Prevalence of Depressive Symptoms and Correlating Variables Among German Elite Athletes

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Depression among elite athletes is a topic of increasing interest, but empirical data are rare. The present study aimed to provide insight into the prevalence of depressive symptoms among German elite athletes and possible associated factors. In an online survey of 162 athletes, we explored depressive symptoms, chronic stress, coping strategies and stress-recovery states. Results indicated an overall prevalence of 15% for depression among elite athletes (n = 99), and revealed higher levels of depressive symptoms among the individual athletes than the team athletes. Furthermore, correlation analyses showed a significant connection between high levels of depressive symptoms and high levels of chronic stress, negative coping strategies and negative stress-recovery states. Results indicate that the prevalence for depressive symptoms in elite athletes is comparable to that in the general German population. Moreover, exploratory analyses provide first indications of factors associated with depressive symptoms.

Keywords: depression, athlete, stress, coping, sport

Since several cases of prominent elite athletes affected by depression and burnout have become publicly known, psychological well-being and mental disorders have become topics of increasing public and scientific interest. However, few empirical data are available on this specific topic with elite athletes. There are no prevalence rates on depression among elite athletes known.

Over the last decade, data on depression in sports were provided by only a few studies about American collegiate athletes. In general, the overall prevalence
of depression in American colleges is high. For example, Armstrong and Oomen-
Early (2009) found an overall prevalence rate of 34% for depression in U.S. college
students (athletes and nonathletes). Taking a closer look at athlete students, Yang
et al. (2007) found a prevalence rate of 21% for depressive symptoms in a sample
of 257 college athletes. Proctor and Boan-Lenzo (2010) reported a prevalence rate
of 15% (30% for nonathletes) in their all male sample showing higher prevalence
rates in nonathletes than in athletes. Armstrong and Oomen-Early (2009) found
similar differences in depressive symptoms with higher rates in nonathletes. How-
ever, Storch, Storch, Killiany, and Roberti (2005) did not find such a difference,
reporting comparable prevalence rates between athletes and nonathletes in their
study of college students. Taking a closer look at this specific sample, Storch et
al. (2005) found female athletes to have higher depression scores compared with
male athletes and male and female nonathletes. These findings show that they are
contradictory regarding the question of whether athletes are less prone to depres-
sion than nonathletes.

In Germany, however, little empirical data exist on this issue. Thiel, Mayer,
and Digel (2010) reported 2–4% of handball players and track and field athletes
have depressive, melancholic, or unhappy feelings. As the authors only examined
athletes from handball and table tennis, the results cannot be seen as a representa-
tive athletic sample. In addition, depressive feelings were not assessed through a
clinically relevant and validated measure, and therefore provide only little insight
into depression in German athletes. Machnik, Sigmund, Koch, and Schänzer (2009)
analyzed doping control samples to determine the prevalence of antidepressants in
athletes. In their study, the authors found a prevalence rate of 0.6% in athletes on
the basis of positive test results. However, the authors were able to demonstrate an
increase in the number of athletes taking antidepressants since 2006, rather than a
true prevalence of athletes with depressive symptoms or episodes of major depres-
sion. This study shows that there is not only a shortcoming on prevalence rates for
depression but also a lack of empirical evidence on the intake of antidepressants
among elite athletes.

In the general German population, Jacobi et al. (2004) reported a 4-week
prevalence rate of 6% for any form of unipolar depression. The 12-month preva-
ience rate was reported to be 11% and the lifetime prevalence risk 17%, with
higher prevalence rates for women (23%) than for men (11%). These representa-
tive epidemiological results can be considered as a reference point for studying
German athletes. Therefore, the current study was conducted to provide insights
into depressive symptoms among elite athletes.

**Sport and Depression**

Several findings attest to an antidepressant function of sports (e.g., Blumenthal
et al., 2007). Being active and engaging in sports may possibly result in a lower
level of depressive symptoms and may serve to protect against the development of
depression (cf. Ströhle et al., 2007). The applicability of these assertions to elite
athletes may be questionable, however, because of the extreme load of physical
training and psychological stress in high-achievement sports. Hoyer and Kleinert
(2010) identified various risks for elite athletes, such as getting injured, which are
often accepted to achieve important goals in sports. At the same time, injuries can
serve as a psychological stressor for athletes. Besides the physical consequences of injuries and the resulting discontinuity in practice and participation in competitions, depression is a common reaction to serious injuries (Brewer, 2001). Several other components can be added to the list of risks factors for elite athletes. For instance, Puffer and McShane (1992) note that the great physical stress and tremendous pressure to perform at the best possible level may also place athletes at risk for developing depressive symptoms.

Stress in Competitive Sports

In the psychological literature, stress is most commonly addressed in three ways: (a) as a harmful environmental stimulus, (b) as a stress reaction of the organism, and (c) as a transactional event. Stress can be characterized as being either acute or chronic. Whether one takes into consideration the important tournaments and potential sporting injuries (acute stress) or the frequency of tournaments and training sessions (chronic stress), the life of an athlete can be regarded as “stressful.” Stoll (1995) viewed stress in an athlete’s life as having an emotional and motivational impact that can negatively affect the efficiency of training and the outcome of a tournament or match. Stoll also claimed that, besides the potential negative impact on an athlete’s physical achievements, stress can also affect an athlete’s self-esteem and social relationships. A growing number of researchers (Cohn, 1990; Gould, Jackson, & Finch, 1993; Puente-Díaz & Anshel, 2005; Scanlan, Stein, & Ravizza, 1991) have indicated that, in addition to the stress related to competitions, the amount of daily stress in an athlete’s life can cause an essential burden. Concerns about personal achievement potential; a lost match accompanied by fear of failure and dissatisfaction; conflicts with trainers, partners, and family; and the time and effort that goes into training can all be identified as primary sources of stress.

Furthermore, studies have shown differences in the quality of stressors between team sports and individual sports (Nicholls, Holt, & Polman, 2005; Nicholls, Holt, Polman, & Bloomfield, 2006; Park, 2000). Nicholls, Polman, Levy, Taylor, and Cobley (2007) indicated that athletes in team sports report more stressors related to playing on a team (e.g., selection, mistakes by teammates, and letting teammates down), whereas individual athletes report significantly more stressors related to training and to the coach.

Many theoretical models postulate a multifactorial cause for depression (e.g., diathesis-stress models, Abramson, Metalsky, & Alloy, 1989; Beck, 1987; Monroe & Simons, 1991). Studies further show a significant correlation between acute and chronic stressors and depressive symptoms (Hammen, Kim, Eberhart, & Brennan, 2009; Monroe & Reid, 2009). As previously noted, both acute and chronic stressors are present in the life of professional athletes, therefore suggesting that elite athletes may be at high risk for developing depression.

Coping and Depression

Coping is considered to be a personal skill or a group of strategies used to handle stress and deal with negative events (Schmidt & Caspar, 2009). Kohlmann and Eschenbeck (2009) described some of the aspects of coping: (a) reducing the impact of harmful surrounding conditions; (b) improving the chances of recovery;
(c) adapting to negative events or circumstances; (d) maintaining a positive self-perception; (e) supporting the safekeeping of emotional balance; and (f) enabling satisfying social contacts. Wingenfeld and colleagues (2009) pointed to a significant difference in the use of coping strategies among healthy and depressive individuals. The authors revealed a positive correlation between depressive symptoms and emotion-based coping strategies, and a negative correlation between depressive symptoms and problem-based coping strategies.

It has been postulated that coping strategies, in addition to excellent motor and sporting skills, are vitally important to a successful athletic career. As a result, we assume that elite athletes who use mainly ineffective and emotion-based coping strategies may demonstrate greater depressive symptoms.

Exhaustion, Recovery, and Depression

To win competitions, achieve goals, and improve performances, athletes have to push themselves more and more toward their limits. An increase in exercise loads connected with physical and psychological stress tends to be common in professional athletes’ exercise plans. Yet with increasing exercise loads, recovery becomes more important for athletes’ well-being, an aspect that is not always recognized.

Recovery can be described as an inter- and intraindividual process that occurs over time for the reestablishment of performance abilities (Kellmann, 2002). This process, which includes psychological, physiological, and social factors, varies from person to person and situation to situation, and underlies intentional regulations. Beckmann (2002) described recovery as a process of self-regulation in which detachment from a past activity followed by engagement in a new activity should be achieved. The author argues that it is important to fully deactivate the stressful activity because of the complex relationship between recovery and stress. If detachment from a stressful activity fails, recovery can be impaired, and an imbalance arises. According to this theory in the end, the system may collapse and may result in illness, burnout, or overtraining. Such a state is described as overtraining syndrome, or staleness, in which athletes do not recover from previous exhaustion despite a recovery period of at least 2 weeks (cf. Budgett, 1998). Athletes who do not recover from exhaustion may experience symptoms such as frequent minor infections, sore muscles, change in sleep quality, loss of energy, loss of competitive drive, loss of libido, loss of appetite and weight, mood disturbance, anxiety, and irritability (e.g., Budgett, 1990, 2000; Budgett et al., 2000). Overtraining is a well-known syndrome among athletes, and it is evident that the results of intense exercise and the lack of adequate recovery can lead to physical symptoms (such as reduced energy and performances), as well as to psychological symptoms. O’Connor, Morgan, Raglin, Barksdale, and Kalin (1989) showed a connection between intense exercise loads in the corresponding training period and changes in tension, depression, anger, vigor, fatigue, and mood. The connection to depressive symptoms may thus seem obvious when one takes a closer look at the symptoms of major depressive disorder (American Psychiatric Association, 2000) and of overtraining syndrome.

Armstrong and VanHeest (2002) outline the overlapping symptoms of the two syndromes, such as depressed mood, change in appetite, change in weight, diminished ability to concentrate, psychomotor agitation, loss of energy, sleep disturbances, and change in sleep quality. Puffer and McShane (1992) also pointed to...
these overlapping connections and noted that although depression may occur in the absence of physiological fatigue, the most common syndrome seen in competitive athletes is depression along with physiological exhaustion. Furthermore, similar brain structures and endocrine neurotransmitters have been found to be involved in both syndromes, and Armstrong and VanHeest (2002) even propose similar etiologies. These findings suggest the possibility that for some individuals, there may be a connection between depressive symptoms and an imbalance of exhaustion and recovery.

The Present Study

The present study aimed to assess the prevalence of depressive symptoms among German elite athletes. Based on the limited research on the subject, we avoided a directional hypothesis and instead took an explorative approach.

Bearing in mind the possible risk factors for depression discussed earlier, we surveyed several factors such as chronic stress, coping strategies, exhaustion, and recovery. Our hypotheses were as follows: (a) a high level of chronic stress is accompanied by pronounced depressive symptoms; (b) the use of ineffective coping strategies (e.g., escaping a situation, resignation, self-pity) is accompanied by pronounced depressive symptoms; (c) the use of effective coping strategies (e.g., situation control, reaction control, addressing oneself in encouraging tones) is not accompanied by pronounced depressive symptoms; and (d) an imbalance of exhaustion and recovery is accompanied by pronounced depressive symptoms.

Method

Participants

A total of 162 German athletes who met the criteria for participation were surveyed. To assess differences in the dependent variables due to the level of expertise of an athlete we did include elite athletes (n = 99), junior professional athletes (younger than 17 years of age; n = 35), and amateur athletes (n = 28). Table 1 provides an overview of the age and gender of the three groups.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Professionals n = 99</th>
<th>Junior Professionals n = 35</th>
<th>Amateurs n = 28</th>
<th>Total N = 162</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender, n (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>44 (44.44%)</td>
<td>12 (34.29%)</td>
<td>2 (7.14%)</td>
<td>58 (35.80%)</td>
</tr>
<tr>
<td>Male</td>
<td>55 (55.56%)</td>
<td>23 (65.71%)</td>
<td>26 (92.86%)</td>
<td>104 (64.20%)</td>
</tr>
<tr>
<td>Age, M (SD)</td>
<td>23.05 (4.47)</td>
<td>17.71 (1.82)</td>
<td>31.82 (10.09)</td>
<td>23.41 (7.03)</td>
</tr>
<tr>
<td>Age range</td>
<td>16–37</td>
<td>15–22</td>
<td>20–53</td>
<td>15–53</td>
</tr>
</tbody>
</table>
The participating athletes came from 18 different sport disciplines, as shown in Table 2. The canoeists compete in single contests, as well as in group competitions, and therefore are listed separately. At the time of assessment, 117 athletes were in training, 10 athletes were injured, and 7 athletes were not active for other reasons. A total of 50 athletes had had experience with sport psychological counseling for performance enhancement during their careers, and 19 athletes were in sport psychological counseling for performance enhancement at the time of assessment.

No reward for participation was given other than an offer to inform the athletes about their personal results in the psychological tests used. This offer was accepted by 18 participants.

### Measures

The demographic element of the survey assessed the athletes’ gender, age, health status, sport discipline, current or past performance enhancement counseling, desire for performance enhancement counseling, level of performance, hours of exercise per week, and number of competitions per season.

**Center for Epidemiologic Studies Depression Scale.** The incidence of depressive symptoms in athletes was assessed with the widely used German version of the Center for Epidemiologic Studies Depression Scale (CES-D) from the National Institute of Mental Health (Hautzinger, Bailer, Hofmeister, & Keller, 2011; Radloff, 1977). The CES-D is a short self-report scale designed to measure depressive symptoms in the general population. The 20 items include symptoms associated with depression and are assessed on a scale ranging from 0–3. The cutoff for assuming a major depressive episode is a score of > 22. The scale has been found to have very high internal consistency (α = .89) and an adequate test-retest reliability of .58 (Hautzinger et al., 2011).

### Table 2  Sport Disciplines Differentiated by Individual and Team Sports

<table>
<thead>
<tr>
<th>Individual Sport</th>
<th>Partial Sample Size, n</th>
<th>Team Sport</th>
<th>Partial Sample Size, n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Badminton</td>
<td>3</td>
<td>Beach volleyball</td>
<td>3</td>
</tr>
<tr>
<td>Ice running</td>
<td>5</td>
<td>Ice hockey</td>
<td>1</td>
</tr>
<tr>
<td>Golf</td>
<td>4</td>
<td>Soccer</td>
<td>20 (2)</td>
</tr>
<tr>
<td>Athletics</td>
<td>2</td>
<td>Handball</td>
<td>15</td>
</tr>
<tr>
<td>Modern pentathlon</td>
<td>1</td>
<td>Hockey</td>
<td>2</td>
</tr>
<tr>
<td>Cycling</td>
<td>38 (26)</td>
<td>Rugby</td>
<td>12</td>
</tr>
<tr>
<td>Wrestling</td>
<td>1</td>
<td>Volleyball</td>
<td>3</td>
</tr>
<tr>
<td>Swimming</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Snowboarding</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Triathlon</td>
<td>2</td>
<td>Canoeing*</td>
<td>19</td>
</tr>
</tbody>
</table>

* Canoeing is rated as neither a single sport nor a team sport.

Note. Numbers in parentheses refer to number of amateur athletes.
**Trier Inventory of Chronic Stress.** The Trier Inventory of Chronic Stress (TICS) screening scale (Schulz, Schlotz, & Becker, 2004) was used to identify athletes with a high level of chronic stress. The questionnaire measures six aspects of chronic stress: work overload, worries, social stress, lack of social recognition, work discontent, and intrusive memories. The answers are provided on a 5-point rating scale ranging from 0–4. Higher scores indicate a strong exposure to chronic stress. The scale was found to have a very high internal consistency ($\alpha = .91$; Schulz et al., 2004).

**Stress Coping Inventory.** Athletes’ coping responses to life stressors were measured by using the Stress Coping Inventory (SVF) (Erdmann & Janke, 2008). The SVF also was selected because of its focus on dispositional coping, rather than on situational coping, meaning that it indicates a temporally consistent coping style in the subject being tested. The questionnaire provides a comprehensive inventory of methods, allowing a choice of individual procedures depending on the research question. In the case of elite athletes, Erdmann and Janke (2008) frame three positive coping strategies (situation control, reaction control, and addressing oneself in encouraging tones) and three negative strategies (escaping the situation, resignation, and self-pity). The six coping strategies are assessed with 36 items, and answers are provided on a 5-point rating scale ranging from 0–4. Higher scores on the respective coping strategies indicate a frequent and favored use.

**The Recovery-Stress Questionnaire for Athletes.** We used the German version of the 52-item Recovery-Stress Questionnaire for Athletes (RESTQ-Sport) (Kellmann & Kallus, 2000, 2001) to measure the frequency of current stress along with the frequency of recovery-associated activities. The questionnaire assesses potentially stressful and restful events and their subjective consequences during the past 3 days and nights. The answers are given on a 7-point scale from 0–6. Individual recovery-stress states are calculated.

**Procedure**

After receiving an informed consent, participants answered the online questionnaire containing these measures in predetermined order, and therefore could not skip questions or go back to previous pages or questions. However, participants could quit the survey at any time. Before beginning the questionnaire, participants were provided with information about the study, including the estimated duration of the survey. The participants first answered questions related to demographic information, followed by completion of the RESTQ-Sport, CES-D, TICS, and SVF scales. At the end of the survey, contact details of the authors were provided. The duration of the survey was about 30 min (mean = 32.00 min, $SD = 99.96$ min).

**Criteria for Participation**

Of the 230 individuals who participated in the online questionnaire, 68 were excluded because they did not meet the inclusion criteria. Data were excluded for participants who did not finish the entire questionnaire ($n = 60$), who failed the honesty criteria (nonplausible answers, response set, etc.; $n = 6$), or who made indecisive statements in open questions ($n = 2$).
The 162 remaining participants were divided into three subpopulations: professionals, junior professionals, and amateurs, on the basis of level of performance, age, hours of exercise per week, and number of competitions per season, with level of performance being the main criterion. Athletes in the national squad were automatically designated as professionals. Athletes in the first national league in handball, cycling, and volleyball and in the first and second national league in soccer were also designated as professionals. Athletes in junior national squads and those who were younger than 23 years and who had not fully met the criteria for professionals were designated as junior professionals. The remaining athletes were designated as amateurs. Because the amateurs do not represent the main target population, they were included in the analysis comparing the prevalence rates of the subpopulations, but were excluded from further analyses.

Results

Prevalence

The overall prevalence rate for major depression among the participants, based on the CES-D cutoff score (> 22), was 19%. The groups varied in their prevalence rates: 15% for professionals, 20% for junior professionals, and 29% for amateurs. A comparison of the means showed no significant difference between the three subpopulations, \( \chi^2(2) = 2.68, p = .262 \). The amateurs were excluded from the following analyses.

Group Differences

To gain further information about depressive symptoms, we analyzed differences in gender, age, injury status, relationships, sports, current psychological counseling, and the desire for (more) psychological counseling. The results listed in Table 3 show no significance for gender, injury status, and relationships. Athletes competing in individual sports, however, showed more depressive symptoms than did athletes in team sports, \( t(113) = -2.06, p = .042 \). Furthermore, athletes who desired (more) psychological counseling had more depressive symptoms than did athletes who had less desire for (more) psychological counseling, \( t(132) = 2.15, p = .033 \). Athletes with current psychological counseling showed no fewer depressive symptoms, \( t(132) = -1.72, p = .088 \). There was no correlation between age and depressive symptoms, \( r = -.06; p = .460 \).

Correlations

To test hypotheses about the correlations, we calculated a Pearson product-moment correlation coefficient, which shows a strong correlation between depressive symptoms and chronic stress, \( r = .70, p < .001 \). As hypothesized, high levels of chronic stress correlate with high levels of depressive symptoms.

Furthermore, we tested correlations between the strategies: situation control, resignation, self-pity, reaction control, positive self-instruction, and escape with depressive symptoms. The results listed in Table 4 show positive correlations between negative coping strategies and depression, and negative correlations between the positive strategies of positive self-instruction and situation control and depression.
As shown in Table 4, the hypotheses about the assumed correlation between exhaustion, recovery, and depression are supported by the data. The factors general stress and sport-specific stress show positive significant correlations with depressive symptoms, whereas the factors general recovery and sport-specific recovery both show significant negative correlations with depressive symptoms. Sport-specific stress and general stress are connected with high levels of depression, whereas sport-specific recovery and general recovery are connected with lower levels of depression. This is reflected in strong correlations between the sport-related state and the depressive scores and the general state and the depressive scores.

Table 3 Differences in Depressive Symptomatology of Elite Athletes for Gender, Injury Status, Relationship, Sport, Performance Enhancement Counseling, and Desire for Performance Enhancement Counseling

<table>
<thead>
<tr>
<th>Factor</th>
<th>Category</th>
<th>Sample Size, n</th>
<th>CES-D Mean</th>
<th>t Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Female</td>
<td>56</td>
<td>13.43</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>78</td>
<td>12.58</td>
<td>(t(132) = 0.53, p = .595)</td>
</tr>
<tr>
<td>Injury status</td>
<td>Active</td>
<td>117</td>
<td>12.38</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Injured</td>
<td>10</td>
<td>16.30</td>
<td>(t(125) = -1.35, p = .180)</td>
</tr>
<tr>
<td>Relationship</td>
<td>With partner</td>
<td>67</td>
<td>12.90</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Without partner</td>
<td>67</td>
<td>12.97</td>
<td>(t(132) = -0.05, p = .962)</td>
</tr>
<tr>
<td>Sport</td>
<td>Team</td>
<td>56</td>
<td>11.18</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Individual</td>
<td>59</td>
<td>14.69</td>
<td>(t(113) = -2.06, p = .042)</td>
</tr>
<tr>
<td>Performance enhancement</td>
<td>Counselled</td>
<td>19</td>
<td>9.63</td>
<td></td>
</tr>
<tr>
<td>counseling</td>
<td>Not counselled</td>
<td>115</td>
<td>13.48</td>
<td>(t(132) = -1.72, p = .088)</td>
</tr>
<tr>
<td>Desire for performance</td>
<td>High</td>
<td>94</td>
<td>14.02</td>
<td></td>
</tr>
<tr>
<td>enhancement counseling</td>
<td>Low</td>
<td>40</td>
<td>10.38</td>
<td>(t(132) = 2.15, p = .033)</td>
</tr>
</tbody>
</table>

Note: Differences were measured with a two-sided \(t\) test for independent samples. CES-D = Center for Epidemiological Studies Depression Scale.

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As shown in Table 4, the hypotheses about the assumed correlation between exhaustion, recovery, and depression are supported by the data. The factors general stress and sport-specific stress show positive significant correlations with depressive symptoms, whereas the factors general recovery and sport-specific recovery both show significant negative correlations with depressive symptoms. Sport-specific stress and general stress are connected with high levels of depression, whereas sport-specific recovery and general recovery are connected with lower levels of depression. This is reflected in strong correlations between the sport-related state and the depressive scores and the general state and the depressive scores.

**Discussion**

In the current study, we conducted an online survey to investigate depression and its correlating variables among German elite athletes. In a sample of 162 athletes, we found a prevalence rate for depressive symptoms of 15% among professional athletes and 20% among junior-professional athletes. We further ascertained that significant correlations exist between depressive symptoms and chronic stress, coping strategies, level of exhaustion, and recovery.

The prevalence rate of depressive symptoms among these athletes is quite pronounced and provides some initial insight into the severity of the issue. Considering that the general German population has prevalence rates of between 6–17% (cf. Jacobi et al., 2004), we can no longer assume that elite athletes are less affected by depressive symptoms.
Although the general population shows higher prevalence rates of depressive symptoms in women (Jacobi et al., 2004), this was not the case in our sample of elite athletes, as we found no differences between female and male athletes. Another interesting result was the higher prevalence rate seen in individual athletes in contrast to team athletes. Yet, Barmi (2011) did not find such a difference reporting equivalent depressive symptoms between individual athletes and team athletes. Because the participants in Barmi’s study were students from Iran, which indicates a different cultural background, comparisons to German elite athletes may be worthy of caution. As the current study did not assess mechanisms for the found difference between individual and team athletes, one might only assume reasons for the present findings. As stated earlier, studies have been conducted showing differences between individual athletes and team athletes related to the quality of stressors (e.g., Nicholls et al., 2007). These different stressors may influence the development of depressive symptoms. Another possible explanation may be rooted in the handling of emotional events. Any sort of feedback, such as a lost match or pressure of performance, may be more internalized by individual athletes, possibly leading to depressive symptoms. Further studies verifying such differences

Table 4  Correlations of Chronic Stress (TICS), Positive and Negative Coping Strategies (SVF) and Exhaustion and Recovery (RESTQ-Sport) with Depressive Symptomatology (CES-D)

<table>
<thead>
<tr>
<th>Test</th>
<th>Factor</th>
<th>Correlation $r$ With CES-D</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>TICS</td>
<td>Screening</td>
<td>.70</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>SVF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive strategies</td>
<td>Situation control</td>
<td>-.19</td>
<td>.030</td>
</tr>
<tr>
<td></td>
<td>Reaction control</td>
<td>-.06</td>
<td>.460</td>
</tr>
<tr>
<td></td>
<td>Positive self-instruction</td>
<td>-.32</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Negative strategies</td>
<td>Escape</td>
<td>.47</td>
<td>&lt; .001</td>
</tr>
<tr>
<td></td>
<td>Resignation</td>
<td>.66</td>
<td>&lt; .001</td>
</tr>
<tr>
<td></td>
<td>Self-pity</td>
<td>.51</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>RESTQ-Sport</td>
<td>General state</td>
<td>-.83</td>
<td>&lt; .001</td>
</tr>
<tr>
<td></td>
<td>General stress</td>
<td>.77</td>
<td>&lt; .001</td>
</tr>
<tr>
<td></td>
<td>General recovery</td>
<td>-.70</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Sport-specific state</td>
<td>Sport-specific stress</td>
<td>.57</td>
<td>&lt; .001</td>
</tr>
<tr>
<td></td>
<td>Sport-specific recovery</td>
<td>-.64</td>
<td>&lt; .001</td>
</tr>
</tbody>
</table>

Note: TICS = Trier Inventory of Chronic Stress; SVF = Stress Coping Inventory; RESTQ-Sport = Recovery-Stress Questionnaire for Athletes; CES-D = Center for Epidemiological Studies Depression Scale. Correlations between TICS; RESTQ-Sport; and the SVF factors situation control, resignation, and self-pity were calculated with Pearson’s product-moment correlation. The SVF factors reaction control, positive self-instruction, and escape were calculated with Spearman’s rank correlation.
and investigating the underlying mechanisms in professional athletes are needed to illuminate these results.

Our first hypothesis concerning the possible correlative variables for depressive symptoms was that chronic stress would correlate with depressive symptoms in elite athletes. This hypothesis is supported by the data, as our results show a strong correlation between chronic stress and depressive symptoms. In our sample, athletes with high levels of chronic stress experienced more depressive symptoms than did athletes with lower levels of chronic stress. This finding replicates multiple previous results and underlines the important connection of stress and depression (e.g., Hammen et al., 2009). Furthermore, athletes are consistently exposed to acute and chronic stressors, and the present findings suggest the importance of managing the amount and quality of stress to which an individual athlete is exposed.

With these high levels of stress, coping strategies become increasingly important. Lending support to our hypothesis, the results show correlations between coping strategies and depressive symptoms. The frequent use of negative coping strategies (escape, resignation, and self-pity) correlated with high levels of depressive symptoms, in agreement with previous findings (Crocker & Graham, 1995). Furthermore, in the current study, even some positive strategies (situation control and addressing oneself in encouraging tones) showed correlations with low levels of depression. Thus, the importance of adequate coping strategies is highlighted in the current study. Athletes, especially those who are exposed to high levels of stress, should increase their use of positive coping strategies and decrease their use of negative coping strategies. Because adequate strategies can be learned, we assume that a special training in coping strategies could serve as a potential prevention mechanism.

Another research question addressed in this study was the possible connection between athletes’ stress-recovery state and depressive symptoms. The strong correlations found in the current study support this assumption. Negative stress-recovery states, with high scores in stress and low scores in recovery, correlate with high levels of depressive symptoms. This pattern was found for sport-related and for general stress-recovery states. The data support previous findings of correlations between physical exhaustion and psychological mood changes (O’Connor et al., 1989), as well as the connection between overtraining syndrome and depression in athletes (Armstrong & VanHeest, 2002; Puffer & McShane, 1992). In addition, the present findings show a connection between negative stress-recovery states and depressive symptoms, as surveyed with a validated questionnaire specialized for depressive symptoms instead of for mood states in general (e.g., O’Connor et al., 1989). One important implication is the need to carefully monitor athletes’ physical and psychological states; the psychological component should be especially taken into account if signs of overtraining are recognized.

**Limitations and Future Directions**

Considering that only a small number of athletes participated in the survey, one might question the representativeness of the prevalence rate shown by the results. This issue might be addressed in future studies by including more participants in a representative distribution of sport disciplines.
There was no experimental study design to calculate group differences. Because of varying group sizes, a comparison of athletes with and without psychological counseling, as well as athletes with and without injuries, would tend to be biased. Whether psychological counseling has a significant impact on the intensity of depressive symptoms cannot be answered by the current study. A comparison of the athletes showed no significant difference. Although the comparison of depressive symptoms between professionals, junior professionals, and amateurs showed no significant difference, this result cannot be generalized. Further studies with equal group sizes are therefore required.

No causality can be assumed between depressive symptoms and chronic stress, coping strategies and exhaustion and recovery since the current study used a singular cross-sectional ascertainment. Further research is necessary to gain insight into the causal direction of these connections. In addition to the relevant factors that we examined in the current study, there may be more factors that influence and contribute to depressive symptoms among athletes. In the current study, we aimed to provide an initial insight into depression among elite athletes in the hopes that it will lead to increased knowledge and a greater ability to support athletes.

Conclusion

Taken together, our findings indicate that we can no longer deny the issue of depressive symptoms among elite athletes. However, more research on the origin and context of such psychopathological problems is needed before helpful group-specific interventions can be developed. Relevant factors such as chronic stress, coping strategies, and level of exhaustion and recovery may be practical starting points for establishing preventative programs and supportive interventions for depressed athletes.

References


