Anxiety, Arousal, and Stress Relationships

KIN 380 – Psychological Analyses of Physical Activity

Chapter 4 Objectives

- discuss the nature of stress and anxiety and how to measure these traits
- identify the major sources of anxiety and stress
- explain how and why arousal and anxiety-related emotions affect performance
- compare and contrast ways to regulate arousal, stress, and anxiety

Questions

- What are arousal and anxiety?
- What are their major components?
- How are they measured?
- What are the theories of arousal?

Arousal

- Arousal is a general physiological and psychological activation, varying on a continuum from deep sleep to intense excitement.

  - Weinberg & Gould (2007, p. 78)

Anxiety

- Anxiety is a negative emotional state in which feelings of nervousness, worry, and apprehension are associated with activation or arousal of the body.
  - Emotional impact or cognitive dimension of arousal results from environmental demand interpreted as threatening
  - Physical impact or somatic anxiety is the degree of physical activation

  - Weinberg & Gould (2007, p. 78)

Two Types of Anxiety

- State Anxiety
  - temporary, activates the autonomic nervous system
- Trait Anxiety
  - part of one’s core personality
State Anxiety:
- 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.
  - Cognitive State Anxiety
    - Degree to which one worries or has negative thoughts
  - Somatic State Anxiety
    - Perception of fluctuation in activation

Trait Anxiety:
- Trait Anxiety
  - A behavioral disposition to perceive as threatening circumstances that are objectively not dangerous and to then respond with disproportionate state anxiety.

Precompetitive Anxiety:
- Cognitive anxiety starts high and remains high as time-to-event approaches.
- Somatic anxiety remains low until 24 hours before the event.
- Once performance begins, somatic anxiety dissipates rapidly, and cognitive state anxiety fluctuates throughout the contest.

State and Trait Anxiety:
- Interaction between State & Trait Anxiety
  - High trait-anxious individuals usually have more state anxiety in highly competitive, evaluative situations as compared to individuals with lower trait anxiety.
  - Example: Match point in tennis played by player low or high in trait anxiety.
Anxiety Tests

- Anxiety tests in sport psychology include physiological and psychometric measures
- Physiological measures of arousal include heart rate, respiration rate, blood pressure, body temperature, brain activity, and Galvanic skin response

Source: Lavallee et al. (2004) Sport Psychology: Contemporary Themes (Palgrave Macmillan, Basingstoke, Chapter 6)

Anxiety Tests

- Although physiological measures are useful, there is no single agreed physiological index of anxiety.
- Also, importance of perceptual factors (whether arousal is interpreted positively or negatively) suggests physiological measures are limited.

Source: Lavallee et al. (2004) Sport Psychology: Contemporary Themes (Palgrave Macmillan, Basingstoke, Chapter 6)

Arousal Measured

- Behavioral and physiological measures
- Paper and pencil questionnaires
  - Generally consider:
    - Somatic anxiety/ arousal
    - Cognitive anxiety
    - and sometimes
    - Concentration
    - Self-confidence

Physiological Measures

- Physiological components of Arousal
  - Blood Pressure
  - Heart Rate (EKG)
  - Respiration Rate
  - EMG, EEG, EOG
  - Galvanic Skin Response
  - Level of adrenaline in blood

Image source: http://www.chemistrydaily.com/chemistry/Adrenaline

Physiological Measures of Arousal and Anxiety

- An Electrocardiogram (ECG or EKG) is a quick, painless test that records the electrical activity of the heart. It may be taken at rest or during exercise.

Image source: http://www.medmovie.com/

Physiological Measures of Arousal and Anxiety

- Blood Pressure – Using a Mercury Sphygmomanometer.

Image source: http://www.adinstruments.com/education/experiments/
Physiological Measures of Arousal and Anxiety

- Electroencephalogram (EEG) data determine the difference between interfering signals and brain waves and examine the effects of visual activity on alpha rhythm in the brain.

Image source: http://www.adinstruments.com/education/experiments/

- Electroencephalography (EEG) is the measurement of electrical patterns at the surface of the scalp which reflect cortical activity, and are commonly referred to as “brainwaves”.


- The Electrodermal Response (EDR) is a technique for measuring the resting potential of the retina.

Image source: http://www.qubitsystemElectrooculography

- Electrooculography (EOG) is a technique for measuring eye movement.


Physiological Measures of Arousal and Anxiety

- GSR in Biofeedback: The galvanic skin response (GSR) feedback instrument measures skin conductivity from the fingers and / or palms. The GSR is highly sensitive to emotions in some people.


- Electrodermal Response (EDR) Biofeedback

United States Rhythmic Gymnastic practicing imagery rehearsal of her routine with the EDR feedback device (GSR).

http://www.bfe.org/protocol/prof12eng.htm
**Physiological Measures of Arousal and Anxiety**

- Infrared Thermography, Thermal Imaging, Thermographic Imaging, and Thermal Video

![Snake on a man's hand](http://en.wikipedia.org/wiki/Thermography)

**Psychological Measures of Arousal and Anxiety**

- Development of a CSAI-2 short form for assessing competitive state anxiety during and immediately prior to competition:
  - Somatic State Anxiety
    1. I feel nervous (item 2).
    2. My body feels tight (item 26).
    3. I feel tense in my stomach (item 11).

  Anxiety Screening Tool: [http://psychcentral.com/quizzes/anxiety.htm](http://psychcentral.com/quizzes/anxiety.htm)

**Psychological Measures of Arousal and Anxiety**

- Cognitive State Anxiety
  1. I’m concerned about performing poorly (item 16).
  2. I am concerned about this competition (item 1).
  3. I’m concerned that others will be disappointed with my performance (item 22).

  Anxiety Screening Tool: [http://psychcentral.com/quizzes/anxiety.htm](http://psychcentral.com/quizzes/anxiety.htm)

**Psychological Measures of Arousal and Anxiety**

- Phase One Derived Anxiety Rating Scale for Measuring Competitive Somatic State Anxiety (ARS-S).
  - Relative to the upcoming competition, and relative to the following statement, rate how you feel right now (circle the appropriate number):
    - I feel nervous, my body feels tight and/or my stomach tense
    1. Not at all
    2. A little bit
    3. Somewhat
    4. Moderately so
    5. Quite a bit
    6. Very much so
    7. Intensely so

  [http://findarticles.com/p/articles/mi_hb6401/is_n1_v21/ai_n28703500/pg_5/?tag=content;col1](http://findarticles.com/p/articles/mi_hb6401/is_n1_v21/ai_n28703500/pg_5/?tag=content;col1)

**Psychological Measures of Arousal and Anxiety**

- Phase One Derived Anxiety Rating Scale for Measuring Competitive Cognitive State Anxiety (ARS-C).
  - Relative to the upcoming competition, and relative to the following statement, rate how you feel right now (circle the appropriate number):
    1. I feel nervous
    2. I feel jittery
    3. My body feels tense
    4. I feel tense in my stomach
    5. My body feels relaxed

  [http://findarticles.com/p/articles/mi_hb6401/is_n1_v21/ai_n28703500/pg_5/?tag=content;col1](http://findarticles.com/p/articles/mi_hb6401/is_n1_v21/ai_n28703500/pg_5/?tag=content;col1)

**Somatic Anxiety (CSAI-2)**

- I feel nervous
- I feel jittery
- My body feels tense
- I feel tense in my stomach
- My body feels relaxed
- My heart is racing
- I feel my stomach sinking
- My hands are clammy
- My body feels tight

[http://findarticles.com/p/articles/mi_hb6401/is_n1_v21/ai_n28703500/pg_5/?tag=content;col1](http://findarticles.com/p/articles/mi_hb6401/is_n1_v21/ai_n28703500/pg_5/?tag=content;col1)
Cognitive Anxiety (CSAI-2)

I am concerned about:
- this competition
- losing
- choking under pressure
- that I may not do as well as I could
- performing poorly

I’m concerned that:
- others will be disappointed with my performance
- I won’t be able to concentrate
- I have self-doubts
- I’m worried about reaching my goal

Self-Confidence (CSAI-2)

I feel at ease
I feel comfortable
I feel self-confident
I feel secure
I’m confident I can meet the challenge
I feel mentally relaxed

Behavioral Measures of Arousal and Anxiety

Observation: Viewing an athlete's behavior before, during, and after an event can provide much information about their stress response. Clues to watch out for include shaking, talking fast, irregular (excessive) toilet visits, biting the nails, and an inability to stay still.

Stress and the Stress Process

Stress is the non-specific response of the human organism to any demand that is placed upon it. Dr. Hans Selye

- The stress continuum
  - Eustress
    - stress health and performance
  - Distress
    - stress health and performance

The relationship between stress and health and performance.

The Stress Process

Stimulus
Environmental or competitive situation

Appraisal of Situation
1. Primary—Personal stake in situation
2. Secondary—Perceived coping resources

Response
(stress response (distress or state anxiety response))

No stress response (balance)

Active coping (cognitive-behavioral intervention)

Hoeger & Hoeger (2008, p. 327)
Stressors in the lives of college students.

General adaptation syndrome: The body’s response to stress.

Adapting to Stress
The body’s eternal quest for homeostasis.

- General Adaptation Syndrome (GAS)
  - Alarm reaction
    - Immediate nonspecific response by mobilizing resources to react to the perceived stressor
  - Resistance
    - Continuous, reactive, counter stress effort
  - Exhaustion/Recovery
    - A prolonged resistance leads to exhaustion
    - A short resistance allows for a quick recovery

Distress occurs when there is a substantial imbalance between the physical and psychological demands placed on an individual and that person’s response capability and under conditions in which failure to meet the demand has significant consequences.

Stage 1: Environmental Demand
Stage 2: Perception of Demand
Stage 3: Stress Response
Stage 4: Behavioral consequences

Can you identify sources of eustress and distress in your personal life during this past year?

Explain your emotional and physical response to each stressor and how the two differ.
Arousal
- Arousal
  - varies on a continuum from
    - deep sleep to
    - extreme excitement

Arousal vs Somatic Anxiety
- Arousal
  - measured by physiological parameters
- Somatic Anxiety
  - measured by perception of physiological parameters

Arousal
- Arousal
  - an energizing function
    - responsible for harnessing the body's resources for intense and vigorous activity
  - a physiological state of readiness to perform

Theories of Arousal
- Drive Theory
- Inverted-U hypothesis
- Individualized Zones of Optimal Functioning (IZOF)
- Multidimensional Anxiety Theory
- The “catastrophe” model
- Reversal Theory
- Processing efficiency theory
- “Conscious processing” hypothesis

Theories of Arousal/Performance
No one theory or model provides a unifying theory that describes the relationship between arousal/anxiety and athletic performance.

Drive Theory
- Developed by Hull and Spence
- Linear Relationship
- Positive Correlation
- Performance = Arousal X Skill Level
- Examples of when this might be true?
  - Social Facilitation Theory

Image source: http://nbcsports.msnbc.com/id/30021156/
Inverted-U Hypothesis

- Developed by Yerkes and Dodson (1908)
  - http://psychclassics.yorku.ca/Yerkes/Law/
- Really measuring Somatic Anxiety
- How do Somatic Anxiety and Arousal differ?

Inverted-U Hypothesis

- “Inverted-U” hypothesis (e.g., Oxendine, 1984) suggests that arousal and performance are related in curvilinear manner: increased arousal held to improve performance up to certain point beyond which further increases may impair it.
- This theory seems plausible but is difficult to test empirically due to a lack of independent measures of arousal and inadequate specification of point beyond which diminishing returns occur.

Lavallee et al. (2004) Sport Psychology: Contemporary Themes (Palgrave Macmillan, Basingstoke)

Inverted-U Hypothesis

- Problems
  - looks at three groups
    - high
    - medium
    - low anxious
  - should look at 1 individual
    - at many levels of anxiety

Levels of Task Difficulty

SOMATIC ANXIETY
Inverted-U Hypothesis

- Non-linear
- Highest levels of performance
  - moderate arousal
- Lowest levels of performance
  - exceptionally low
  - exceptionally high arousal

Levels of Ability

Multidimensional Anxiety Theory

  - Individualized Zones of Optimal Functioning (IZOF)
  - A person’s zone of optimal functioning may be at the lower, middle, or upper end of the state anxiety continuum.

Somatic Anxiety and Performance

Cognitive Anxiety and Performance

Fazey & Hardy’s Catastrophe Theory

- Recognizes that cognitive and somatic anxiety interact with one another.
  - The “catastrophe” model (Hardy, 1996) suggests that arousal has different effects on sport performance depending on cognitive anxiety.
  - Specifically, performance improves when cognitive anxiety is low but a sudden (catastrophic) decline in performance may occur when cognitive anxiety is relatively high.

Lavallee et al. (2004) Sport Psychology: Contemporary Themes (Palgrave Macmillan, Basingstoke)
**Catastrophe Model**

- Under conditions of low cognitive anxiety the relationship between physiological arousal and performance is an inverted-U relationship.

  - see Figure 4.6, p. 90 (Weinberg & Gould, 2007)

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**Catastrophe Model**

- As cognitive anxiety increases, increases in physiological arousal can lead to catastrophic drops in performance.

  - see Figure 4.6, p. 90 (Weinberg & Gould, 2007)

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**Zone of Optimal Functioning (ZOF)**

- Developed by Yuri Hanin (1989)
- Based on scores on State Anxiety Inventory (SAI) initially
- Later researchers have used CSAI-2 because of concerns about recall and reliability.
- Individualized Inverted-U

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**ZOF for Different Individuals**
Research has demonstrated that the use of IZOF theory can be used to assist athletes in achieving optimal levels of precompetitive anxiety through the use of mental skills.

- Relies on subjective interpretation of arousal
- Arousal can be viewed as + or -
  - arousal-seeking
  - arousal-avoiding

Can quickly reverse in interpretation
- pleasant
- unpleasant
- Telic-dominant-goal directed orientation
- Paratelic- “here and now” orientation; sensation seeking.

Eysenck and Calvo (1992) suggested that anxiety may affect processing efficiency (mediated by working memory resources) rather than task effectiveness
- Predicts that anxious athletes will have to work harder to maintain same level of performance they would display if not anxious
- Promising theory but has received little attention

Lavallee et al. (2004) Sport Psychology: Contemporary Themes (Palgrave Macmillan, Basingstoke)
“Conscious Processing” Hypothesis Theory
Masters (1992) suggests that anxiety may cause “paralysis by analysis” by encouraging athletes to exert conscious control over previously automated skills. Thus anxiety may induce regression from implicit/automatic control to explicit/verbal control.
- Supported by finding that skills learned implicitly are more resistant to effects of anxiety than skills learned explicitly (Masters, 1992, not consistently replicated, however)

Lavallee et al. (2004) Sport Psychology: Contemporary Themes (Palgrave Macmillan, Basingstoke)

Why do some athletes choke under pressure?
- “Choking” refers to a sudden impairment or failure of athletic performance due to an overwhelming anxiety attack.
- Choking is characterised by anxiety symptoms and the feeling that the harder one tries, the worse one’s performance gets.

Lavallee et al. (2004) Sport Psychology: Contemporary Themes (Palgrave Macmillan, Basingstoke)

Why do some athletes choke under pressure?
- Choking has afflicted many sports stars such as Ian Woosnam (golf) and Eric Bristow (darts)
- Most likely to be caused by concern with excessive self-consciousness and concern with mechanics of skill execution.

Lavallee et al. (2004) Sport Psychology: Contemporary Themes (Palgrave Macmillan, Basingstoke)

Causes of anxiety in athletes
- Predisposition to anxiety (note circularity of explanation)
- Perceived importance (threat) of situation
- Negative attributional style (e.g. ascribing poor performance to one’s own lack of ability)
- Perfectionism
- Fear of failure
- Competition-specific stress

Lavallee et al. (2004) Sport Psychology: Contemporary Themes (Palgrave Macmillan, Basingstoke)

Next time...
- Optimizing Arousal for Best Performance