Anxiety and Exercise
Mental Health vs. Mental Illness

- Mental health
  - State of successful performance of mental function, resulting in productive activities, fulfilling relationships, and the ability to adapt to change and to cope with adversity

- Mental illness
  - Collectively, all diagnosable mental disorders
Mental Disorders

- Health conditions that are:
  - Characterized by alterations in thinking, mood, or behavior (or some combination thereof)
  - Associated with distress and/or impaired functioning

- Diagnosed based on the *Diagnostic and Statistical Manual of Mental Disorders*, fourth edition (DSM-IV).
Anxiety Defined

“Pathological counterpart of normal fear, manifest by disturbances of mood, as well as of thinking, behavior, and physiological activity.”

(USDHHS, 1999, p. 233)
Anxiety Defined (continued)

Anxiety is more than chronic stress and increased arousal:

- Perception and concern over the threat are disproportionate to the actual threat.
- One’s perception or concern over the threat that a situation or task exceeds their present capacity or ability.
- Anxiety is usually experienced far longer than the arousal lasts.
- Anxiety can occur in the absence of an actual threat.
- We cognitively or behaviorally will take actions to avoid being anxious.
Clinical Anxiety vs. “Normal” Anxiety

- Anxiety is characterized by worry, self-doubt, nervousness, and tension.

- When anxiety disrupts thought processes and behavior so much that normal behavior is disrupted, it becomes clinical.

- Clinical anxiety is distinguished from “normal” anxiety based on the number and intensity of symptoms, degree of suffering, and degree of dysfunction.
Symptomatology

- Unpleasant feelings (uncertainty, feeling overwhelmed)
- Bodily symptoms (muscle tension, autonomic hyperactivity)
- Changes in cognitions (obsessions, compulsions, irrational fear of objects or situations)
- Changes in behavior (avoidance of situations)
- Vigilance
Anxiety Disorders

- Panic disorder
- Phobias
- Generalized anxiety disorder
- Obsessive–compulsive disorder
- Post-traumatic stress disorder
Characteristics of Main Anxiety Disorders

PANIC DISORDER
- Intense fear and discomfort associated with physical and mental symptoms, including:
  - Sweating, trembling, shortness of breath, chest pain, nausea
  - Fear of dying or loss of control of emotions
- Induces urge to escape or run away, and often results in seeking emergency help (e.g., hospital)
- Frequently accompanied by major depressive disorder
- Twice as common in women as in men

AGORAPHOBIA
- Severe, pervasive anxiety when in situations perceived to be difficult to escape from, or complete avoidance of certain situations (e.g., crowded areas, alone outside of home, travel in bus or plane)
- Often seen after onset of panic disorder
- Twice as common in women as in men
What Is Panic Disorder?

- Watch this video to find out.

www.youtube.com/watch?v=2gNGUartUEI&feature=PlayList&p=E32BD6BD942E221A&playnext_from=PL
Anxiety Disorders (continued)

SOCIAL PHOBIA (SOCIAL ANXIETY DISORDER)
- Marked, persistent anxiety in social situations (e.g., public speaking)
- Possibility of embarrassment or ridicule is crucial factor
- Individual is preoccupied with concern that others will notice the anxiety symptoms (e.g., trembling, sweating, halting/rapid speech)
- Accompanied by anticipatory anxiety days or weeks prior to feared event
- More common in women than in men

OBSESSIVE–COMPULSIVE DISORDER
- Obsessions, such as recurrent thoughts or images that are perceived as inappropriate or forbidden, elicit anxiety
- Individual perceives loss of control, thus acts on impulses or thoughts
- Compulsions, including behaviors or thoughts, reduce anxiety associated with obsessions
  - Includes overt behavior (e.g., hand washing) and mental acts (e.g., counting, praying)
- Take long periods of time to complete
- Disorder has fluctuating course, including periods of increased symptoms, usually linked with life stressors
- Equally common in women and men
Anxiety Disorders (continued)

GENERALIZED ANXIETY DISORDER

- Defined by worry lasting more than six months, along with multiple symptoms (e.g., muscle tension, poor concentration, insomnia, irritability)
- Anxiety and worry not attributable to other conditions (e.g., panic disorder, phobias)
- Disorder has fluctuating course, including periods of increased symptoms, usually linked with life stressors
- Twice as common in women as in men

POST-TRAUMATIC STRESS DISORDER

- Anxiety and behavioral disturbances following exposure to extreme trauma (e.g., combat, physical assault), which persist for more than one month
- Dissociation, symptom involving perceived detachment from emotional state or body, is critical feature
- Symptoms also include generalized anxiety, hyperarousal, avoidance of situations that trigger memories of trauma, recurrent thoughts
- Occurs in about 9 percent of those exposed to extreme trauma
Generalized Anxiety Disorder

What is generalized anxiety disorder?

Everyone experiences stress—but could you be going through something more serious? Watch this video to find out.

www.youtube.com/watch?v=dRmBJhtys9g&feature=PlayList&p=E32BD6BD942E221A&playnext_from=PL
Prevalence of Anxiety

- **Epidemiological Catchment Area Study, 1993:**
  - 13.1% of population will have an anxiety disorder

- **National Comorbidity Survey, 1994:**
  - 18.7% of U.S. adult population will have a diagnosable anxiety disorder

- **U.S. Dept. of Health and Human Services, 1999:**
  - 16.4% of population will have an anxiety disorder

- **According to the National Institute of Mental Health, 2009:**
  - an estimated 26.2% of Americans ages 18 and older have a mental disorder in any given year (about 57.7 million people)

- Mental disorders are the leading cause of disability in the U.S. and Canada

- Nearly half suffer from more than one mental disorder at a given time
Figure 4-1  Hospitalizations for anxiety disorders* in general hospitals per 100,000 by age group, Canada, 1999/2000

* Using most responsible diagnosis only

Source: Centre for Chronic Disease Prevention and Control, Health Canada using data from Hospital Morbidity File, Canadian Institute for Health Information
Costs of Anxiety

- Economic burden in terms of treatment and lost productivity:
  - Approximately one-third of costs are for psychiatric treatment
  - Approximately one-half of costs are for nonpsychiatric medical treatment
  - 10 percent of costs are indirect expenses
  - 5 percent of costs are for prescriptions and mortality costs (anxiety-induced suicide)
  - $63 billion annual costs associated with anxiety disorders (2008 statistics)

- Drug and substance abuse adds to the costs
Measurement
State vs. Trait Anxiety

- **State anxiety:**
  - A transient emotional state characterized by feelings of apprehension and heightened autonomic nervous system activity (increased heart rate, sweaty palms, increased breathing rate, increased muscle tension)

- **Trait anxiety:**
  - A more general predisposition to respond with apprehension, worry, and nervousness across many situations (lack of confidence, difficulty making decisions, feelings of inadequacy)
One’s anxiety level

Total anxiety = state levels + trait levels

If an intervention can lower one or both, total anxiety is lowered.
Measures

- Psychological measures:
  - Self-report inventories

- Physiological measures:
  - Muscle tension, via electromyography
  - Blood pressure and heart rate
  - Skin responses
  - Central nervous system
**Measures**

The State-Trait Anxiety Inventory consists of 20 State items (identified as Scale Y1) and 20 Trait items (identified as Scale Y2).

This scale is used to respond to items:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not At All</td>
<td>Somewhat</td>
<td>Moderately So</td>
<td>Very Much So</td>
<td></td>
</tr>
</tbody>
</table>

The following is a sample of five items from the complete 40-item scale.

**“State” means “How I feel at this moment”**

**Examples from the State scale:**

<table>
<thead>
<tr>
<th>Item</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel calm.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel at ease.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel frightened.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**“Trait” means “How I usually am”**

**Examples from the Trait scale:**

<table>
<thead>
<tr>
<th>Item</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am a steady person.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I lack self-confidence.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Because higher scores are indicative of greater levels of anxiety, in the scoring of the scales, some items are reverse scored (e.g., a response of 1 to “I feel calm” would be scored as a 4 since not feeling very calm would be indicative of greater levels of anxiety) in order to arrive at a total for State and a total for Trait. Respondents’ scores are typically compared with a normative group (e.g., college-aged students) to understand relative anxiety.

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Measurement of Anxiety

- STAI FORM Y-1 = State
  - Mean for Males = 36.8; Females = 39.5

- STAI FORM Y-2 = Trait
  - Mean for males = 36.6; Females = 39.4
Psychological and Physiological Measures of Anxiety

- Psychological measures:
  - Trait & State Self-report inventories

- Physiological measures:
  - Muscle tension, via electromyography
  - Blood pressure and heart rate
  - Galvanic Skin responses
  - Central nervous system
High Trait Individuals

- Have initial higher level of anxious feels across all highly evaluative situations

- Needs to develop more refined coping strategies or interventions to deal with situations that are highly evaluative as compared to low trait individuals.
Anxiety Symptoms

Cognitive
- Changes in cognitive functions
- fear, worry

Somatic
- Bodily symptoms
- sweating, muscle tension
Treatment of Anxiety
+ Treatment

- **Medications:** Tranquilizers and antidepressants
  - Can be costly
  - Have side-effects

- **Psychotherapy:** Cognitive-behavioral therapy (CBT) and time-limited therapies
  - Can be costly
  - CBT can be time-consuming
A Different Form of Treatment

- Physical activity:
  - A potential tool in both the prevention and the treatment of anxiety.
FIGURE 1. Change in Primary Outcome Measures of Patients’ Anxiety During 10 Weeks of Treatment With Aerobic Exercise (N=11), Clomipramine (N=15), or Placebo (N=11) (Completer Analysis)
Evidence for Treatment Effects of Exercise

![Bar graph showing Hamilton Anxiety Rating Scale Scores for Exercise, Drug treatment, and Placebo groups at baseline and change at Week 10.]

Source: Adapted from Broocks, Bandelow, Pekrun, et al. (1998).
Physician and Sportsmedicine indicated 60% of 1,750 physicians prescribe exercise for those suffer from anxiety.
Preventive Effects

- Cross-sectional study by Stephens (1988) involving 23,791 adults found physically active adults had fewer symptoms of anxiety.

- Goodwin (2003) found that people who regularly exercise had reduced chances of having anxiety disorders.

- Landers and Petruzzello (1994) found that physically fit people have less anxiety than those who are unfit.

- A low fit and highly anxious individual have the most to gain from exercise training (Martinsen, Hoffart, and Solberg, 1989)
Mechanisms of Change

- Thermogenic hypothesis
- Distraction/time-out hypothesis
Thermogenic Hypothesis

- Elevated body temperature resulting from exercise may also lead to psychological changes such as reduced anxiety.

- The brain senses the temperature increase → leads to muscular relaxation response → feeds back to the brain → interprets the muscle response as relaxation or reduced anxiety.

- It could be brain temperature, not body temperature, that drives the affective response.
Distraction/Time-Out Hypothesis

- The anxiety-reducing effects of exercise may be due to the distraction it provides from one’s normal routine.

- An anxious or depressed individual who exercises is taking a “time-out” from his/her worries and concerns.
Exercise and Anxiety

- Acute and Chronic exercise programs can be associated with reduced state anxiety (Morgan & Goldston, 1987).

- Vigorous exercise is not necessary for improvements (Sexton, Maere, & Dahl, 1989) in state nor trait anxiety.

- Chronic exercise programs is usually associated with reductions in neuroticism and trait anxiety but acute exercise program affects has not been proven (Morgan & Goldston, 1987).

- Exercise can have beneficial effects across all ages and both genders (Morgan & Goldston, 1987).

- In patients with panic disorder:
  - Pharmacotherapy is most effective, but exercise results in significant improvement (Broocks et al., 1998)
  - Patients show significant anxiety reduction following exercise (O’Connor, Smith, & Morgan, 2000)
Exercise as a Treatment

- Both anaerobic and aerobic training resulted in significant psychological (cognitive – worry) improvements (Martinsen, Hoffart, & Solberg, 1989).

- Significant relationship has been noted between aerobic capacity and anxiety levels, with greater fitness levels related to lower anxiety (Sexton, Maere, & Dahl, 1989).

- Higher one’s fitness level the greater one’s buffer to anxiety symptoms and disorders.
More on the Relationship Between Exercise and Anxiety

**Acute exercise**
- Effect does not last indefinitely; lasts for 2 to 4 hours
- Anxiety returns to pre-existing levels
- Possibility that over time pre-exercise levels of anxiety may become reduced
- Reduces state anxiety levels

**Chronic Exercise**
- Slight reduction in trait anxiety levels
What We Don’t Know About Exercise and Anxiety

- Intensity levels of exercise
  - More research is needed on recommendations of minimal exercise intensity levels across all disorders and conditions.

- Duration of exercise
  - Some research shows that durations less than 20 minutes were as effective as those greater than 20 minutes but more is needed to confirm the duration relationship.
  - Some researchers have reported that anxiety reduction seems to be achieved regardless of duration but again more research is needed to confirm this statement.

- Few studies with clinical population??
  - Mostly fit versus unfit population
Exercise Training Effects on Trait Anxiety
Physical Activity and Trait Anxiety

- Meta analysis study by Petruzzello (1991) revealed that chronic physical activity is associated with a small to moderate reduction in trait anxiety (ES = .34)

- Exercise programs lasting at least 16 weeks had the greatest effect on trait anxiety

- Little is known about intensity and trait anxiety. Aerobic activities had small to moderate reduction.

- Non-aerobic activities had slight increase in trait anxiety.
Consensus Statements Regarding Exercise Training and Anxiety

- Training usually reduces trait anxiety
  - Minimum 9 weeks, ideally > 16 weeks
- Reductions seen on various indices
- Beneficial effects across all ages and both genders
- Just as effective as other treatments
Exercise Rx for Train Anxiety

- Duration guidelines unclear
  - May be effects < 20 min
- Type
  - Aerobic
- Intensity guidelines are unclear
Effects of Exercise on State Anxiety
Physical Activity Versus Other State Anxiety Treatments

Other behavioral techniques are:
- Rest
- Progressive relaxation
- Meditation
- Biofeedback
- Hypnosis

Physical activity is as effective for anxiety reduction as other behavioral techniques used to manage the disturbance
State Anxiety & Duration of Exercise

- Positive changes occur after 16 weeks involving aerobic activities but not weight training.
- Duration of an aerobic session
  - 0-20 min. related to decreased anxiety (ES .78)
  - 20-40 minutes = ES .31
  - 40 minutes = ES .28
- Beneficial effects of PA on state anxiety seems to begin within 5 minutes of the cessation of acute physical activity and generally last up to 2 hours.
State Anxiety & Intensity of Exercise

- Intensity of a session
  - 70% of maximal oxygen uptake or 70% of maximal heart rate for at least 20 minutes
  - High intensity exercise had detrimental impact on state anxiety
  - Anaerobic exercise may result in slight increases in anxiety
  - Strength training may increase state anxiety
Summary
Consensus Statements Regarding Exercise and Anxiety

- Short and/or long term exercise can be associated with reduced state anxiety.

- Long-term exercise is usually associated with reductions in neuroticism and trait anxiety.

- Exercise can result in the reduction of various other stress indices.

- Exercise can have beneficial emotional effects across all ages and both genders.
Practical Recommendations

- Exercising on a regular basis does seem to be useful in reducing/treating anxiety, although the minimal level required is unknown.

- Aerobic forms of exercise seem to be most effective.

- Exercise is a treatment of anxiety that is equal to other forms of treatment.

- People who are lowly fit and highly anxious will benefit from exercise.