Hardiness and Mood Disturbances in Swimmers While Overtraining

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The personality construct of hardiness has been introduced as a moderator in the stress–illness relationship. Hardy individuals are thought to alter their appraisal of stress into a less stressful form. Mood disturbances have been found to be a product of intensive physical training. This investigation examines the relationships between hardiness and mood disturbances in swimmers who are overtraining and between hardiness, mood disturbances, and coping behaviors. Swimmers (N = 253) from eight universities and seven competitive club programs completed the Cognitive Hardiness Inventory, the Profile of Mood States, the Everly Coping Scale, and the Marlowe-Crowne Social Desirability Scale at the beginning of their competitive season, and at two 7-week intervals. Hardy swimmers experienced fewer mood disturbances during the season than nonhardy swimmers. Specifically, hardy swimmers had lower feelings of tension, depression, anger, fatigue, confusion, and higher feelings of vigor. Hardy swimmers also possessed more adaptive coping behaviors.

Key words: swimming, coping behavior, performance, stress life events

The Training Method

In today’s competitive sports environment, athletes must dedicate much of their lives to training. Proper nutrition, technical instruction, psychological preparation, and year-round physical training are mandatory for an athlete to be in top form. The amount of physical training for athletes has greatly increased over the last few decades (Bompa, 1985; Murphy, Fleck, Dudley, & Callister, 1990). However, the question arises whether the increase in volume is too great (Chambliss, 1989; Levin, 1991; Parker, 1989). Physical training presents itself to the body as a stressor (Bompa, 1985; Harre, 1981). Excessive training stress is unpleasant and, when too great, can be harmful (Arnheim, 1989; Costill,
However, proper amounts of physical training increase an individual’s physiological capacity, which often leads to increases in performance.

Determining the proper amount of training for each athlete is a difficult process and has a direct relationship with performance. One method of training often employed by swimmers, runners, cyclists, and rowers is overtraining. “Overtraining is an imbalance between training and recovery” (Kuipers & Keizer, 1988, p. 79). It is based on the overload principle in which “workloads are gradually increased, thereby, exceeding the previously employed workload” (Kuipers & Keizer, 1988, p. 80). If recovery and adaptation do not occur in the allowed time, fatigue results. The process of overtraining increases the muscular endurance, power, and aerobic capacity of the athlete.

The paradox of overtraining is that in some athletes many of the positive effects of exercise may be reversed, with the athlete’s performance decreasing rather than increasing (Morgan, Brown, Raglin, O’Connor, & Ellickson, 1987; Morgan & O’Connor, 1988). Silva (1990) suggests that overtraining can possibly result in “detectable psychophysiological malfunctions and is characterized by easily observable changes in the athlete’s mental orientation and physical performance” (p. 10). This is referred to as staleness or the overtraining syndrome.

Physiological indicators such as increased morning heart rate (Dressendorfer, Wade, & Scaff, 1985; Morgan & O’Connor, 1988), decreased muscle glycogen (Costill et al., 1988; Hackney, Pearson, & Nowacki, 1990), increased perception of effort and lack of economy (Costill et al., 1985), elevated serum creatine (Dressendorfer & Wade, 1983), decreased appetite and weight loss (Kindermann, 1986; Ryan, Brown, Frederick, Falsetti, & Burke, 1983), and decreased maximal aerobic power (Callister, Callister, Fleck, & Dudley, 1990; Kindermann, 1986) have been suggested as possible responses to overtraining.

Morgan and his colleagues (Morgan, Brown, Raglin, O’Connor, & Ellickson, 1987; Morgan & O’Connor, 1988; O’Connor, Morgan, Raglin, Barksdale, & Kalin, 1989; Raglin, Morgan, & Luchsinger, 1990), in an attempt to determine the psychological factors related to the process of overtraining, monitored the mood state of competitive swimmers in a group of studies over a 10-year period. Mood disturbances were determined by the Profile of Mood States (POMS; McNair, Lorr, & Droppleman, 1981). The results indicated a significant increase in global mood disturbances in the middle of the season during high intensity training. These mood disturbances have been determined to increase in a dose–response manner with increased training. Mood disturbances were found to return to baseline with a decrease in training.

Costill et al. (1988), though primarily interested in the physiological effects of the overtraining process, studied 12 swimmers who were subjected to a twofold increase in training over a period of 10 days. Various physiological tests and measures were taken on the swimmers throughout the acute training overload period. In addition, the POMS was completed daily by each swimmer. The “responders” (those who could not maintain the training level) were found to have excessively low muscle glycogen levels and longer recovery times and were less efficient with their motor skills (Costill et al., 1988). Morgan, Costill, Flynn, Raglin, and O’Connor (1988) received the psychological inventories that the swimmers had completed. Using the psychological data from the POMS, Morgan et al. (1988) predicted which swimmers would be unable to maintain the level of
training. There was 89% agreement between the psychological and physiological classifications of the responders and nonresponders. The one incorrect classification was a swimmer judged as a borderline case.

The results of overtraining on the mood of 14 female collegiate swimmers along with a control group were studied by O'Connor et al. (1989). The swimmers were subjected to a 4-1/2-month training period that involved a progressive increase in training volume, followed by one month of a progressive decrease in volume. Mood state and salivary cortisol were measured on three occasions. The swimmers were found to have an increase in global mood disturbances during overtraining, which was followed by reduced global mood disturbances during the reduced training. Consistent with previous research (Carli et al., 1983; Kirwan et al., 1988), swimmers were also found to have higher levels of salivary cortisol than the controls during the baseline and overtraining periods.

At present one would suggest that psychological factors such as mood disturbances may be a consequence of the process of overtraining, along with various physiological responses. However, others may suggest that the psychological factors might be a precipitate. It is essential that possible psychological facts be investigated. The present research is interested in psychological characteristics that might be related to mood disturbances experienced while overtraining.

**Hardiness**

Hardiness is a personality characteristic proposed to explain the differences in mood states among groups of individuals who are subjected to stress. Kobasa (1979) proposed that hardiness may have a buffering effect against illness in the face of life’s stressful events. Hardiness is composed of three components often referred to as the three Cs: commitment, control, and challenge. Commitment is the ability to be deeply involved in or committed to the activities in one’s life versus feeling alienated. Control is the belief that one can control or influence the events experienced in life. Challenge is viewing the changes in one’s life as exciting and necessary for further personal development rather than as threatening (Kobasa, Maddi, Puccetti, & Zola, 1985).

Hardiness has been theorized to affect stress in two ways. First, hardy individuals transform stressful life events into less stressful forms by altering their appraisals of the stressor (Kobasa, 1982). Second, hardy individuals are more apt to utilize effective coping mechanisms to reduce the stressfulness of a situation (Kobasa & Puccetti, 1983). A significant portion of hardiness research focuses on stressful life events, illness, and hardiness in various groups. Investigations involving middle and upper level managers (Kobasa, Maddi, & Kahn, 1982), undergraduate resident assistants (Nowack & Hanson, 1983), and executives (Kobasa, Maddi, & Zola, 1983) indicated that hardiness was related negatively to the frequency and severity of illness.

Hardiness, in essence, is a personality construct that enables an individual to better cope with stressful situations. Research has found that individuals who make better use of coping resources report less psychological distress (Monet & Lazarus, 1991). Coping has been defined as “efforts, both action-oriented and intrapsychic, to manage (that is, master, tolerate, reduce, minimize) environmental and internal demands, and conflicts among them, which tax or exceed a person’s resources” (Cohen & Lazarus, 1979, p. 219).
From the research presented above, it can be concluded that with increased training stress, athletes have increased mood disturbances, but as the training stress is reduced, the mood state returns to baseline (Morgan, Brown, Raglin, O’Connor, & Ellickson, 1987; Morgan & Luchsinger, 1990; O’Connor et al., 1989). However, it is unknown why some athletes are capable of enduring severe bouts of training without noticeable detrimental effects, whereas others have mood disturbances and decreases in performance. The variance in the amount of the decrement is suspected to be related to psychological factors. The theoretical concept of hardiness has been shown to have a moderating or buffering effect on illness and stress in a variety of nonsport settings. Whether this construct will be applicable to the sport environment, that is, whether the personality characteristic of hardiness will act as a buffering agent in preventing the adverse effects of overtraining in competitive swimmers, is not known. The primary purpose of the present study was to determine if hardiness is related to the mood disturbances experienced by swimmers during overtraining. The secondary purpose of the study was to establish if there is any relationship between hardiness, mood disturbances, and coping behaviors.

Method and Procedures

Subjects

The subjects (N = 253) were male (n = 131) and female (n = 122) swimmers attending junior high school, high school, or college and participating in a competitive swimming program. The noncollegiate swimmers (n = 75) were selected from competitive swim programs in Alberta, Florida, Maryland, Ontario, Texas, and Vermont. The collegiate swimmers (n = 178) were from competitive programs at NCAA Division I (46%) and Division III (40%) universities and at Canadian universities (14%).

Instruments

Cognitive Hardiness Inventory. The Cognitive Hardiness Inventory (CHI) is part of a larger Stress Assessment Inventory, developed by Kenneth Nowack (1990), which is based on the personality hardiness literature. This inventory is composed of the three dimensions of commitment, control, and challenge as outlined by Kobasa (1979). The 30-item inventory is composed of attitudes and beliefs on a 5-point Likert scale, from 1 = strongly disagree to 5 = strongly agree. The CHI addresses situations such as work, home life, and hobbies. In the present study, work was changed to school and swimming was included along with activities and hobbies.

The CHI has shown convergent validity with the original Kobasa hardiness scales (Nowack, 1989, 1990). This brief scale is conceptually based on Kobasa’s personality hardiness model and has shown adequate internal reliability (alpha) of .83 (Nowack, 1989). The internal reliability (alpha) for this sample was .77. Criterion-related validation of hardiness was shown, as it was negatively correlated to psychological distress and positively correlated to psychological well being (Nowack, 1990). Test–retest reliability conducted on a small sample (n = 62) of the swimmers revealed a correlation of .839 over the period of a year.
Profile of Mood States. The Profile of Mood States (POMS) is a 65-item inventory in which the athletes were asked to check the adjectives to indicate how they have felt in the last week and today. The six subscales are Tension-Anxiety, Depression-Depression, Anger-Hostility, Vigor-Activity, Fatigue-Inertia, and Confusion-Bewilderment scale. A global mood score was derived from totalling the negative POMS factors (Tension, Depression, Anger, Confusion, and Fatigue) and subtracting the positive mood factor (Vigor).

Of particular importance to the present study is that the POMS has been sufficiently validated and found reliable by numerous sources (Lorr & McNair, 1982; Peterson & Headen, 1984). Also the POMS has been utilized in a number of investigations evaluating the effects of overtraining on athletes (Callister et al., 1990; Morgan, Brown, Raglin, O’Connor, & Ellickson, 1987; Morgan, O’Connor, Sparling, & Pate, 1987; O’Connor et al., 1989; Raglin, Morgan, & Luchsinger, 1990).

Everly Coping Scale. The Everly Coping Scale (ECS; Everly, Sherman, & Smith, 1989) dichotomizes coping behavior as either adaptive or maladaptive. Adaptive coping is defined “as any coping behavior that can be used to manage demands and reduce stress/anxiety while simultaneously fostering/promoting personal health” (p. 75). Maladaptive coping is defined “as any coping behavior that can be used to manage demands and reduce acute stress/anxiety, but which is simultaneously self-debilitating in that such behavior will create other demands and prolonged stress/anxiety” (p. 75). The ECS is a 20-item scale that generates three scores: the number of adaptive coping behaviors, the number of maladaptive coping behaviors, and the difference score, which provides an indication of the overall health-enhancing behavior practiced by the subject.

The difference score had test–retest reliability for 1-week and 2-week intervals of .75 and .75, respectively. Negative correlations with the Taylor Manifest Anxiety Scale (Taylor, 1953) (−.40) and the State Trait Anxiety Inventory (Spielberger, Gorsuch, & Lushene, 1970) (−.34) were cited as evidence of construct validation of the ECS. Concurrent criterion validity was determined by assessing patients from clinical and nonclinical groups in which the ECS discriminated between the two groups.

Marlowe-Crowne Social Desirability Scale. Finally, a short form of the Marlowe-Crowne Social Desirability Scale (MC-10) was administered due to the possibility that “personality test scores are influenced by non-test-relevant response determinants” (Crowne & Marlowe, 1960, p. 349). The MC-10 was found to be related to several subscales of the POMS; however, the probability value associated with these correlations was of low magnitude (e.g., $r = .16$), which indicated that social desirability was not an important factor in the test results.

Procedure

The swimmers completed the CHI, POMS, ECS, and MC-10. The first data collection occurred during the first 2 weeks of the collegiate and competitive fall season. The questionnaires (POMS and ECS) were repeated at two 7-week intervals following the beginning of training. This provided a midway measure during increased training and a final measure during high-intensity training prior to the competition phase (taper) of the season. Both the collegiate and competitive seasons have similar training, tapering for conference, collegiate, and national
championships in late February and March. The first data collection was completed by 387 swimmers; however, three full data collections were gathered on 253 swimmers, a return rate of 76%.

The coaches also provided a summary of the average training volume performed by the swimmers over the season (see Figure 1). This information was obtained to assure that the swimmers were experiencing a progressive threefold increase in training volume over the season. For example, the team with the lowest yardage reported an initial yardage of 2,500 and progressed up to 8,200 yards. This volume marker was chosen to assure that the overtraining method was utilized and because previous research has operationalized overtraining as at least a twofold increase in training volume in a controlled setting (Morgan, Brown, Raglin, O’Connor, & Ellickson, 1987; O’Connor et al., 1989; Raglin, Morgan, & O’Connor, 1991).

**Results**

The data were analyzed according to the demographic variables of sex, age, competitive level (age group, Division I, and Division III), school level
Hardiness and Swimmers

(high school and below, and college and above), and their relationship to hardiness, mood disturbances, and coping behaviors. To examine the effect of hardiness, the swimmers were grouped into a high-hardiness group and a low-hardiness group and analyses on mood disturbances and coping behaviors were conducted.

Demographic Variables

The mean hardiness score was 112.1 (SD = 11.6) out of a possible 150 for the competitive swimmers. Further analysis revealed a significant relationship between age and hardiness, \( r = .16, p < .01 \); that is, as age increased, so did the level of hardiness. Although the results indicated that age was related to hardiness, the amount of variance in the hardiness score accounted for by age was minimal, \( F(1, 251) = 6.630, p < .01, R^2 = .02 \). An ANOVA comparing males and females in hardiness revealed no significant difference, nor did ANOVAs for college and above for high school and below swimmers.

To determine whether mood disturbances were related to any of the demographic variables, a correlational analysis was performed, revealing that global mood state was negatively related to age at each data collection. However, the magnitude of this relationship accounted for a minimal amount of the variance in global mood state, Time 1 \( F(1, 251) = 20.122, p < .0001, R^2 = .07 \); Time 2 \( F(1, 251) = 8.458, p < .004, R^2 = .03 \); Time 3 \( F(1, 251) = 16.963, p < .0002, R^2 = .06 \).

A series of ANOVAs compared males and females on mood state and indicated no significant differences. The POMS subscales were examined separately to determine which subscales were significantly different for the high school and below and the college and above groups. Overall, the Vigor subscale did not differ significantly. This indicated that the high school and below group possessed greater feelings of depression, anger, tension, fatigue, and confusion. A repeated measures ANOVA comparing mood state for the various competitive levels revealed a significant \( F \) ratio, \( F(2, 250) = 8.873, p < .0002 \). Post hoc Scheffé tests showed the significant differences, \( F(2, 250) = 4.741, p < .0009 \), primarily existed between age group and Division I and age group and Division III. The age group swimmers were found to have greater mood disturbances than the Division I and Division III swimmers.

A correlational analysis of age with coping behaviors indicated that no significant relationships existed for any of the ECS subscales over the three data collections. A series of ANOVAs conducted on each subscale's score on the ECS did not reveal a significant effect for sex, school, or competitive level.

Hardiness and Mood Disturbances

A correlational analysis indicated a significant relationship existed between hardiness and each subscale of the POMS at each data collection. All the subscales were found to be significantly related to the CHI at all three data collections (see Table 1). As hardiness increased, mood disturbances decreased.

To determine if there was a change in mood over the three data collections, a repeated measures MANOVA was performed, which showed a significant difference across time for global mood state, \( F(2, 506) = 12.43, p < .0001 \), and for the subscales of Fatigue, \( F(2, 506) = 25.4, p < .0001 \), and Vigor, \( F(2, 506) = \)
Table 1  Correlations of the Cognitive Hardiness Inventory and the Subscales of the Profile of Mood States (POMS)

<table>
<thead>
<tr>
<th>POMS subscales</th>
<th>Correlations</th>
<th>Time 1</th>
<th>Time 2</th>
<th>Time 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tension</td>
<td>-.55</td>
<td>-.49</td>
<td>-.53</td>
<td></td>
</tr>
<tr>
<td>Depression</td>
<td>-.59</td>
<td>-.52</td>
<td>-.55</td>
<td></td>
</tr>
<tr>
<td>Anger</td>
<td>-.41</td>
<td>-.43</td>
<td>-.48</td>
<td></td>
</tr>
<tr>
<td>Vigor</td>
<td>.40</td>
<td>.29</td>
<td>.33</td>
<td></td>
</tr>
<tr>
<td>Fatigue</td>
<td>-.28</td>
<td>-.34</td>
<td>-.43</td>
<td></td>
</tr>
<tr>
<td>Confusion</td>
<td>-.53</td>
<td>-.52</td>
<td>-.52</td>
<td></td>
</tr>
<tr>
<td>Global</td>
<td>-.61</td>
<td>-.56</td>
<td>-.61</td>
<td></td>
</tr>
</tbody>
</table>

Note. All correlations significant at \( p < .05 \)

20.56, \( p < .0001 \). Post hoc Scheffé tests indicated that Fatigue, Vigor, and global mood state differed significantly between Time 1 and Time 2 and between Time 1 and Time 3. The difference was not significant for the scores between Time 2 and Time 3. This result indicates that over the swim season the swimmers exhibited an increase in feelings of fatigue and a decrease in feelings of vigor while displaying an increase in global mood disturbances.

To determine if hardy swimmers experienced fewer mood disturbances, the subjects who scored over 120 on the CHI were included in the high-hardiness group and subjects who scored below 100 were included in the low-hardiness group. These scores (120 and 100) represented levels approximately one standard deviation (11.6) above and below the mean of the entire sample (112.1). This provided 36 subjects in the low-hardiness group and 78 subjects in the high-hardiness group.

To compare the changes in global mood state and the various subscales across the training season, a series of \( 2 \times 3 \) (Group \( \times \) Time) repeated measures MANOVAs were applied to the data (see Table 2). The results of these analyses indicated that there was a significant difference in global mood state between the high-hardiness and low-hardiness groups. The high-hardiness group had significantly lower global mood scores than the low-hardiness group, \( F(1, 112) = 140.69, p < .0001 \).

Because the two hardiness groups had different starting points, a \( 2 \times 2 \) (Group \( \times \) Time) analysis of covariance (ANCOVA) was employed to account for the possible confounding effect due to the initial differences. Mood state at Time 1 was used as the covariate, and the results revealed a main effect for the hardiness groups of the subscales of Fatigue and Anger. The \( 2 \times 2 \) (Group \( \times \) Time) ANCOVA using global mood at Time 3 found a significant main effect for hardiness groups, \( F(1, 110) = 17.54, p < .0001 \), specifically for the subscales of Depression, Anger, Fatigue, and Confusion. This confirmed the difference between the high-hardiness and low-hardiness groups that existed at the outset of the season.
Table 2  Global Mood State Scores of High- and Low-Hardiness Groups Across Time

<table>
<thead>
<tr>
<th></th>
<th>Low hardiness</th>
<th>High hardiness</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>SE</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Time 1</td>
<td>67.3</td>
<td>34.4</td>
<td>5.7</td>
<td>13.3</td>
<td>18.1</td>
</tr>
<tr>
<td>Time 2</td>
<td>67.0</td>
<td>32.3</td>
<td>5.4</td>
<td>17.4</td>
<td>20.8</td>
</tr>
<tr>
<td>Time 3</td>
<td>74.5</td>
<td>27.4</td>
<td>4.5</td>
<td>17.9</td>
<td>20.6</td>
</tr>
</tbody>
</table>

Table 3  Correlations of the Cognitive Hardiness Inventory and the Subscales of the Everly Coping Scale (ECS)

<table>
<thead>
<tr>
<th>ECS subscales</th>
<th>Time 1</th>
<th>Time 2</th>
<th>Time 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adaptive</td>
<td>.32</td>
<td>.43</td>
<td>.52</td>
</tr>
<tr>
<td>Maladaptive</td>
<td>.23</td>
<td>.42</td>
<td>.46</td>
</tr>
<tr>
<td>Overall</td>
<td>.24</td>
<td>.41</td>
<td>.46</td>
</tr>
</tbody>
</table>

Note. All correlations significant at p < .05

Hardiness and Coping Behaviors

A repeated measures MANOVA indicated that coping behavior did not change over time. A correlational analysis revealed that a significant relationship existed between hardiness and each subscale of the ECS at each data collection (see Table 3). Specifically, as the level of hardiness increased, adaptive coping behaviors and overall health-enhancing coping behaviors also increased, and maladaptive coping behaviors decreased.

Coping behaviors and hardiness groups were analyzed by way of a series of 2 x 3 (Group x Time) repeated measures MANOVAs, and the results indicated a significant difference between the high- and low-hardiness groups. Coping behaviors did not change significantly over the 3 data collections. The Group x Time interaction indicated that the two hardiness groups' differences did not change over the training season. There was a main effect for the subscales of the ECS; specifically, the high-hardiness group possessed more adaptive coping behaviors and fewer maladaptive coping behaviors than did the low-hardiness group. There was also a significantly higher overall health-enhancing score for the high hardiness group.

Discussion

In the present study, the swimmers were exposed to psychological and physiological stressors of the overtraining process. A correlational analysis found
hardiness to be positively related to age. As a swimmer’s age increased, hardiness increased. This was expected in this particular sample. As these athletes progress through the various levels of swimming, from recreational to the most competitive level, the athletes who either develop an effective method to cope or appraise these events as less stressful, are likely to be the swimmers who will continue to participate. A simple explanation might be that the swimmers who continue are more talented; however, differences in abilities in NCAA Division I and Division III are severe. Further analyses conducted on the demographic variables did not indicate any results of significance.

Mood disturbances were related to age. The older swimmers possessed fewer mood disturbances than did the younger swimmers. Most of the research conducted on mood and overtraining has concentrated on a collegiate population with few age differences (Morgan, Brown, Raglin, O’Connor, & Ellickson, 1987; Morgan et al., 1988; O’Connor et al., 1989; Raglin et al., 1990). This age-related response is typical of the POMS. McNair et al. (1981) found older respondents to have somewhat lower scores on the Anger and Confusion subscales. An ANOVA performed to determine if differences in mood existed between males and females revealed that gender was not a factor. This is consistent with the work of Morgan, Brown, Raglin, O’Connor, and Ellickson (1987), who concluded that “overtraining and tapering had the same effect on the mood states of female and male swimmers” (p. 10).

ANOVA conducted on the school and competitive level factor also revealed significant differences. The college and above group possessed fewer mood disturbances than did the high school and below group. The analysis also found the age group swimmers to be significantly different from the Division I and Division III swimmers. The Division I and Division III swimmers possessed fewer mood disturbances than did the age group swimmers. The college and above swimmers who have continued competitive swimming seemed to have successfully adjusted to the physiological and psychological demands and, as a result, have few negative repercussions as illustrated by fewer mood disturbances.

Previous research has reported that active individuals and athletes tend to score above the population average on vigor and below the population average on negative mood subscales (Morgan, 1985; Morgan, Brown, Raglin, O’Connor, & Ellickson, 1987). This profile has been termed the iceberg profile (Morgan, 1985). To view the present investigation’s entire sample (N = 253), the profile generated could be described as an illustration of the iceberg profile (see Figure 2); however, when the groups are separated into high-hardiness and low-hardiness groups, the profile is much more severe. It is possible that Morgan’s model has been extended and that there could be other possible mitigating factors like hardiness.

The analyses of coping behaviors and the demographic variables of age, sex, school, and competitive level did not reveal any significant differences or relationships. The high school and below swimmers and the college and above swimmers had similar coping behaviors, which is consistent with the nonsignificant relationship found between age and coping behaviors. The different competitive levels were also found to have similar coping behaviors.

The swimmers in the present study were found to exhibit a significant increase in mood disturbances over the training season; specifically, a decrease in vigor and an increase in fatigue. These results are consistent with Morgan,
Brown, Raglin, O’Connor, and Ellickson (1987) and Raglin et al. (1991), who completed several studies on collegiate swimmers in which they found that swimmers displayed an increase in global mood disturbances as the volume of training was increased. This significant change was found to be due to an increase in fatigue and decrease in vigor. The increase in training volume associated with the overtraining process results in various physiological and psychological responses. Morgan et al. (1988) and O’Connor et al. (1989) concluded that the significant increase in global mood disturbances experienced by their swimmers was associated with an increased training volume. Even though, for example, the increase in fatigue was statistically significant, it is important to mention that the observed mood disturbance was not of clinical significance. The increase resulted in a mean T score of 55, well within the normal range for college students.

**Hardiness and Mood Disturbances**

Accordingly, hardiness was analyzed to determine if a relationship existed with mood disturbances. The results of the correlational analysis indicated that there was a negative relationship between hardiness and mood disturbances; that is, as hardiness increased, mood disturbances decreased. Although hardiness and mood disturbances have not been specifically addressed in the literature, this...
relationship follows the theoretical concept of hardiness, which suggests that individuals high in hardiness are less apt to suffer detrimental effects of stress (Kobasa et al., 1982). Hardiness has been studied, along with various personality traits and emotional states such as general sense of well-being (Morrissey & Hannah, 1987), independence (Howard, Cunningham, & Rechnitzer, 1986), and extraversion and neuroticism (Parkes & Rendall, 1983). The majority of the literature has indicated a negative relationship between hardiness and various detrimental or disruptive personality traits.

It was hypothesized in the present study that swimmers classified as hardy (as determined by the CHI) would experience fewer mood disturbances while overtraining than would nonhardy swimmers. Upon analysis of the low-hardiness and high-hardiness groups, a significant difference was found in mood state at the three data collections. Specifically, the hardy swimmers possessed fewer mood disturbances at each time than did the nonhardy swimmers. The hardy swimmers were found to be consistently less tense, depressed, angry, fatigued, confused, and more vigorous than the nonhardy swimmers were.

The results have confirmed the hypothesis that hardy swimmers experience fewer mood disturbances while overtraining than do nonhardy swimmers. Not only were the hardy swimmers less disturbed at the beginning of the season, but over the entire season of training they experienced fewer feelings of tension, depression, anger, fatigue, confusion, and more feelings of vigor. Hardiness in athletes has not been addressed by any other investigations, making it difficult to refute or rebut any other findings. The crucial importance of this study is that it is the first study of its kind to strongly demonstrate a specific personality construct that can distinguish those individuals who may be prone to mood disturbances while overtraining.

The hardy and nonhardy swimmers exhibited a significant difference in mood at the initial data collection, with the hardy swimmers having significantly lower feelings of tension, depression, anger, fatigue, confusion, and higher feelings of vigor. Over the training season the hardy swimmers possessed significantly lower feelings of depression, anger, fatigue, and confusion than the nonhardy swimmers.

**Hardiness and Coping Behaviors**

The hardiness literature suggests that hardy individuals are more apt to use coping resources when faced with stressful situations (Kobasa & Puccetti, 1983). A correlational analysis found a significant relationship between hardiness and coping behaviors. Specifically, as hardiness increased, adaptive coping behaviors and overall health-enhancing coping behaviors increased, and maladaptive coping behaviors decreased. In addition, the high-hardiness group had significantly different coping behaviors than did the low-hardiness group. The hardy swimmers possessed more adaptive coping behaviors and overall health-enhancing coping behaviors and fewer maladaptive coping behaviors than did the nonhardy swimmers. The analysis also revealed that coping behaviors of both the hardy and nonhardy swimmers did not change over the swim season.

These results are consistent with the hardiness research, which had found effective coping behaviors to be related to hardiness (Nowack, 1989; Parkes &
Rendall, 1988). As Kobasa suggests, the psychological resiliency of hardy individuals is due not only to the components of commitment, challenge and control but also to the effective coping style that is associated with the dynamic combination of these traits (Kobasa et al., 1982).

In conclusion, the present findings support the idea that hardy swimmers experience fewer mood disturbances while overtraining than do nonhardy swimmers. This research indicates a need for future research to determine if performance is related to mood disturbances and at what level mood disturbances affect performance.

References


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