

A Sport and Exercise Psychology: Perspective on Stress

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My purpose is to introduce the psychological perspective (or perspectives) on stress. In doing so, I will focus on conceptual models or frameworks that guide sport and exercise psychology work on stress, leaving the details of the research findings and implications to the later papers (Berger, 1994; Dishman, 1994; Wrisberg, 1994). Rather than detailed research, this paper presents a framework or context for those subsequent papers.

To the sport and exercise psychologist, stress is neither an event (stressor), a physiological response, nor a stressor—response chain. All those concepts miss the key psychological component— the individual, and more specifically, the individual's perceptions and cognitions. Stress is what you think it is. Thought, or cognition, is the key element differentiating a psychological approach from some others.

The following illustration from Spielberger's (1989) work captures the key aspects of most psychological models:

Stressor → Perception and Appraisal of Threat → State Anxiety

First, there is the stressor (e.g., competition, heat, fatigue). Then comes perceived threat, or the appraisal process. Without this perception ("I think I'm stressed") there is no stressor. This appraisal is neither automatic nor as simple as it appears, but this perceived threat is what elicits the stress response. State anxiety is the response Spielberger highlights and is the response studied most by sport and exercise psychologists.

Appraisal is also the key element in Lazarus's stress model (e.g., Lazarus, 1990, 1993; Lazarus & Folkman, 1984), and that model is the focus of this paper. But Lazarus's model and most current approaches are more complex and go beyond simply highlighting cognition. According to Lazarus (1990), stress is not definable, because stress is not one construct but a rubric or complex system of interrelated constructs and processes.

Lazarus's model serves as my guiding framework—not because it has guided the sport and exercise psychology work on stress, but because it seems to be a framework that both ties that work together and can be used to develop further research directions and practical implications. After a brief overview of some of the key aspects of Lazarus's model for reference, I will review the major lines of research related to stress within sport and exercise psychology (particularly noting how they move toward the more complex Lazarus model), eventually returning to Lazarus's model to pull things together and suggest directions.

Overview of Lazarus's Model

In his early major writing on stress, Lazarus (1966) emphasized cognitive appraisal. He not only has maintained that cognitive emphasis but also has expanded the model greatly in his more recent work. The following highlights key aspects of that model by listing the major themes presented by Lazarus (1986) in one overview of his model.

1. Stress is best regarded as a rubric or system of interdependent variables. Stress is a complex system or process rather than a unidimensional variable. One cannot define stress as any one part of that system.
2. The stress process refers to a *relationship* between a person with certain characteristics and an environment with certain characteristics. Appraisal is the key here. The person's appraisal, which includes appraisal of coping capabilities, defines the relationship; the person and environment affect each other. The relationship is more than the sum of its parts; it cannot be decomposed into person and environmental antecedents. The level of analysis should be the relationship stress is not in the person or in the environment, but in the relationship. Lazarus's model is sometimes called *transactional*, reflecting this emphasis on the relationship.
3. The system is recursive in that each variable and process can affect the other, depending on where in the flow of behavior one begins. We do not have one independent variable and one dependent variable—all can be both.
4. Emotion and stress are overlapping constructs. Also, emotion is more encompassing and informative. From his early work (e.g., Lazarus, 1966) to the present (e.g., Lazarus, 1993; Smith & Lazarus, 1990), Lazarus has been moving toward an emphasis on emotion, but this aspect of his work has not yet been adapted fully by sport psychologists. According to Lazarus, studying the intensities, qualities, antecedents, and processes of emotions will give more information on what is important to people and on how they think than will continuing to focus on unidimensional stressors.
5. Stress and emotion are best understood as processes rather than static events. The stress process changes over time. Multiple variables do not a system make. The space between antecedents and consequences is the heart of the process, and we must look at how variables *change*. All the complex LISREL and path analyses that we can calculate will not tell us about *process* until we actually assess process and change.
6. Not all stressful encounters, severity notwithstanding, have the same significance for mental and physical health. Some events or hassles are more equal than others. Lazarus made this point in particular reference to work on general life stressors and health, but it also seems relevant to other sport and exercise concerns (e.g., performance, enjoyment). Some events are more central to the person than others. Just summing events misses the process; individual diagnosis is important.

Historical Perspective

Lazarus's model did not guide sport and exercise psychology research on stress, but an historical review of our work reveals parallel developments. The story of stress in sport and exercise psychology begins with simpler models. As sport and exercise psychology was becoming a specialty area in the late 1960s and into the 1970s, stress was one of the initial focal points. Selye's (1974, 1976) work had infiltrated psychology, and several psychologists (e.g., Lazarus, 1966; McGrath, 1970; Spielberger, 1966) were actively researching stress and developing conceptual models. McGrath's and Spielberger's work was current and was a strong influence on sport psychologists such as Rainer Martens and Dan Landers, who conducted several important studies during this time.

Jones and Hardy (1990) illustrated the major research directions on stress and sport in a triad comprising stress responses, stress and performance, and stress management/selfregulation. Stress and performance is clearly the most active of the three and is the one with the longest history. Jones and Hardy discuss stress responses as anxiety responses to sport and competition, but more recently, sport and exercise psychologists have explored stress responses in relation to health and fitness, as covered in later papers in this issue (Berger, 1994; Dishman, 1994; Plowman, 1994). Stress management emerged from the stress-performance literature, along with the increasing emphasis on applied sport psychology work, over the last 10 years.

The following review of our sport and exercise psychology research focuses on the models that have guided that work, as they have advanced and moved closer to the Lazarus model.

Anxiety—Performance Research

Details on findings and implications of anxiety–performance research may be found in Gould and Krane's (1992) recent review or Wrisberg's (1994) paper in this issue. This section summarizes the research and theory progression. It is not surprising that this was an early research focus because anxiety–performance research has obvious practical appeal. Both researchers and practitioners are familiar with the stress of competition: We have seen athletes or students rise to the challenge, and we have seen others choke under stress. Also, psychology was a rich source of theories and empirical work related to anxiety–performance research. In late 1960s, sport psychology emerged as a research area by focusing on motor performance using lab tasks borrowed from motor behavior. So, much work focused on the effect of social influence (particularly anxiety-provoking conditions) on performance of motor tasks.

The dominant models were drive theory, which purports that increased arousal/anxiety increases habit or dominant response performance, and the inverted-U hypothesis, which predicts that performance is best at a moderate optimal level and becomes progressively worse with either increases or decreases in arousal. Both theories were based on experimental psychology research and often on lab studies with animals.

Sport psychologists adopted and tested these theories, and Martens and Landers (1970) published one of the key supporting studies for the inverted-U. Considerable work went into debating drive versus inverted-U. Inverted-U won, perhaps as much because of its intuitive appeal as any research support. Drive theory did not really "lose," and continued to be cited in some work (e.g., audience effects on performance). Janet Spence (1971), who developed the Manifest Anxiety Scale used in much drive theory research, wrote an aptly titled defense, "What Can You Say About a Twenty-Year Old Theory That Won't Die?" in response to Martens's (1971) call for motor behavior researchers to abandon drive theory in favor of the inverted-U. Now, with drive theory over 40, Spence seems willing to bury it, as she has moved to more cognitive and social approaches in her work. Moreover, Martens no longer promotes the inverted-U.

Something is missing in both drive and inverted-U theories. Both miss the key element of a psychological perspective—thought or appraisal. Neither drive theory nor the inverted-U hypothesis includes a cognitive step, and neither is prominent in current stress work. Sport and exercise psychology has moved toward more social cognitive approaches, although we have not fully realized the implications of those approaches.

Competitive Anxiety

Anxiety continued as a dominant research theme in sport psychology, and as researchers moved away from testing the arousal—performance relationship, they adopted more cognitive approaches. In particular, Spielberger's (1966) work guided much work on competitive anxiety. In his early work, Spielberger (1966) separated trait and state anxiety. Trait anxiety is a characteristic that influences perceived threat (cognitive appraisal). Perceived threat then elicits state anxiety, which is the immediate state or response to stress (the fight or flight reaction and related responses). A high-trait-anxious person might see an upcoming tennis match as a threat and respond with high state anxiety, whereas another might perceive it as a challenge and remain relatively calm.

Sport psychologists, particularly Martens, took Spielberger's basic model and developed sport-specific constructs and measures, and this was a major step forward for sport and exercise psychology. Rather than simply adopting psychology constructs and measures, researchers began to consider unique aspects of sport and exercise. Working from a conceptual model of competitive anxiety, Martens (1976) developed a sport-specific measure of trait anxiety, with the assumption that persons perceiving competitive sport as threatening and responding with state anxiety might not be the same people who respond to other potential threats (e.g., tests, speeches). Subsequent research confirmed that sport-specific measures were better predictors of competitive anxiety (for a review see Martens, 1976; Martens, Vealey, & Burton, 1990), and researchers now emphasize sport-specific constructs and approaches in much of their sport psychology work.

Martens et al. (1990) later took a sport-specific approach to state anxiety. This work took another important advance by approaching anxiety as a multidimensional construct. Psychologists (e.g., Borkovec, 1976;

Davidson & Schwartz, 1976; Liebert & Morris, 1967; Moms, Davidson, & Hutchings, 1981) had begun to emphasize multidimensional approaches, and the dominant distinction was between cognitive (worry) and somatic (physiological arousal) dimensions. These multidimensional approaches have expanded questions and methods, and also moved sport psychologists closer to the Lazarus model with its system of interrelated variables. For example, cognitive and somatic anxiety seem to have different antecedents (somatic seems a more automatic reaction, whereas cognitive is more dependent on appraisal), different relationships to performance or performance components, and different implications for practice (e.g., stress management) (Gould & Krane, 1992; Wrisberg, 1994). Recently, some sport psychologists have investigated the possibility that different anxiety components have different relationships to performance. For example, Burton (1988) and Martens et al. (1990) have suggested that somatic anxiety and performance follow the inverted-U, whereas cognitive worry and performance are negatively related.

Landers and Boutcher (1993) recently reviewed the anxiety—performance literature and used a guiding model that resembles Lazarus's model. This model highlighted cognitive appraisal, and contained a multidimensional approach that extended beyond Martens's self-reported anxiety to incorporate psychophysiological measures. That opens up even more possibilities, as well as problems. It has been clear for some time that measures (even physiological measures) of anxiety are not highly correlated. Instead, anxiety responses seem to be idiosyncratic patterns.

Rather than simply consider multiple dimensions separately, the most recent models have looked at interactions. For example, one simple interaction would be to suggest that if cognitive anxiety is positive (confidence, no worry), then somatic anxiety or physiological arousal has a positive relationship to performance, but if cognitive anxiety is negative (high worry), then somatic anxiety and performance are negatively related. Although this theory has not been proposed, reversal theory (proposed by Kerr, 1990), and Martens's (1987) discussion of psychic energy in his coaching psychology book, express similar views.

One intriguing interactive model that has gained the attention of sport psychology researchers is catastrophe theory, which has been promoted by several sport psychologists in Great Britain (e.g., Hardy, 1990). This theory includes an interaction similar to the one just mentioned, but it is a much more complex model, involving three-dimensional, nonlinear relationships. Essentially, the relationship between cognitive anxiety and performance changes, depending on the level of physiological arousal; however, the relationships are not simple, straight lines. Some of the more interesting features involve nonlinear relationships. Catastrophe theory suggests that as arousal increases, performance increases to a point (as in the inverted-U), but that as arousal gets beyond the optimal level, it does not simply decrease in a smooth curve, but drops abruptly as the athlete goes over the edge a catastrophe. Moreover, if the athlete who has gone over the edge tries to bring arousal under control and get back to an optimal level, it's not simply going back in the same path. Instead, the athlete must go back much further to lower arousal levels in order to get back on track and then gradually build up again. That seems reasonable as stated, but showing it on the model, and demonstrating it empirically, is a challenge, to say the least. Investigating the inverted-U was a major methodological problem, and catastrophe theory looks like a nightmare compared to the inverted-U. The mathematics are complex, and testing the relationships requires multiple, precise, consistent, and valid measures of both anxiety and performance. Such measures and procedures are not imminent in either psychology or sport and exercise science.

Not only is the precision required to adequately test the model beyond our current methodologies, but the reality of anxiety—performance, at least at the level of interest for sport and exercise psychology, may not be nearly as precise as the model. Catastrophe theory is similar to the dynamical systems approach, and may be more applicable to other research questions (e.g., providing more precise motor control parameters or psychophysiological patterns over time) than to the more behavioral anxiety—performance relationship. Moreover, developing adequate methodologies to test catastrophe predictions could take us far from our real issues and behaviors of interest. Catastrophe theory is one research track, but one that is incredibly limiting in comparison to the broader implications of Lazarus's model.

Exercise and Stress

Most sport and exercise psychology work on stress focuses on anxiety–performance, but a few scholars in our field have investigated other aspects of stress. Usually these investigations move away from competitive sport to exercise. Also, these more recent lines of research often take their cues from the growing health psychology literature rather than from the experimental and social psychology models that guided anxiety–performance research. Many of these health psychology topics (e.g., adherence, stress management, coping) have obvious connections to sport and exercise. Also, health psychology, probably more than any other psychology area, uses a biopsychosocial model that could provide a nice parallel framework for sport and exercise psychology.

Considerable health psychology work involves the stress–health link (e.g., relationships of stress to cardiovascular disease or immune function). You can think yourself sick, or think yourself well. For example, the recent Bill Moyers (1993) PBS series and book on healing and the mind shows the prominence and acceptance of this work within the medical and research communities. That work becomes relevant to sport and exercise science when we add physical activity to the equation—a triad of stress, health, and physical activity.

Physical activity can fit into the model in several ways, and we have begun to investigate some of those links. One of the more active research lines is physical activity as a mediator between stress and health/illness. For example, do fit people have less stress response or recover more quickly? The early answer is "Yes," but the research is just beginning, and we know little about the processes, mechanisms, and variations involved in these relationships (e.g., Crews & Landers, 1987). We might consider physical activity as a coping mechanism in recovery and rehabilitation (e.g., activity with cancer or AIDS patients). Several people in sport and exercise science, as well as health psychology, have looked at the role of physical activity in mood, depression, or general psychological well-being (see Morgan & Goldston, 1987, for a review). Also, we should note that the role of physical activity in the stress—health relationship is not necessarily beneficial. Physical activity could negatively affect stress or health (for further information on these topics see Berger, 1994; Dishman, 1994).

We can look at direct links between activity and stress, or activity and health, but our greatest contributions may come when we use a more encompassing stress model as a framework to consider the role of physical activity within the stress process.

Application of Stress Models

This concern for more encompassing models brings me to another way that sport psychology interfaces with stress research. We have adopted more encompassing stress models to provide a framework for some research and practice.

First, we have used stress models in the area of stress management. Ron Smith (1980), who has worked with psychological stress models in his broader psychology work, applied a cognitive stress model to stress management for sport. Specifically, Smith highlights cognitive appraisal as a key to the stress process. The model includes multiple interrelated variables, and the process moves over time. External events may trigger stress, but the individual appraisal is the key. Similarly, the response is multidimensional, with physiological, psychological, and behavioral correlates and consequences. Smith developed a stress-management program with an integrated coping response, which involves both cognitive and behavioral strategies, as the key skill. With an integrated set of coping skills and possible strategies, the individual can then tailor coping responses to the situation and individual preferences.

More recently, Smith (1986) has taken a similar approach and has adopted the stress model to fit the particular constructs and relationships that are prominent for burnout. Similarly, Anderson and Williams (1988) applied the stress model to injury in sport. Again, injury is a stress process, highlighting cognitive appraisal in a multidimensional system, and the stress/ injury model provides a framework for both research and practice.

The application of stress models in sport and exercise by Smith and others incorporates key features of Lazarus's model. These models highlight cognitive appraisal in a multidimensional system of interrelated

psychobiological variables, and the complexity of the model highlights the importance of individualizing applications. Given the almost limitless possibilities, the stress process is different for every individual, even with the same situation. This is one of the most important practical implications of the stress research. The complexity of the model makes universal principles or predictions virtually impossible. Stress is an individual process; coping with stress is an individual process; and sport and exercise psychologists should focus on individual characteristics and preferences rather than applying universal strategies to all.

Current Directions and Possibilities

So, sport and exercise psychologists recognize some aspects of the model—cognitive appraisal, the interactive roles of person and environment, and the importance of individualization. However, our methodology has not kept up with these conceptual advances. Moreover, there are other aspects of Lazarus's model that we have not really recognized yet in our research models. We discuss the dynamic, recursive nature of the stress process, but we have not really dealt with it. Research models generally assume one-dimensional predictions, and no method adequately probes the ongoing process over time. These are big research challenges; major design and methodological innovations are needed to examine the model. As Lazarus (1986, 1990) notes, we cannot decompose the model into parts to understand the relationships and processes.

We recognize that stress is a psychobiological process. But, stress actually is a biopsychosocial process, and we are just beginning to incorporate the social aspect. The social aspect receives increasing attention in Lazarus's recent work. Everything takes place within a social context. Social context affects both person and environment and determines both sources of stress and appraisals of stress. For example, sources and perceptions of competitive stress and coping processes may be quite different for girl and boy soccer players. Social context further influences psychophysiological responses and consequences of stress, as well as coping processes.

Social support has been investigated as a coping mechanism or buffer for stress, and sport psychologists (e.g., Rosenfeld, Richman, & Hardy, 1989) have begun to look at the role of social support in competitive athletics. We might consider stress management at a social level, similar to community interventions sometimes considered in health psychology. We might adapt community approaches to sport and exercise settings and consider team or group interventions and processes.

Stress is an encompassing system, but Lazarus suggests that it is not encompassing enough. Stress and emotion are overlapping processes, and emotion is the more encompassing and richer term. Lazarus suggests that we could gain greater information by considering emotion. For example, we typically look at anxiety in competition. Individuals might also respond with hope, anger or sadness. If we consider the broader emotional response possibilities within a dynamic system of interrelationships, we might better understand sport and exercise behavior.

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