vulnerable and out of control. But how exactly do physiological arousal and psychological arousal function to the advantage of one person and the detriment of another? How does it happen that even in our own performance on a single afternoon, we can notice fluctuations in anxiety levels and their effects?

Sport and exercise psychologists have studied the relationship between anxiety and performance for decades. They haven't reached definitive conclusions, but they have illuminated aspects of the process that have several implications for helping people psych up and perform better rather than psych out and perform poorly. Some 60 years ago, researchers concentrated on drive theory, which was later used in the 1960s and 1970s to explain social facilitation. In the past quarter-century psychologists have found the inverted-U hypothesis more convincing, and still more recently they have proposed variations and newer hypotheses, including the concepts of zones of optimal functioning, multidimensional anxiety theory, the catastrophe phenomenon, reversal theory, and the anxiety direction and intensity view. We discuss each of these briefly.

Drive Theory

Psychologists first saw the relationship between arousal and performance as direct and linear (Spence & Spence, 1966). According to this view, called **drive theory**, as an individual's arousal or state anxiety increases, so too does her performance. The more psych'd up an athlete becomes, for example, the better that individual performs. Most athletes, of course, can also remember situations in which they became overly aroused or overly anxious and then performed more poorly. Little scholarly support exists for the drive theory (Mellalieu, Hanton, & Fletcher, 2006). You may recall the social facilitation theory (the example of a theory we used in chapter 2). Zajonc (1965) observed a pattern in the seemingly random way in

which people sometimes performed better in front of an audience and other times performed worse. His observation was that the presence of an audience had a positive effect when people performed tasks that they knew well or that were simple, whereas their performance suffered when they performed less familiar or more complex tasks. Zajonc's social facilitation theory contended that an audience creates arousal in the performer, which hurts performance on difficult tasks that are not yet learned but helps performance on well-learned tasks.

Key Point

Social facilitation theory predicts that the presence of others helps performance on well-learned or simple skills and inhibits or lessens performance on unlearned or complex tasks.

An audience need not be present for social facilitation to occur. The theory refers more broadly to the effects of the presence of others on performance, including coaction (two people performing simultaneously). Zajonc (1965) used drive theory to show that the presence of others increases arousal in the performer and that this increased arousal (drive) increases or brings out the performer's dominant response (the most likely way to perform the skill). When people perform well-learned or simple skills (e.g., sit-ups), the dominant response is correct (positive performance) and the increased arousal facilitates performance. When people perform complex or unlearned skills (e.g., a novice golfer learning to drive a golf ball), the presence of others increases arousal and more often causes their dominant response to be incorrect (poorer performance). Thus, social facilitation theory predicts that an audience (i.e., coaction or the presence of others) inhibits performance on tasks that are complex or have not been learned thoroughly and enhances performance on tasks that are simple or have been learned well.

The implications are that you would want to eliminate audiences and evaluation as much as possible in learning situations. For example, if you were teaching a gymnastics routine, you would not want to expose youngsters to an audience too soon. It is critical to eliminate or lessen audience and coaction effects in learning environments to make them as arousal free as possible. However, when participants are performing well-learned or simple tasks, you might want to encourage people to come watch.

Although the drive and social facilitation theories explain how an audience can hurt performance when one

is learning new skills, they do not explain so well how an audience affects a person's performance of well-learned skills. These theories predict that as arousal increases, performance increases in a straight line. If this were true, we would expect highly skilled athletes to consistently excel in all high-pressure situations. Yet nervousness and choking in the clutch occur even at the elite level. For this reason, we can only conclude that on well-learned skills, an audience may sometimes enhance performance and at other times inhibit it. The views presented next will give you a better understanding of how increased arousal or anxiety influences performance on well-learned tasks. In addition, "Home-Court Advantage: Myth or Reality" discusses what sport psychology researchers have learned about the home-field advantage—a topic related to both audience effects and the relationship between anxiety and performance.

Inverted-U Hypothesis

Dissatisfied with the drive theory, most sport psychologists turned to the **inverted-U hypothesis** to explain the relationship between arousal states and performance (Landers & Arent, 2010). This view holds that at low arousal levels, performance will be below par (figure 5.4); the exerciser or athlete is not psyched up. As arousal increases, so too does performance—up to an optimal point where best performance results. Further increases in arousal, however, cause performance to decline. This view is represented by an inverted U that reflects high performance with the optimal level of arousal and lesser performance with either low or very high arousal.

Most athletes and coaches accept the general notions of the inverted-U hypothesis. After all, most people have experienced underarousal, optimal arousal, and overarousal. However, despite the acceptance of the

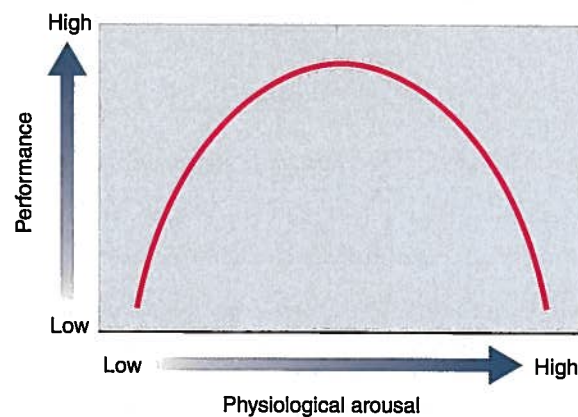


FIGURE 5.4 The inverted U showing the relationship between arousal and performance.

Home-Court Advantage: Myth or Reality

One way spectators influence performance is by providing support and encouragement for the home team. In fact, in many sports, teams battle throughout the season for the best record so that they can have the home-court advantage during the play-offs. Do teams really win more at home than on the road? Research has shown that teams actually do win more at home and that the advantage is fairly small in football and baseball but quite large in basketball and hockey. In a comprehensive review of the literature, Jamieson (2010) sampled more than 260,000 games in a wide variety of sports and showed an overall home winning percentage of 60.4%. Because hockey and basketball are played in intimate indoor sites, compared to the more open outdoor stadiums of baseball and football, it may be that the proximity of the fans to the action and the noise level they generate in enclosed facilities enhances players' performance. Despite the evidence supporting the home-court advantage during the regular season, other findings have indicated that this advantage might be lost in the play-offs and championship games. In fact, the home court might even become a disadvantage. For example, in a study of baseball World Series games played from 1924 to 1982, Baumeister and Steinhilber (1984) found that in series that went at least five games the home team won 60% of the first two games but only 40% of the last two games. In the 26 series that have gone to a final and deciding seventh game, the home team won only 38% of the time. In professional baseball, home teams won 70% of the first four games. However, the home teams' winning percentage was 46% during the fifth and sixth games and dropped to a dismal 38% for the deciding seventh game.

Thus, the home-court advantage turned to a disadvantage as games became more critical and the pressure mounted. Game statistics were gathered to determine how and why this occurred. In both baseball and basketball, the visiting team's performance remained fairly consistent throughout the series. However, the home teams' performance significantly decreased as games became more critical, producing more errors in baseball and lower foul shooting in basketball. In essence, home teams were choking under pressure instead of getting a lift from their fans. Researchers argue that supportive spectators can create expectations for success, which in turn can increase self-consciousness in athletes, causing them to think too much instead of simply playing and performing automatically. This results in a "championship choke."

However, the success of home teams in basketball appears to have shifted over the years. Specifically, from 1984 to 1994 the home team won 18 consecutive seventh and deciding games during the National Basketball Association (NBA) play-offs. Furthermore, when looking at game seven of the play-offs through the 2017 season, the home team won 101 and lost only 26. In addition, when focusing just on game seven of the NBA finals, the home team won 15 and lost only 3. It's possible that coaches and athletes have become more knowledgeable about putting too much pressure on themselves in critical games, thus reducing self-consciousness and letting the emotion of hometown fans carry them to victory. To muddy the waters even more, the home court advantage in the NBA regular season has been diminishing over the past 25 years, with the road team winning 82% of the time in 1988 to 1989, 39.7% in 2012 to 2013, and 42.5% in 2014 to 2015. So the jury is still out on the importance of the home-court advantage.

So, looking at the research in this area in general, what is the bottom line? Home-field advantage or disadvantage?

- During the regular season, a clear home-field advantage exists for both professional and amateur team sports and dates back almost 100 years.
- The home-field advantage occurs for both team and individual sports and for both male and female athletes.
- Researchers propose that a home-field disadvantage exists during play-offs, but the evidence supporting this concept is mixed. Leading group dynamics researchers Carron, Hausenblas, and Eys (2005) concluded that the jury is still out on the home-field disadvantage in championship games. They noted, however, that nonsport research supports the idea of choking in a championship as a result of performer self-consciousness.
- Athletes bound for play-offs should have well-developed strategies for coping with anxiety in order to prevent negative attentional effects that interfere with performance.

hypothesis in general and recent evidence supporting its predictions on relatively simple tasks, it has come under criticism (Mellalieu et al., 2006). Critics rightly question the shape of the arousal curve, ask whether optimal arousal always occurs at the midpoint of the arousal continuum, and question the nature of the arousal itself. In essence, the inverted U has taken us as far as it can, but now we need more explicit explanations. Hence, sport psychologists have begun to explore other views, hoping to more specifically understand the arousal–performance relationship.

Individualized Zones of Optimal Functioning

Yuri Hanin, a noted Russian sport psychologist, presented an alternative view called the **individualized zones of optimal functioning (IZOF)** model. Hanin (1997) found that top athletes have a zone of optimal state anxiety in which their best performance occurs. Outside this zone, poor performance occurs. To underscore the importance of the IZOF model, Ruiz, Raglin, and Hanin (2017) conducted a historical review identifying 183 IZOF-based publications, making it one of the most widely applied models to study subjective experiences related to athletic performance.

Hanin's IZOF view differs from the inverted-U hypothesis in two important ways:

1. First, the optimal level of state anxiety does not always occur at the midpoint of the continuum but rather varies from individual to individual. That is, some athletes have a zone of optimal functioning at the lower end of the continuum, some in the midrange, and others at the upper end (figure 5.5).

2. Second, the optimal level of state anxiety is not a single point but a bandwidth. Thus, coaches and teachers should help participants identify and reach their own specific optimal zone of state anxiety.

However, despite the support that exists for the IZOF model, it has been criticized for its lack of explanation of why individual levels of anxiety may be beneficial or detrimental for performance (Woodman & Hardy, 2001b).

The IZOF model has good support in the research literature (e.g., Gould & Tuffey, 1996; Hanin, 2007). In addition, Hanin (2000, 2007) expanded the IZOF notion beyond anxiety to show how zones of optimal functioning use a variety of emotions and other psychobiosocial states, such as determination, pleasantness, and laziness. He concluded that for best performance to occur, athletes need individualized optimal levels not only of state anxiety but of a variety of other emotions as well. The IZOF view also contends that there are positive (e.g., confident, excited) and negative (e.g., fearful, nervous) emotions that enhance performance and positive (e.g., calm, comfortable) and negative (e.g., intense, annoyed) emotions that have a dysfunctional influence on performance. This development is important because it recognizes that a given emotion (e.g., anger) can be positively associated with performance for one person but negatively associated with performance for another. This idea of individualized profiling was highlighted in a study demonstrating that having athletes develop their own emotion-related states helped predict both successful and unsuccessful performance (Ruiz, Hanin, & Robazza, 2016). A major coaching implication of the IZOF model, then, is that coaches must help each

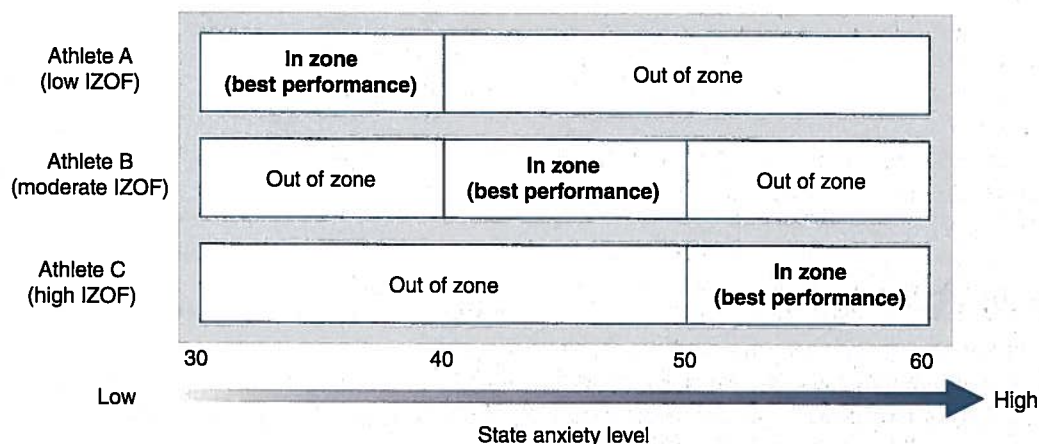


FIGURE 5.5 Individualized zones of optimal functioning (IZOF).

individual athlete achieve the ideal recipe of positive and negative emotions needed by that athlete for best performance.

Key Point

A person's zone of optimal functioning may be at the lower, middle, or upper end of the state anxiety continuum.

Multidimensional Anxiety Theory

Hanin's IZOF hypothesis does not address whether the components of state anxiety (somatic and cognitive anxiety) affect performance in the same way. These state anxiety components are generally thought to influence performance differently; that is, physiological arousal (somatic state anxiety) and worry (cognitive state anxiety) affect performers differently. Your heart racing or pounding and your mind reiterating negative predictions, for instance, can affect you differentially.

Multidimensional anxiety theory predicts that cognitive state anxiety (worry) is negatively related to performance; that is, increases in cognitive state anxiety lead to decreases in performance. But the theory predicts that somatic state anxiety (which is physiologically manifested) is related to performance in an inverted U and that increases in anxiety facilitate performance up to an optimal level, beyond which additional anxiety causes performance to decline. Although studies have shown that these two anxiety components differentially predict performance, the precise predictions of multidimensional anxiety theory have not been consistently supported (Mellalieu, et al., 2006). One reason for this lack of support is the prediction that cognitive anxiety always has a detrimental effect on performance. As noted earlier in this chapter, the effect of cognitive anxiety (as well as somatic anxiety) on performance appears to be determined by a performer's interpretation of anxiety, not just the amount or type of anxiety (Jones & Swain, 1992). Consequently, multidimensional anxiety theory has little support with respect to its performance predictions and is of little use in guiding practice.

Catastrophe Phenomenon

Hardy's catastrophe view addresses another piece of the puzzle. According to his model, performance depends on the complex interaction of arousal and cognitive anxiety (Hardy, 1990, 1996). The **catastrophe model** predicts

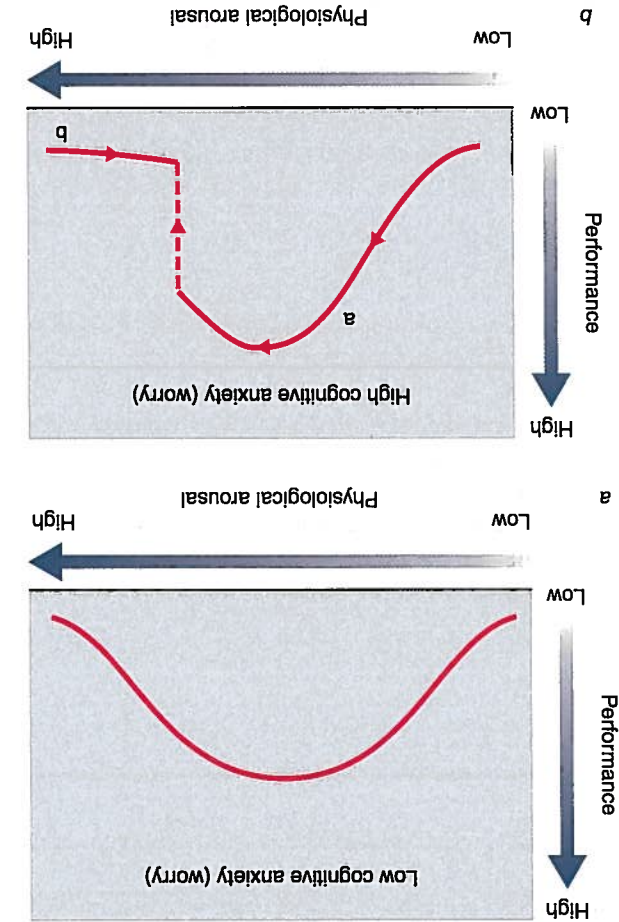


FIGURE 5.6 Catastrophe theory predictions: (a) arousal-performance relationship under low cognitive state anxiety; (b) arousal-performance relationship under high cognitive state anxiety.

that physiological arousal is related to performance in an inverted-U fashion, but only when an athlete is not worried or has low cognitive state anxiety (figure 5.6a). If cognitive anxiety is high (i.e., the athlete is worrying), however, the increases in arousal at some point reach a kind of threshold just past the point of optimal arousal level, and afterward a rapid decline in performance—the catastrophe—occurs (figure 5.6b). Therefore, physiological arousal (i.e., somatic anxiety) can have markedly different effects on performance depending on the amount of cognitive anxiety one is experiencing. Moreover, amid high worry, performance deteriorates dramatically once overarousal and the catastrophe occur. This is different from the steady decline predicted by the inverted-U hypothesis, and recovery takes longer.

The catastrophe model predicts that with low worry, increases in arousal or somatic anxiety are related to

performance in an inverted-U manner. With great worry, the increases in arousal improve performance to an optimal threshold, beyond which additional arousal causes a catastrophic or rapid and dramatic decline in performance. In low-worry situations, arousal is related to performance in a traditional inverted-U fashion. However, overall performance is not as elevated as in the high-worry situation. Finally, under conditions of great worry, high levels of self-confidence allow performers to tolerate higher levels of arousal before they hit the point where they have a catastrophic drop in performance (Hanton et. al, 2008).

Figure 5.6b shows that under conditions of high cognitive anxiety as physiological arousal increases, performance also increases until an optimal arousal level is reached (marked *a* on the curve). After that point, however, a catastrophic decrease in performance occurs; the performer drops to a low level of performance (marked *b* on the curve). Once the athlete is at that part of the curve, he would need to greatly decrease his physiological arousal before being able to regain previous performance levels. The catastrophe model predicts, then, that after a catastrophic decrease in performance, the athlete must (a) completely relax physically, (b) cognitively restructure by controlling or eliminating worries and regaining confidence and control, and (c) reactivate or rouse himself in a controlled manner to again reach the optimal level of functioning. Doing all this is no easy task, so it is understandably very difficult to quickly recover from a catastrophic decrease in performance.

Finally, figure 5.6 shows that an athlete's absolute performance level is actually higher under conditions of high cognitive anxiety than under conditions of low cognitive anxiety. This shows that cognitive anxiety or worry is not necessarily bad or detrimental to performance. In fact, this model predicts that you will perform better with some worry, provided that your physiological arousal level does not go *too* high (i.e., a little bit of stress heightens an athlete's effort and narrows attention, giving the individual an edge over other performers). Performance deteriorates only under the combined conditions of high worry plus high physiological arousal.

Although some scientific support exists for the catastrophe model, it is difficult to scientifically test (Hardy, 1996; Woodman & Hardy, 2001b) and, to date, evidence for it is equivocal (Mellalieu, et al., 2006). Still, you can derive from it an important message for practice, namely that an ideal physiological arousal level isn't enough for optimal performance; it is also necessary to manage or control cognitive state anxiety (worrying).

Reversal Theory

Kerr's application of **reversal theory** (Kerr, 1985; 1997) contends that the way in which arousal affects performance depends on an individual's interpretation of his or her arousal level. Jose might interpret high arousal as a pleasant excitement, whereas Isabelle might interpret it as an unpleasant anxiety. She might see low arousal as relaxation, whereas Jose sees it as boring. Athletes are thought to make quick shifts—"reversals"—in their interpretations of arousal. An athlete may perceive arousal as positive one minute and then reverse the interpretation to negative the next minute. Reversal theory predicts that for best performance, athletes must interpret their arousal as *pleasant excitement* rather than as unpleasant anxiety.

Reversal theory's key contributions to our understanding of the arousal–performance relationship are twofold. First, reversal theory emphasizes that one's interpretation of arousal—not just the amount of arousal one feels—is significant; second, the theory holds that performers can shift or reverse their positive or negative interpretations of arousal from moment to moment. Reversal theory offers an interesting alternative to previous views of the arousal–performance relationship. However, few have tested the theory's predictions, so firm conclusions cannot be made about the scientific predictions.

Key Point

How a performer interprets arousal influences performance.

Anxiety Direction and Intensity

For many years, most researchers assumed that anxiety had only negative effects on performance. English sport psychologist Graham Jones and colleagues (Jones, 1995; Jones, Hanton, & Swain, 1994), however, showed that an individual's interpretation of anxiety symptoms is important for understanding the anxiety–performance relationship. People can view anxiety symptoms either as positive and helpful to performance (facilitative) or as negative and harmful to performance (debilitative). To fully understand the anxiety–performance relationship, you must examine both the intensity of a person's anxiety (how much anxiety the person feels) and its direction (his interpretation of that anxiety as facilitative or debilitative to performance). Jones and colleagues

contended that viewing anxiety as facilitative leads to superior performance, whereas viewing it as debilitating leads to poor performance.

Jones (1995) also developed a model of how **facilitative anxiety** and **debilitative anxiety** come about (figure 5.7). Specifically, some stressor occurs in the environment, such as running in the finals at the state track meet. How much stress a runner will have depends on individual factors such as her trait anxiety or self-esteem. Most important, whether the resulting state anxiety is perceived as facilitative or debilitating depends on how much control the athlete perceives. If the runner feels in control (e.g., that she can cope with the anxiety and that running a certain time in the race is possible), then facilitative anxiety will result. However, if she believes that there is no way she can run a competitive time and that she can't cope with the pressure, debilitating anxiety occurs. The athlete's **perception of control** relative to coping and goal attainment is critical, then, in determining whether state anxiety will be viewed as facilitative or debilitating.

Related to perceptions of control is whether the athlete views the situation as a challenge or threat. For example, research has found that when athletes viewed a pressurized situation as a **challenge** (i.e., they had the resources and coping skills to meet the demands placed on them) rather than a **threat** (i.e., they did not have the resources and coping skills to meet the demands placed on them) they exhibited increases in performance (Moore, Wilson, Vine, Coussens, & Freeman, 2013). Viewing the situation as a challenge also produced lower levels of cognitive and somatic anxiety and produced more focused attentional processes. Therefore, athletes' perception that they have the resources to control the situation produces a variety of positive responses. Sport psychologists have already found support for this association between how anxiety is perceived and

performance level. For example, good performances on the balance beam have been associated with gymnasts interpreting cognitive anxiety as facilitative. Similarly, elite swimmers have reported both cognitive and somatic anxiety as more facilitative and less debilitating than have nonelite swimmers (Jones & Swain, 1992). In addition, researchers (Hanton & Jones, 1999a, b; Wadley & Hanton, 2008) found that elite swimmers were able to consistently maintain a facilitative interpretation of anxiety, especially through psychological skills such as goal setting, imagery, and self-talk. In essence, performers can be trained to effectively use their anxiety symptoms in a productive way and to develop a rational appraisal process in relation to their experiences during competition (Hanton, Thomas, & Mellalieu, 2009). Although these results suggest that using relaxation techniques (see chapter 13) to reduce the intensity of anxiety may not always be appropriate, athletes should learn a repertoire of psychological skills to help interpret anxiety symptoms as facilitative. Furthermore, Nicholls, Polman, Levy, and Hulleman (2012) suggest that the interpretation of anxiety as facilitative may not be what enhances performance per se; rather, they argue that the positive emotion of excitement might enhance performance. Whereas most previous studies measured only the construct of anxiety, they measured both anxiety and excitement in their study. Future studies should assess other positive emotions (e.g., excitement, happiness, hope, pride) along with anxiety and other negative emotions (e.g., shame, sadness, guilt, anger) to determine what has the greatest influence on performance. It is also important to note that a range of personal and situational variables may influence the directional response (see Hanton et al., 2008, for a review). Some of these personal factors include trait anxiety, neuroticism, extraversion, achievement motivation, hardiness, self-confidence, sex, coping strategies, and psychological

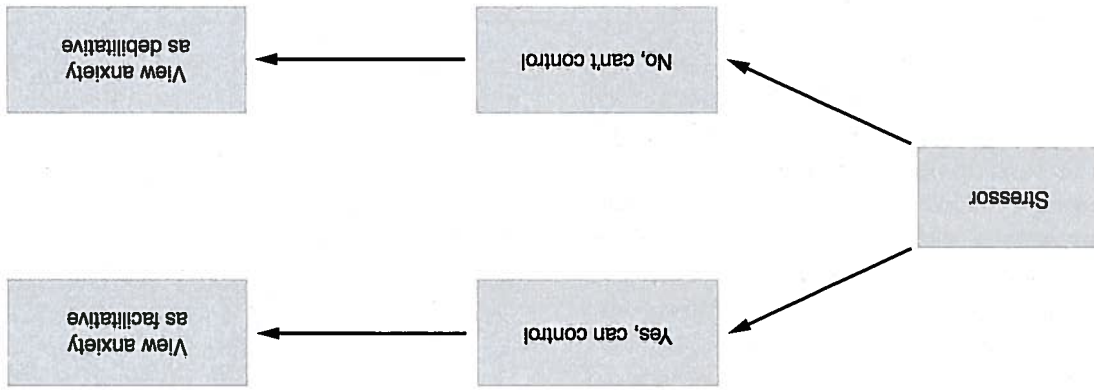


FIGURE 5.7 Jones' model of facilitative and debilitating anxiety.

skills. A study indicated that of all the personal variables, trait anxiety was the most important predictor of the directional response employed by athletes (Wolf, Eys, & Kleinert, 2015). The situational variables that influence the interpretation of anxiety include competitive experience, skill level, goal attainment, expectations, sport type, and performance. The individual difference variable that has most consistently determined whether anxiety is interpreted as facilitative or debilitative has been skill level. Specifically, elite performers interpret their anxiety symptoms as more facilitative and report higher levels of self-confidence than their nonelite counterparts do. Studies have revealed that these elite athletes maintain a facilitative perspective as well as high levels of confidence through rationalizing thoughts and feelings before competing via the combined use of such psychological skills as self-talk, imagery, and goal setting (Hanton et al., 2011).

In summary, how an athlete interprets the direction of anxiety (as facilitative or debilitative) has a significant effect on the anxiety–performance relationship. Athletes can learn psychological skills that allow them to interpret their anxiety as facilitative. It follows that coaches should try to help athletes view increased arousal and anxiety as conditions of excitement instead of fear. Coaches should also do everything possible to help athletes develop perceptions of control through enhancing confidence and through psychological skills training.

Frequency of Anxiety

Compared to direction of anxiety, frequency of anxiety has received little attention in the sport psychology literature. It seems intuitive that the frequency with which athletes have anxiety symptoms (especially ones that are interpreted as debilitating) is an important component of the anxiety response and its effect on performance. For example, researchers found that athletes who viewed anxiety as facilitative had lower frequencies of cognitive anxiety and higher frequencies of self-confidence throughout the precompetition period than did athletes who viewed their anxiety as debilitating (Thomas, Maynard, & Hanton, 2004). From a coaching perspective, a coach would want to know how often (and when) an athlete feels anxiety symptoms, not just how intense the symptoms are and how they are interpreted. For example, a soccer player may rarely have anxiety symptoms but does so when he is chosen to take a penalty kick. Knowing both how frequently and in what situations a player has anxiety that would be debilitative is helpful for coaches in choosing to play certain players in certain situations.

Significance of Arousal–Performance Views

There is certainly no shortage of arousal–performance views—there are so many that it is easy to get confused. So let's summarize what these views tell us regarding practice. The IZOF, multidimensional anxiety, catastrophe, reversal, and direction and intensity views offer several guidelines (Hanton et al., 2011; Hardy, Jones, & Gould, 1996; Mellalieu, et al., 2006; Woodman & Hardy, 2001b):

1. Arousal is a multifaceted phenomenon consisting of both physiological activation and an athlete's interpretation of that activation (e.g., state anxiety, confidence, facilitative anxiety). We must help performers find the optimal mix of these emotions for best performance. Moreover, these optimal mixes of arousal-related emotions are highly individual and task specific. Two athletes participating in the same event may not have the same optimal emotional arousal level, and a person's optimal emotional arousal level for performing a balance beam routine would be quite different from the optimal arousal level for a maximum bench press in power weightlifting.

2. Arousal and state anxiety do not necessarily have a negative effect on performance. The effects can be positive and facilitative or negative and debilitative, depending largely on how the performer interprets changes. In addition, self-confidence and enhanced perceptions of control are critical to facilitating heightened arousal as positive (psyching up) as opposed to negative (psyching out).

3. Some optimal level of arousal and emotion leads to peak performance, but the optimal levels of physiological activation and arousal-related thoughts (worry) are not necessarily the same!

4. Both the catastrophe and reversal theories suggest that the interaction between levels of physiological activation and arousal-related thoughts appears to be more important than absolute levels of each. Some people perform best with relatively low optimal arousal and state anxiety, whereas others perform their best with higher levels.

5. An optimal level of arousal is thought to be related to peak performance, but it is doubtful that this level occurs at the midpoint of the arousal continuum. Excessive arousal likely does not cause slow, gradual declines in performance but rather “catastrophes” that are difficult to reverse.

2. Changes in attention, concentration, and visual search patterns
- Muscle Tension, Fatigue, and Coordination Difficulties**
- Many people who have great stress report muscle soreness, aches, and pains. Athletes who have high levels of state anxiety might say, "I don't feel right," "My body doesn't seem to follow directions," or "I tensed up" in critical situations. Comments like these are natural: Increases in arousal and state anxiety cause increases in muscle tension and can interfere with coordination. For example, some highly trait-anxious and lower trait-anxious college students were watched closely as they threw tennis balls at a target. As you might expect, the higher trait-anxious students had considerably more state anxiety than the lower trait-anxious participants had (Weinberg & Hunt, 1976). Moreover, the students' muscles showed that increased state anxiety caused the highly anxious individuals to use more muscular energy before, during, and after their throws. Similarly, in a study of novice rock climbers traversing

6. Strategies for psyching up should be used with caution because it is difficult for athletes to recover once they have a performance catastrophe.
 7. Athletes should have well-practiced self-talk, imagery, and goal-setting skills for coping with anxiety. They must also perceive performance goals to be truly attainable.
- Why Arousal Influences Performance**
- Understanding why arousal affects performance can help you regulate arousal, both in yourself and in others. For instance, if heightened arousal and state anxiety lead to increased muscle tension in Nicole, a golfer, then progressive muscle relaxation techniques may reduce her state anxiety and improve performance. Though control strategies, however, may work better for Shane, another golfer, who needs to control excessive cognitive state anxiety.
- At least two things explain how increased arousal influences athletic performance:
1. Increased muscle tension, fatigue, and coordination difficulties



Optimal levels of arousal and anxiety lead to peak performance.

an identical route under high-height versus low-height conditions, participants had increased muscle fatigue and blood lactate concentrations when performing in the high-anxiety height condition (Pijpers, Oudejans, Holsheimer, & Bakker, 2003). Thus, these studies show that increased muscle tension, fatigue, and coordination difficulties contributed to the students' and athletes' inferior performances under high-stress conditions.

Key Point

Increased arousal and state anxiety cause increased muscle tension and fatigue and can interfere with coordination.

Attention, Concentration, and Visual Search Changes

Increased arousal and state anxiety also influence athletic performance through changes in attention, concentration, and visual search patterns (Janelle, 2002; Wilson, 2010). First, increased arousal narrows a performer's attentional field. (For example, Tamika is a goalie in ice hockey and needs to maintain a broad but optimal focus of attention as three opponents break into her end of the ice. If she becomes preoccupied with Sandra, who has the puck, and does not attend to the other players on the periphery, Sandra will simply pass off to a teammate on the wing for an easy score. Under normal conditions, Tamika can maintain her optimal attentional focus (figure 5.8a), but if she is underaroused (figure 5.8b) her attentional focus may be too broad, taking in both task-relevant (e.g., the opposing players) and irrelevant (e.g., the crowd) cues. When she has excessive levels of arousal and state anxiety, however, her attentional focus narrows too much and she is unable to survey the entire playing surface (figure 5.8c). For example, an athlete who had severe anxiety problems might say the following: "When the pressure is on, it's like I'm looking through the tube in a roll of toilet paper." In psychological terms, increased arousal causes a narrowing of the attentional field, which negatively influences performance on tasks requiring a broad external focus.

When arousal is increased, performers also tend to scan the playing environment less often. For example, Tony is a wrestler who has high levels of arousal and state anxiety. He becomes preoccupied with executing one move on an opponent and does not visually or kinetically scan the opponent's total body position for other potential opportunities. Thus, Tony's performance

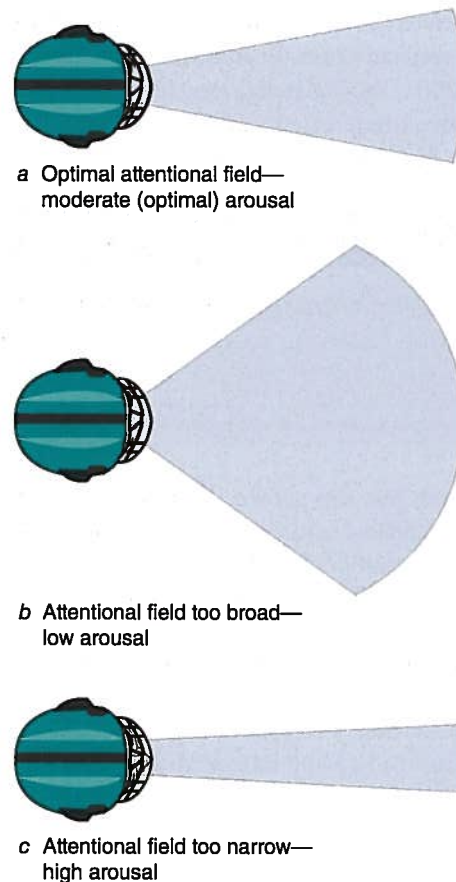


FIGURE 5.8 Attentional narrowing under conditions of high arousal.

deteriorates as he scans less often, and potential scoring opportunities consequently go undetected.

Arousal and state anxiety also cause changes in attention and concentration levels by affecting attention style (Nideffer, 1976). Athletes must learn to shift their attention to appropriate task cues (see chapter 17). For example, a quarterback in football needs to shift from a broad external span when surveying the field for open receivers to a narrow external focus when delivering a pass. Each individual also has a dominant attention style. Increased arousal can cause performers to shift to a dominant attention style that may be inappropriate for the skill at hand.

Increased arousal and state anxiety also cause athletes to attend to inappropriate cues. For instance, most athletes perform well-learned skills best when they fully concentrate on the task. Unaware of their levels of concentration, they perform on automatic pilot or in a "flow zone" (see chapter 7). Unfortunately, excessive cognitive state anxiety sometimes causes performers to focus on inappropriate task cues by "worrying about worrying" and becoming overly

Applying Knowledge to Professional Practice

You can integrate your knowledge of arousal, stress, and anxiety by considering its implications for professional practice. Four of the most important guidelines are to

1. identify the optimal combination of arousal-related emotions needed for best performance;
2. recognize how personal and situational factors interact to influence arousal, anxiety, and performance;
3. recognize the signs of increased arousal and anxiety in sport and exercise participants; and
4. tailor coaching and instructional practices to individuals.

Identify Optimal Arousal-Related Emotions

One of the most effective ways to help people achieve peak performance is to increase their awareness of how arousal-related emotions can lead to peak performances (see chapter 13 for specific techniques). Once this is accomplished, teaching athletes various psychological strategies (e.g., using imagery and developing preperformance routines) can help them regulate arousal. Think of arousal as an emotional temperature and arousal-regulation skills as a thermostat. The athletes' goals are to identify the optimal emotional temperature for his best performance and then to learn how to set his thermostat to this temperature—either by raising (psyching up) or lowering (chilling out) his emotional temperature. For example, a study by Rathschlag and Memmert (2013) found that athletes can induce emotions, and that certain emotions such as anger and happiness can lead to increased performance, whereas sadness and anxiety can lead to decreased performance.

Recognize the Interaction of Personal and Situational Factors

Like other behaviors, stress and anxiety can best be understood and predicted by considering the interaction of personal and situational factors (figure 5.9). For trait-anxious athlete will always be the best performer because she will achieve an optimal level of state anxiety and arousal needed for competition. In contrast, the assumption is that the highly trait-anxious athlete will consistently choke. But this is not the case.

self-conscious (Bellock & Gray, 2007). This, in turn, affects optimal concentration. In addition, Hatzigeorgiadis and Biddle (2001) showed that three types of thoughts are tied to cognitive interference for athletes: performance worries, situation-irrelevant thoughts, and thoughts of escape.

Key Point

Arousal and state anxiety narrow one's attentional field, decrease environmental scanning, and cause a shift to the dominant attentional style and to inappropriate cues.

Research has also shown that visual cues are differentially identified and processed when performers are anxious. In studying karate participants, for example, Williams and Elliott (1999) showed that increased anxiety influences attention via changes in visual search patterns. Janelle (2002) also showed that increased anxiety is associated with alterations in gaze tendencies and eye fixations. Wilson, Vine, and Wood (2009) conducted an interesting study using basketball free-throw shooting. Shooters performed under conditions of either high or low threat of evaluation, and their efficiency of eye gaze (the final visual fixation on the target before physical movement) was assessed. As expected, participants in the high-stress condition shot less well and had a significant reduction in the “quiet eye” period just before the shot. (Longer fixations are better.) This shows that anxiety influences performance by disrupting the visual attention of shooters. However, quiet-eye training has been shown to increase performance (Wilson, 2010).

Finally, the complexity in the way anxiety influences sport performance is reflected in the processing efficiency theory (Hill, Porter, & Quilliam, 2013; Wilson, 2008, 2010; Woodman & Hardy, 2001b). This theory contends that increased anxiety interferes with working memory resources. In the short run, this does not negatively influence performance because the athlete makes up for the deficits caused by the anxiety by increasing her effort. However, as anxiety increases, the benefits of increased effort are often outweighed by the reduced attentional capacity (processing inefficiency) that comes with heightened anxiety. Thus, anxiety may initially result in increased performance because of increases in effort, but the attentional deficits will overcome any increases in effort when the anxiety rises high enough. What all these studies show, then, is that the relationship between increased anxiety and attention or thought control is a key mechanism for explaining the arousal–performance relationship.

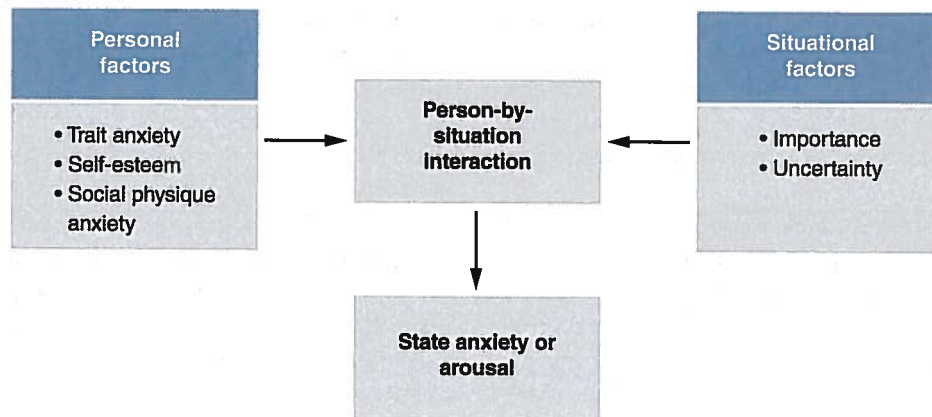


FIGURE 5.9 Person-by-situation interactional model of anxiety.

Where the importance placed on performance is not excessive and some certainty exists about the outcome, you might expect a swimmer with high trait anxiety to experience elevated arousal and state anxiety because he is predisposed to perceiving most competitive situations as somewhat threatening. It seems likely that he would move close to his optimal level of arousal and state anxiety. In contrast, a competitor with low trait anxiety may not perceive the situation as very important because she does not feel threatened. Hence, her level of arousal and her state anxiety remain low, and she has trouble achieving an optimal performance.

In a high-pressure situation, in which the meet has considerable importance and the outcome is highly uncertain, these same swimmers react quite differently. The higher trait-anxious swimmer perceives this situation as even more important than it is and responds with very high levels of arousal and state anxiety: He overshoots his optimal level of state anxiety and arousal. The low trait-anxious swimmer also has increased state anxiety, but because she tends to perceive competition and social evaluation as less threatening, her state anxiety and arousal will likely be in an optimal range. The interaction of personal factors (e.g., self-esteem, social physique anxiety, and trait anxiety) and situational factors (e.g., event importance and uncertainty) is a better predictor of arousal, state anxiety, and performance than either set of these factors alone.

Recognize Arousal and State Anxiety Signs

The interactional approach has several implications for helping exercise and sport participants manage stress. Chief among these implications is the need to identify people who are experiencing heightened stress and anxiety. This is not easy to do. Coaches, for example, have

been found to be inaccurate predictors of their athletes' anxiety levels. Hanson and Gould (1988) found that only one in four college cross country coaches accurately read their athletes' state and trait anxiety levels. Coaches who could accurately read the anxiety levels did not think it was an easy task; rather, they worked hard to learn about their athletes.

Key Point

To accurately detect an individual's anxiety level, you must know the various signs and symptoms of increased stress and anxiety.

You can more accurately detect a person's anxiety levels if you are familiar with the signs and symptoms of increased stress and anxiety:

- Cold, clammy hands
- Need to urinate frequently
- Profuse sweating
- Negative self-talk
- Dazed look in the eyes
- Increased muscle tension
- Butterflies in stomach
- Feeling ill
- Headache
- Cotton (dry) mouth
- Being constantly sick
- Difficulty sleeping
- Inability to concentrate
- Consistently performing better in noncompetitive situations

Although no specific number or pattern of symptoms characterizes a high level of stress, people who have high levels of state anxiety often exhibit several of the signs listed. The key is to notice changes in these variables between high- and low-stress environments (e.g., when a normally positive athlete becomes negative). One of the best (although often overlooked) ways to understand what people are feeling is to ask them! Encourage your participants to talk freely with you about their feelings. Be empathic by trying to see things from their perspectives (i.e., thinking of how you would feel in their situation at their level of experience). This allows you to associate specific behavioral patterns with varying levels of stress and anxiety and to better read people's anxiety levels.

Activity 5.3 identifies your signs and symptoms of increased anxiety.

Tailor Coaching Strategies to Individuals

Individualize teaching, exercise, and coaching practices. At times arousal and state anxiety levels need to be reduced, at other times maintained, and at still other times facilitated (see chapter 13 for specific strategies). The teacher or coach should recognize when and in whom arousal and state anxiety need to be enhanced, reduced, or maintained.

LEARNING AIDS

SUMMARY

1. Discuss the nature of stress and anxiety (what they are and how they are measured). Stress, arousal, and anxiety each have distinct meanings. Stress is a process that occurs when people perceive an imbalance between the physical and psychological demands on them and their ability to respond. Arousal is the blend of physiological and psychological activity in a person that varies on a continuum from deep sleep to intense excitement. Anxiety is a negative emotional state characterized by feelings of nervousness, worry, and apprehension associated with activation or arousal of the body. It consists of cognitive, somatic, trait, and state components.
2. Identify the major sources of anxiety and stress. Some situations produce more state anxiety and arousal than others (e.g., events that are important and in which the outcome is uncertain). Stress is also influenced by personality dispositions (e.g., trait anxiety and self-esteem). Individuals with high trait anxiety, low self-esteem, and high social physique anxiety have more state anxiety than others.
3. Explain how and why arousal- and anxiety-related emotions affect performance. Arousal-related emotions, such as cognitive and somatic state anxiety, are related to performance. Arousal and anxiety influence performance by inducing changes in attention and concentration and by increasing muscle tension. Hanin's individualized zones of optimal functioning, Hardy's catastrophe model, Kerr's

Instructors who have students or clients with high social physique anxiety should encourage these exercisers to wear clothes that cover their bodies. Instructors can also minimize social evaluation of physiques by creating settings that eliminate observation by passersby.

Sometimes arousal and state anxiety need to be reduced, at other times maintained, and at still other times facilitated.

Key Point

For example, if a student or athlete with high trait anxiety and low self-esteem must perform in a highly evaluative environment, the teacher or coach would best de-emphasize the importance of the situation and instead emphasize the performer's preparation. A pep talk stressing the importance of the situation and of performing well would only add stress and increase arousal and state anxiety beyond an optimal level. Someone with moderate levels of trait anxiety and self-esteem may be best left alone in the same highly evaluative situation. This individual's arousal and state anxiety would probably be elevated but not excessive. However, an athlete with very low trait anxiety and high self-esteem may need a pep talk to *increase* arousal before performing in a nonthreatening environment.

interpretation of reversal theory, and Jones' distinction between the direction and intensity of anxiety should guide practice. An optimal recipe of emotions is related to peak performance, and when performers are outside this optimal range, poor performance results. This optimal combination of emotions needed for peak performance does not necessarily occur at the midpoint of the arousal–state anxiety continuum, and the relationship between arousal and performance depends on the level of cognitive state anxiety (worry) a performer exhibits.

4. Compare and contrast ways to regulate arousal, stress, and anxiety.

An interactional model of motivation should guide teachers and coaches in their efforts to help students and athletes manage arousal and state anxiety. Creating a positive environment and a productive orientation to mistakes and losing is an effective way to manage stress. Additionally, the following four guidelines for managing stress should be followed: (a) identify the optimal combination of arousal-related emotions needed for best performance; (b) recognize how personal and situational factors interact to influence arousal, anxiety, and performance; (c) recognize the signs of increased arousal and anxiety in sport and exercise participants; and (d) tailor coaching and instructional practices to individuals.

KEY TERMS

arousal	emotion	multidimensional anxiety theory
anxiety	self-report measures	catastrophe model
cognitive anxiety	self-report scales	reversal theory
somatic anxiety	stress	facilitative anxiety
state anxiety	social physique anxiety	debilitative anxiety
cognitive state anxiety	drive theory	perception of control
somatic state anxiety	inverted-U hypothesis	challenge
perceived control	individualized zones of optimal	threat
trait anxiety	functioning (IZOF)	

REVIEW QUESTIONS

1. Distinguish between the terms *arousal*, *state anxiety*, *trait anxiety*, *cognitive state anxiety*, and *somatic state anxiety*.
2. Define stress and identify the four stages of the stress process. Why are these stages important? How can they guide practice?
3. What are two or three major sources of situational and personal stress?
4. What is social facilitation theory? What implications does this theory have for practice?
5. Discuss the major differences in how arousal relates to performance according to the following theories:
 - Drive theory
 - Inverted-U hypothesis
 - Individualized zones of optimal functioning
 - Multidimensional anxiety theory
 - Catastrophe model
 - Reversal theory
 - Anxiety direction and intensity view
6. Describe the major signs of increased state anxiety in athletes.
7. Discuss three practical applications from the research and theories on the arousal–performance relationship.
8. Discuss the relationship between ability and an athlete's interpretation of anxiety as facilitative or debilitative.
9. Does a home-court advantage exist in sport? Discuss the research that addresses this issue.
10. Discuss how arousal influences performance through attentional changes and physical changes.
11. Discuss the research regarding the changes in anxiety and emotions before, during, and after competition.

CRITICAL THINKING QUESTIONS

1. How might you tailor coaching strategies to individuals who are trying to deal with stress and anxiety? Give an example.
2. Discuss three implications for professional practice that you derived from the theories and scientific data in this chapter.
3. The chapter begins with the story of Jason coming to bat in a pressure situation. Given what you have learned, what could Jason do to manage his anxiety and play well? How could you help him view his anxiety as facilitative rather than debilitating?