Stress and Health Project Report
Presented to US Rowing

by
Drs. Frank Perna and Sharon McDowell
USOTC Sports Science and Technology Division
RATIONAL

Athletes have been shown to suffer from higher than average incidences of upper respiratory illness and injury. The reasons for this appear to be multifaceted. Various studies have shown that the high training loads undertaken by athletes can result in suppressed immunity and higher injury rates. High levels of stress have also been shown to contribute to injury and/or illness rates among athletes. Few studies, however, have attempted to combine such variables as training load, life event stress and assess how these impact various immune or physiological parameters. Information such as this would be helpful in establishing a model to predict what variables contribute to predisposing an athlete to becoming sick or injured. Hopefully by understanding this, we will be able to 'see the warning signs' and prevent an illness or injury from occurring.

PURPOSES

Three studies were conducted for the following purposes:

1. To assess sources of stress, coping strategies, symptom reporting and social support networks in elite athletes.

2. Determine why athletes get sick or injured.

3. To measure physiological responses to a physical stress while taking into account the effect of mental stress levels.

4. Develop a model to predict illness/injury in athletes.

SUBJECTS

The subjects for this project consisted of 35 swimmers, 28 cyclists and 46 rowers. All were considered elite or national level athletes.
METHODS

Study 1: Athletes were asked to complete a survey regarding their training, sources of stress, ways of coping with stress, physical symptoms and social support network.

Study 2: The athletes performed a submaximal/maximal test. Blood was taken during the test to assess blood lactate levels. Saliva samples were collected the morning of the test, following the test and the following morning. These were frozen and assayed for IgA and Cortisol.

Study 3: The athletes were asked to complete a follow-up survey which tracked for one month the number of days that they modified or took off. They were asked to specify whether they took off days for illness, injury or rest.

RESULTS

Pessimistic athletes and athletes with high life-stress experienced more physical symptoms than low stress and low pessimism athletes.

Athletes under-utilizing social support and over-utilizing self-blame and wishful thinking were more likely to experience symptoms.

Pessimists over-utilized wishful thinking and self-blame, but under-utilized social support, even though pessimists reported an adequate support network.

After accounting for training load, athletes with high life stress were more likely than low stress athletes to increase cortisol: immediately following intense exercise and 24 hours later.

Pessimistic athletes took fewer days off, especially under high stress conditions than low pessimism athletes.

Pessimistic athletes were more likely to become injured and to miss more days of practice due to injury or illness than low pessimism athletes.
Illness and Injury

Increasing social support is thought to decrease risk of illness and injury.

Psychological skills training methods (e.g., relaxation) have been found to increase IgA and decrease cortisol.

Factors such as stress and environmental contaminants can suppress immunity.

Exposure to crowds, close living quarters, and travel increase risk of experiencing illness.

Appears to be a window of susceptibility.

Adequate recovery time is important.

Implications
moved

coaching change

relationship w/

ex: death of friend

sum total of weighted negative events.

life stress (hi-lo)

don't mind specific and unrelated to depressed mood.

devises ways to deal with them, prone to worry.

evisions problems that may arise in competition &

defensive pessimist (high dop)

or prefers to not think too much about upcoming events.

evisions doing well in competitive situations

optimist (low dop)

definitions
PASSIVE AND SELF-PUNITIVE APPROACH TO PROBLEMS.

SELF-BLAME

Tracing in an unhelpful way, refusing to get too serious.

CONTINUOUS Dwellling on problem, and carry on as usual.

DEPARTMENT

1. Tired not to burn my bridges, but leave things open.
2. Hold back actions when they may do more harm than good.

SELF-CONTROL

1. Wish situation would somehow go away, or be over.
2. Use of fantasy to avoid thinking about a problem.

WISERUL THINKING

1. Time to see situation as learning experience.
2. Thinking of alternative ways to view a problem/situation.

NEAPPROPRIATE SITUATION

1. Ask a friend or relative for advice.
2. Efforts to obtain information on support from others.

SOCIAL SUPPORT

1. Tried to see things from another's viewpoint.
2. Generating ideas/thoughts to deal with problems.
3. Doubled my efforts to make things work.
4. Taking action to change or deal with a problem.

ACTIVE COPING

COPING STRATEGIES
Pessimism & Stress Score

Sympotoms

Elite Rowers' Symptom Frequency
Effect Sizes T = .39, Power = 83%; T = .35, Power = 70%
F(1,49) RPE = 8.96, p = .004; STRESS = 6.83, p = .012

DISCRIMINANT PREDICTION ACCURACY = 80.4% F(2, 47) = 8.51, p = .007

**VARIABLES**

![Bar chart with variables Stress and RPE showing changes in scores.]

- **Stress**: Increase, Decrease
- **RPE**: Increase, Decrease

**Change**: Baseline to Post-Max. Test

**Means for Athletes with Cortisol Increase/Decrease**
Effect Sizes $F = 1.49$, $R^2 = 0.07$, $p = 0.47$, Stress = 3.75', $p = 0.059$

$F(1, 49)$, $R^2 = 0.07$, $p = 0.37$, Stress = 3.75', $p = 0.059$

Discriminant Prediction Accuracy = 58.8%, $F(1, 49)$, $-3.75$, $p = 0.69$

**Variables**

- **Increase**
- **Decrease**

**Coriolis ChG.**

**Scores**

<table>
<thead>
<tr>
<th>Stress</th>
<th>RPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.7</td>
<td>13.4</td>
</tr>
<tr>
<td>23.2</td>
<td>14</td>
</tr>
</tbody>
</table>

Change: Baseline to 24HR Rest

Means for Athletes with Coriolis Increase/Decrease
Effect Size = 0.28, Power = 50
Discriminant (Stepwise) DPOF (1, 4.3) = 3.72, p = 0.06
Prediction Accuracy = 66.7%

Means for Injured & Non-Injured Athletes

Variables
- DPOF-Pessimism
- Stress
- RPE

Scores
- 50
- 40
- 30
- 20
- 10
- 0
Effect Size = 0.33, Power = 60
Regression R^2 = 0.11 DpG (1.43) = 5.20 p = 0.28

DpG SCORE

<table>
<thead>
<tr>
<th>3.68</th>
<th>1.22</th>
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<tbody>
<tr>
<td>HIGH</td>
<td>LOW</td>
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</tbody>
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Prospective Analysis
DAYS INJURED OR SICK
Predicting Illness in Athletes

IQA and Stress Comparisons For
STRESS & HEALTH AMONG ROWERS

Frank Perna, Ed.D., Stacie Spencer, M.A., & Sharon McDowell, Ph.D.

The jarring sound of the alarm awakened Wesley Gordon as it had for most of his adult life. 5:15am is an ungodly hour for most, especially on a weekend, but it is an all too familiar one for a rower. The day began typically for Wes, unfortunately this included the ever present scratch in his throat and the recurrent pain in his wrist and forearm which forced him to row on the square as he has had to do time and time again. From his first months on campus as a highly recruited oarsman to his present status as one of the nation's top athletes, Wes had come to view these "annoyances" as inevitable, a right of passage if you will into rowing's higher echelons. Wes regarded his annual bronchitis, that seemed to hang-on until May, and flare-ups of tendinitis as normal occurrences.

"Row through it" had become a daily affirmation rather than an occasional inspiratory saying. Wes had become one of the best on the water and in the classroom, which confirmed his view that this was the best way to manage the stress of competition, school, and later work. "Bare down and keep it in" had become a philosophy of life. To be sure, he had passing thoughts, what could I do if I weren't hurt or sick for half the season? What if I could prevent or more quickly recover from bouts of illness or injury, then what would I really be able to accomplish? It would take Wes years to answer these questions.

Why Is Controlling Stress Important For Rowers?

WESLEY'S experiences of frequent illnesses and chronic injuries with slow recoveries are not unusual but typical of many rowers and other athletes. Take a minute to recall illnesses or nagging injuries that you have encountered. Do you notice any patterns? For example, many people recall becoming ill following their final school exams or having been plagued with injuries during a stress filled year.

Often, illness and injury proceed or coincide with periods of high stress. Research conducted by the USOC's Mental Training & Counseling program and by other sport scientists across the country have discovered that high negative life-event stress is associated with more frequent symptoms, illnesses, and injuries. Additionally, prolonged stress can also inhibit the body's ability to recover and mend damaged tissue as well as increase the intensity of pain.

Performance in the boat is inevitably affected for the athlete who has difficulty maintaining high intensity practices or stringing together months of solid practices. Compromised health in the form of recurrent illness, injury or inadequate recovery from intense workouts is one factor that undoubtedly contributes to breakdowns in the training process. Fortunately, many of the adverse affects of stress are not only controllable but preventable when:

1) Athletes become knowledgeable regarding their body's functioning
under stress. This allows athletes to recognize signs over stressed states before prolonged exposure leads to illness or injury; and 2) Athletes incorporate life-style changes and introduce regular stress management practices that "inoculate" them against over-stress states. The following segments will describe the mechanisms underlying stress-injury/illness relationship, and the implications from a collaborative study between U.S. Rowing and The Athlete Performance division with collegiate and elite rowers.

Of Colds and Athletes: Why They Get Sick

Everyday we are bombarded by a countless array of viruses which cause the common cold and other upper-raspatory infections. Prolonged and intense physiological or psychological stress compromises the immune system's ability to ward off these "bugs". Contrary to popular belief, becoming ill is not simply a chance occurrence of encountering a "bug", but illness is likely under conditions of high stress.

Decreased incidence of illness has commonly been associated with high levels of fitness. This is due in part to the finding that moderate exercise is an effective stress reducer, and it can actually increase the body's immune system functioning. Additionally, fitness inclined individuals typically engage in health conscious behaviors. Yet, in spite of the precautions that competitive athletes take, many periodically succumb to "bugs" that plague the general population. For instance, in our recent study with elite rowers, 42% reported that they had been sick in the last 3 weeks.

When illness or injury occurs, athletes often report a sense of betrayal, "my body has let me down", that is frustrating at best and debilitating at worst. Training is put on hold and performance suffers.

Many competitive athletes do not take into account that while they are extremely fit, they endure above average physical stress along with the stress of daily life. Athletes encounter extreme academic and athletic demands, or the financial burdens of merging a post collegiate rowing career with an occupational pursuit. One might argue that these athletes thrive on the challenge and derive a high degree of satisfaction from constantly challenging themselves. While there is considerable merit to this notion, the trick is to balance demands and challenges with existing resources. Some athletes, particularly younger athletes, come to see themselves as relatively invulnerable and hence do not engage in the health behaviors (e.g. adequate rest, nutrition, and stress management...etc) required given their demands.

Teaching Athletes to "Read Their Body"

Many years are often required for athletes to learn to manage their stress and to read signals that the body sends. Athletes who are adept at this physiological and psychological calculus are often referred to as "mature". Mature athletes have recognized for years what science is only now beginning to fully document and understand, namely, the process known as stress-diathesis. Stress
diathesis refers to the idea that a some bodily systems (e.g. respiratory, immune, muscular, cognitive...etc) are relatively more predisposed to failure than others under prolonged or extreme stress. Thus, each individual possesses a relatively weak bodily system which predisposes a person to illness or injury if that person's physiological and psychological resources become overtaxed. Often, breakdowns in a system result in a specific pattern of symptoms which the mature athlete learns to detect and respond to before an injury or full-blown illness occurs.

Thus, while stress in the general population is defined as a nonspecific reaction to physiological and psychological demands, individuals tend to have an idiosyncratic response to over-stressed states. For example, some people may be skeletal-muscle responders who have frequent or prolonged bodily aches and pains, while others may experience their stress cognitively in the form of racing thoughts or decrements in attention/concentration.

One goal of the Athlete Performance Division's study with rowers was to teach athletes to read the warning signs the body sends in the form of symptoms. Each athlete's stress response in 5 domains (Muscular, Cognitive, Parasympathetic, Emotional, & Immune) was charted to determine their individual stress-response profile. A domain with relatively high responses is also frequently the domain where symptoms will occur as one is becoming over-stressed.

Athletes were also instructed regarding "key Symptoms" such as insomnia, disrupted eating, weight changes, and periods of negative affect. Key symptoms are important to address whenever they occur.

Sources of Stress Among Athletes

Can an athlete identify if they're at risk for illness or injury prior to becoming symptomatic? Yes, experiencing a high degree of negative life-event stress has been associated with both illness and athletic injury. A first step an athlete can take is to determine the relative degree of stress they are under and to identify the source or sources of stress. Although, seemingly simple, many highly stressed people do not realize the pressure they're under and often have difficulty prioritizing the areas in their life that are most stressful.

In our study, collegiate and elite rowers rated the incidence and effect (positive or negative) of 75 life-events encountered in the last year. Athletes received feedback regarding their relative stress status (high or low), recommendations for reducing stress, and the opportunity to discuss their concerns privately. Listed below are examples of common sources of stress for elite and collegiate rowers. Common stressors were defined as events that 20% or more of the group experienced and rated negatively.
Table 1  **Percentage of Elite Rowers Reporting Specific Stress Event.**

<table>
<thead>
<tr>
<th>Event</th>
<th>Total (n=46)</th>
<th>Male (n=26)</th>
<th>Female (n=20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unfulfilled Sport Goal</td>
<td>43</td>
<td>35</td>
<td>55</td>
</tr>
<tr>
<td>Making Occupational Career Decision(s)</td>
<td>41</td>
<td>25</td>
<td>60</td>
</tr>
<tr>
<td>Separated From Mate Due To Sport</td>
<td>37</td>
<td>26</td>
<td>50</td>
</tr>
<tr>
<td>Unable to Find Job</td>
<td>37</td>
<td>38</td>
<td>35</td>
</tr>
<tr>
<td>Financial Problems</td>
<td>33</td>
<td>35</td>
<td>30</td>
</tr>
<tr>
<td>Major Error In A Competition</td>
<td>33</td>
<td>31</td>
<td>35</td>
</tr>
<tr>
<td>Sleep Change</td>
<td>30</td>
<td>26</td>
<td>35</td>
</tr>
<tr>
<td>Illness In Family</td>
<td>24</td>
<td>26</td>
<td>20</td>
</tr>
<tr>
<td>Personal Illness/Injury</td>
<td>24</td>
<td>19</td>
<td>30</td>
</tr>
<tr>
<td>No Recognition/Praise From Coach</td>
<td>24</td>
<td>19</td>
<td>30</td>
</tr>
<tr>
<td>Change in Social Activities</td>
<td>22</td>
<td>23</td>
<td>20</td>
</tr>
<tr>
<td>Changed Relationship With Coach</td>
<td>20</td>
<td>26</td>
<td>10</td>
</tr>
<tr>
<td>Change In Attitude Toward Sport</td>
<td>20</td>
<td>19</td>
<td>20</td>
</tr>
<tr>
<td>Break-Up With Mate</td>
<td>20</td>
<td>23</td>
<td>15</td>
</tr>
</tbody>
</table>
Table 2  Percentage of Collegiate Rowers Reporting Specific Stress Event.

<table>
<thead>
<tr>
<th>Event</th>
<th>Total (n=56)</th>
<th>Male (n=27)</th>
<th>Female (n=29)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unfulfilled Sport Goal</td>
<td>53%</td>
<td>44%</td>
<td>62%</td>
</tr>
<tr>
<td>Roommate Conflicts</td>
<td>46</td>
<td>33</td>
<td>58</td>
</tr>
<tr>
<td>Financial Problems</td>
<td>41</td>
<td>48</td>
<td>34</td>
</tr>
<tr>
<td>Separated From Mate Due To Sport</td>
<td>39</td>
<td>44</td>
<td>34</td>
</tr>
<tr>
<td>Change in Social Activities</td>
<td>39</td>
<td>41</td>
<td>38</td>
</tr>
<tr>
<td>Change In Amount of Time For Academics</td>
<td>34</td>
<td>33</td>
<td>34</td>
</tr>
<tr>
<td>Sleep Change</td>
<td>30</td>
<td>26</td>
<td>34</td>
</tr>
<tr>
<td>Break-Up With Mate</td>
<td>29</td>
<td>37</td>
<td>21</td>
</tr>
<tr>
<td>Change In Family Finances</td>
<td>25</td>
<td>19</td>
<td>31</td>
</tr>
<tr>
<td>Illness In Family</td>
<td>25</td>
<td>26</td>
<td>24</td>
</tr>
<tr>
<td>Problems With Menses Or PMS</td>
<td>25</td>
<td>na</td>
<td>48</td>
</tr>
<tr>
<td>Failing Test</td>
<td>23</td>
<td>22</td>
<td>24</td>
</tr>
<tr>
<td>Injury To Teammate</td>
<td>23</td>
<td>15</td>
<td>31</td>
</tr>
<tr>
<td>No Recognition/ Praise From Coach</td>
<td>23</td>
<td>15</td>
<td>31</td>
</tr>
<tr>
<td>Eating Change</td>
<td>23</td>
<td>22</td>
<td>24</td>
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<tr>
<td>Pressure Re: Weight</td>
<td>20</td>
<td>15</td>
<td>24</td>
</tr>
</tbody>
</table>

It is apparent that sources of stress vary across males and females and athletes of different ages. In general, we found that while sport certainly produced experiences of satisfaction, it was also the most frequently mentioned source of negative stress. Additionally, many athletes, 30% of each group, experienced significant changes in their sleeping patterns which adversely impacted them. Finally, despite what might appear to be a stoic exterior, many athletes were sensitive to
changes in their personal relationships. As might be expected, collegiate athletes were most impacted by events concerning school and adjustment to college life. Elite athletes reported significant stress related to managing occupational and athletic pursuits.

Based on the results from all 75 items, athletes were divided into high and low stress categories. Athletes under high stress were found to report more symptoms across each domain and more overall symptoms than athletes under low stress conditions. It is important to note that High and Low stress status was based on a comparison of an individual's score to the average score of a group; however, the stress tolerance or the amount of stress a person can manage varies between individuals. Simply, high for one person may be low for another. Also, the relative appraisal of the stress-event was important; that is, the same event was rated differently across individuals or groups. For example, women athletes were more likely than men to experience pressure regarding their weight and eating habits, and collegiate athletes were more likely than elite athletes to report conflicts with roommates. Lastly, the experience of a particularly adverse event can produce relatively high stress in an otherwise unstressful life. For example, a death of a close relative occurred for almost a fifth (18%) of all rowers, an unwanted pregnancy was reported by one in seven (13%) of elite rowers, and approximately 5% of all athletes were crime victims.

Stress Moderators

Moderators are factors which influence the relationship between stress and an outcome such as injury or illness. These are factors that enhance or diminish a person's capacity to tolerate stress. Moderators found to influence stress tolerance include the presence of social support, an optimistic outlook, and active coping strategies.

For example, studies have shown that athletes who report having a network of supportive friends or family to whom they can confide their feelings were able to tolerate higher psychological stress loads. These athletes are less likely to become injured and also report fewer physical symptoms.

Additionally, people in the general population who maintain an optimistic outlook on life and put setbacks in perspective (optimists) have been found to suffer fewer colds, recover quicker from surgeries, and generally be at lower risk for heart disease than pessimists. Pessimists, on the other hand, tend to engage in thoughts of worst case scenarios. In essence, by thinking about worst case scenarios some pessimists can devise strategies to overcome the obstacles they envision using their approach as a defense to prepare themselves for a risky or competitive situation. While some pessimists can be very successful in meeting challenges, at times they are prone to inaction and they may pay a physical price for constant worrying. Scientists think that optimists are at less risk because they engage in active approaches to solve their problems and also tend to worry less.

When we looked at optimism and pessimism among rowers by
asking them how they viewed various rowing situations (erg tests, seat races, and actual races), we discovered similar findings (see Figure 1). Pessimists tended to be more symptomatic than optimistic athletes. Pessimists were also less likely to use social support as a coping strategy. The relationship between optimism and health held up despite the number of negative events that were encountered. That is, optimists and pessimists reported the same number of negative events; yet, the pessimists experienced more symptoms.

Putting the information on stress and outlook in practical terms, we wanted to determine how much more accurate we could be in predicting who would become ill (e.g. have symptoms) and to what degree. As we mentioned, part of the reason athletes experience symptoms is related to their training load and their age. That is, athletes who are in heavy training tend to experience more symptoms than athletes in a light training period and young athletes are more prone to illness because their immune systems have not fully developed. Considering training load, age, and gender we could predict the number of symptoms a rower would experience with only about 25% accuracy. However, when we factored in how much stress a person was under and how they viewed rowing (e.g. optimistically or pessimistically) our accuracy at prediction improved to about 75%.

**What Can Rowers Do When they Become Ill**

In order to catch an illness in its early stages, athletes may want to monitor their morning resting heart rate. A heart rate 10 beats above the athlete's average may indicate that he or she has not recovered from a previous workout or that the body is fighting bacterial or viral invasion. Athletes can use this data in their discussions with coaches to help evaluate response to workouts.

When athletes get sick they commonly ask "is it ok to work-out when I'm sick", and "when is it ok to return to practice". The answer depends on a number of factors, most importantly what type of virus is involved and what types of symptoms are experienced. In general it is better to err on the side of caution. Therefore, to be on the safe side, athletes should avoid working out when sick. The benefits of taking some days off while sick far outweigh the gains of doing a workout.

Even when symptoms start to subside and practice is resumed, they should be kept at slow pace and care should be taken to ease back into strenuous workouts. One rule of thumb is that if an athlete has symptoms of a common cold that are very local in nature (i.e. restricted to the nose and throat) training can be resumed a couple of days after cessation of symptoms. However, if there are signs of systemic involvement, such as extreme muscle fatigue or swollen lymph glands, then up to a month should be taken off before full resumption of training. For many athletes enduring a month of inactivity can seem tortuous as well as potentially compromising a season's hard work. Minimizing the risk of becoming ill (or injured) would be highly desirable. Reducing stress can reduce the incidence of illness and injury.
Recommendations For Preventing Stress

Exercise has typically been touted as the stress reducer of choice for the general population. However, athletes may need to find other outlets to manage their stress levels. Progressive muscle relaxation, breathing exercises, listening to relaxing music, or simply taking quiet time during the day can go a long way in reducing stress levels. Research has shown that individuals who practice relaxation techniques for as little as 15 minutes a day can improve the functioning of their immune systems and decrease the unpleasant effects of excess stress. Furthermore, taking a relaxing bath at the end of the day can be as effective as medication for decreasing tension. Unfortunately, many people do not utilize relaxation strategies when they need them the most; when they are under stress. Typically, the behaviors we engage in to reduce stress may be the first thing to go.

Developing and utilizing social support systems can all also be very effective in preventing stress. At first, some people may find difficulty confiding in others, but with time and disclosure people often find that their friendships become more meaningful and mutually rewarding.

Some athletes may want to consider counseling to learn relaxation or to help with some problems or life choices they are facing. For example, many athletes encountered stress due to occupational decisions. Similar to building social support, some athletes may be skeptical of or attach negative connotations to engaging in counseling. For example, "counseling is only for sick people". It is interesting that people used to view exercise the same way; "exercise is only for fat people". Today, we know that exercise is used to enhance functioning, counseling can be viewed in a similar manner.

In our work with athletes, we have seen them invest long hours of training, endure pain, and alter their lives to to commit to the training necessary to cut precious seconds off their times. Yet, athletes may not be doing the simple behaviors outside of the shell that will enable all of that hard work to pay-off. We have discussed sources of stress, physiological response to stress, and methods of reducing the ill effects of stress. Our goal is for coaches and athletes to use the information about physiological and psychological aspects of health to enhance training as well as overall quality of life.
ROWING CAMPS GROUP STRESS DATA

Competitive Optimism-Defensive Pessimism (CDPQ)

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<thead>
<tr>
<th></th>
<th>College Athletes</th>
<th>Rowing Camp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>39</td>
<td>35</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>8.5</td>
<td>3.0</td>
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The CDPQ measures one aspect of athletes' mental approach toward competitive situations. Essentially, athletes can approach competition from an optimistic standpoint and go into the competitive situation expecting to do well or from a pessimistic viewpoint and worry about doing poorly. People with an optimistic perspective often prefer not to think too much about competitive or "risk" situations, and they tend to report lower levels of anxiety or tension.

Pessimists can be either "true" or "defensive". True pessimists expect to do poorly and generally with good reason-they've done poorly in competition in the past. Defensive pessimists, on the other hand, have done well in the past but think a lot about the competitive situation. Defensive pessimists put forth more effort as the importance of the competition increases whereas true pessimists withdraw effort. In essence, defensive pessimists think about all the potential obstacles to performance and devise strategies to deal with them. Since defensive pessimists tend to think/worry about competition a lot, they tend to be more anxious (and may make others anxious).

Both approaches (optimism & defensive pessimism) have been found to be successful in the short run; although each has its costs and benefits. Defensive pessimists may be more thorough in their preparation and less likely to be caught off-guard. However in the long-run, their performance may suffer. For example, defensive pessimists have been found to suffer more physical symptoms of stress potentially making it more difficult for them to maintain consistently high levels of training. The Athlete Performance Stress Study and other researchers are attempting to collect more information on this group and to teach defensive pessimists to maintain their planning & work ethic while decreasing worrying. Optimists tend to report less anxiety & stress symptoms which seems desirable for long & short term performance. Optimists must be wary of being too casual about competitive situations.

Listed above are the means (average) and standard deviations of the CDPQ for college athletes and rowing camp athletes. High scores (defensive pessimists) are those 1 standard deviation above the mean, while low scores (Optimists) are 1 standard deviation below the mean. Scores between 1 standard deviation above and below the mean are considered average or typical of the group.

Negative Life Event Stress For Athletes

<table>
<thead>
<tr>
<th></th>
<th>College Athletes</th>
<th>Rowing Camp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>19</td>
<td>21</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>13.5</td>
<td>17</td>
</tr>
</tbody>
</table>

Life stress has been defined as any event/situation that produces a demand on the individual to respond (or actively resist responding) in order to adapt. Thus any life change, positive or negative, produces some demand on the person. However, research with athletes and non-athletes has indicated that the negative changes are the ones that pose the most threat to health. The scores above represent average values for negative life event stress for athletes in general and for the rowing camp. The scores are calculated by multiplying the number of events by the impact (-4 to -1) of the events
listed/reportd in the survey. Generally, the higher the score the greater the risk of health risk (e.g. injury or illness).

Scores greater than 33 can be considered as high life stress. When interpreting your score several other aspects are important to remember. First, high & low scores are based on averages but "high" for an individual may be greater or less than "high" for another person. The relative appraisal of stress is important to consider. Simply, what is high stress for one person may not be high stress for another. Second, stress is also influenced by the quality and coping style a person utilizes. Lastly, people experience stress differently. For example, some people realize they are under stress from their emotions, while others may first notice that they are having trouble concentrating, or they may notice changes in behavior such as appetite and sleep. Tracking your life stress, moods and symptoms over time is the best way to pin point how you respond to stress.

**Stress Symptoms (Monthly)**

<table>
<thead>
<tr>
<th></th>
<th>Muscle</th>
<th>Autonomic</th>
<th>Emotions</th>
<th>Thinking</th>
<th>Immune</th>
<th>Tot.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Col. M</td>
<td>12</td>
<td>7</td>
<td>13</td>
<td>13</td>
<td>3</td>
<td>48</td>
</tr>
<tr>
<td>ath. Sd</td>
<td>6</td>
<td>5</td>
<td>8</td>
<td>7</td>
<td>2</td>
<td>25</td>
</tr>
<tr>
<td>Rowing M</td>
<td>9</td>
<td>4</td>
<td>11</td>
<td>11</td>
<td>2</td>
<td>36</td>
</tr>
<tr>
<td>Camp Sd</td>
<td>4</td>
<td>3</td>
<td>6</td>
<td>8</td>
<td>2</td>
<td>18</td>
</tr>
</tbody>
</table>

Listed above are the means and standard deviations for 5 categories of symptoms related to stress that are reported on a monthly basis. High scores are those 1 standard deviation above the mean, while low scores in a category are 1 standard deviation below the mean. Scores between 1 standard deviation above and below the mean are considered average or typical of the group. You can compare your individual scores to the group means to determine if your score is relatively high or low. One way to use this information is to look for categories that are high. Categories that are high will also most likely be the symptoms that will become evident first when stress is getting too high. You can think of these symptoms as warning signs to reduce stress before potentially more serious health consequences arise. Another way to use symptom information is to recall the most frequent symptom (e.g. headache, or digestive disturbance) as the warning sign.

It is important to remember that the symptom data reported is only for one occasion. Thus, accuracy could be affected by many variables. Tracking symptoms on several occasions is the best way to determine your specific stress-response. These data can also help you to become more in tune with your body and gain greater control over it. For example, people who practice relaxation on a regular basis report a lower amount of illness, symptoms, and emotional unrest.

**Coping Strategies**

<table>
<thead>
<tr>
<th>Act</th>
<th>Prob. Solve</th>
<th>Social Support</th>
<th>Re-Label</th>
<th>Wish. Think</th>
<th>Self-Control</th>
<th>Detach</th>
<th>Blame</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>2.4</td>
<td>2.4</td>
<td>2.0</td>
<td>2.3</td>
<td>2.3</td>
<td>2.0</td>
<td>2.3</td>
</tr>
<tr>
<td>Sd</td>
<td>.6</td>
<td>.7</td>
<td>.7</td>
<td>.7</td>
<td>.7</td>
<td>.6</td>
<td>.9</td>
</tr>
</tbody>
</table>

| Athletes in General |

<table>
<thead>
<tr>
<th>Rowing</th>
<th>Camp</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td></td>
</tr>
<tr>
<td>Sd</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| M | 3.2 | 2.9 |
| Sd | .4  | .5  |
Listed above are the means and standard deviations of 8 categories of coping strategies that rowers and athletes in general report using to when dealing with problems/situations. High scores are those 1 standard deviation above the mean, while low scores in a category are 1 standard deviation below the mean. Scores within 1 standard deviation above and below the mean are considered average or typical of the group. You can compare your individual scores to the group means to determine if your score is relatively high or low. One way to use this information is to look for categories that are high. Categories that are high will also most likely be the strategies that will be the first used when in dealing with a problem situation. Generally, action oriented strategies, such as action taking, problem solving, and self-control, are the strategies that are most useful. Strategies that involve some sort of avoidance of problems, such as wishful thinking, detaching self from a problem, and self-blame, tend to be less effective in alleviating the actual problem and negative emotional response. Athletes tend utilize action oriented coping strategies.

However, there are several types of occasions where active approaches tend not to work as well and other strategies such as seeking social support and relabeling are extremely useful to incorporate. These occasions involve circumstances where most aspects of the problem are out of the person's control. For example, a particular health issue for athletes, who tend to utilize action oriented strategies, concerns loss of playing or practice time due to injury or illness. People with action oriented coping styles often find it extremely difficult to be side-lined. In these cases, re-focusing on goals of rehabilitation/recovery can be useful. Additionally, adding social support to one's coping repertoire can have definite advantages. Developing social support has been shown to reduce the incidence of injury and speed recovery.

Recommendations

Exercise has typically been touted as the stress reducer of choice for the general population. However, athletes may need to find other outlets to manage their stress levels. Progressive muscle relaxation, breathing exercises, listening to relaxing music, or simply taking quiet time during the day can go a long way in reducing stress levels. Research has shown that individuals who practice relaxation techniques can improve the functioning of their immune systems and decrease the unpleasant effects of excess stress. Furthermore, taking a relaxing bath at the end of the day can be as effective as medication for decreasing tension. Unfortunately, many people do not utilize relaxation strategies when they need them the most; when they are under stress. Typically, the behaviors we engage in to reduce stress may be the first thing to go.

The previous sections have discussed sources of stress and physiological response to stress. These data can provide you with information to gage your individual stress level. Additionally, you may also monitor your morning resting heart rate. A heart rate 10 beats above your average, may indicate that you have not recovered from your previous workout or that your body is fighting bacterial or viral invasion. Athletes can use this data in their discussions with coaches to help evaluate response to workouts.
Individual Summary Scores

Name_________________________  Sport______________  Date_____

Defensive Pessimism-Optimism Score

CDPQ=

Stress Scores

(-) Stress Score=

Stress Symptom Scores

Muscle=
Autonomic=
Emotions=
Thinking=
Immune=
Total=

Coping Strategies

Act=
Prob. Solve=
Social Support=
Re-Label=
Wish. Think=
Self-Control=
Detach-Self=
Blame=