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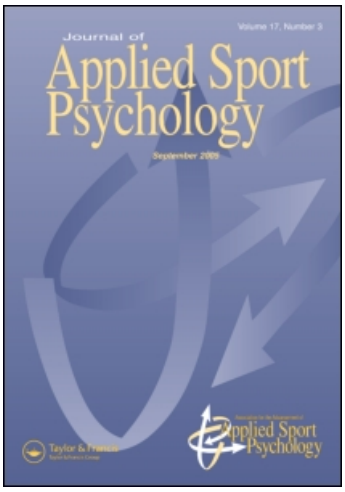

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The POMS and sports performance: A review

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The POMS and Sports Performance: A Review

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The general purpose of this paper is to critically review the literature on precompetitive mood states (using the POMS) and sport performance. Specifically, important interpretative, conceptual, and methodological issues are examined to provide direction for future research. A position is taken that the Mental Health Model (iceberg profile) may not be the most suitable framework for understanding how precompetitive mood states are related to sport performance. A promising alternative approach is Hanin's Individual Zone of Optimal Function (IZOF) model.

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The ability to produce and maintain appropriate emotional feelings before competition is universally recognized by athletes and coaches as one of the most important factors contributing to athletic performance. Thus, it is not surprising that the relationship between precompetitive emotions and sport performance has generated considerable interest from researchers in the field of sport psychology (e.g., Jones & Hardy, 1990; Kerr, 1989; Landers, 1991; Martens, Vealey, & Burton, 1990; Neiss, 1988; Silva & Hardy, 1984). One popular line of research has focused on discriminating between successful and less successful performers based on their mood states prior to competition. The conceptual (descriptive) approach primarily used in this line of research has been Morgan's (1980) Mental Health Model. It is proposed through this model that positive mental (i.e., emotional) health and successful athletic performance are highly correlated. Specifically, athletes who are less anxious, angry, depressed, confused and fatigued, and more vigorous will be more successful than those athletes who exhibit the opposite profile, as assessed by the Profile of Mood States (POMS; McNair, Lorr, & Droppleman, 1971). This positive profile of mood states has been termed the iceberg profile by Morgan since the five negative moods fall below the population norm and the one positive mood lies above it (see Figure 1).

The purpose of the present paper is to critically review the literature

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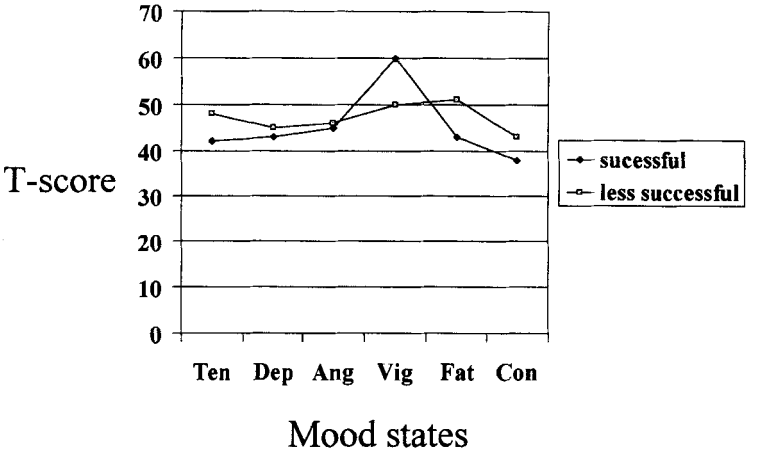

Figure 1. The Mental Health Model (iceberg profile) and the successful elite athlete. From "The prediction of performance in athletics" by W.P. Morgan. In *Coach, athlete, and the sport psychologist* by P. Klavora and J.V. Daniel (eds.), 1979. School of Physical and Health Education, Publications division, University of Toronto. Reprinted with permission.

on precompetitive mood states (using the POMS) and sport performance. Important interpretation, conceptual, and methodological issues are examined to provide direction for future research. The focus of this special edition is on POMS research, hence it was beyond the scope and depth of the present paper to cover other measures of mood (cf. Watson, Clark, 1997; Whitlock, Lubin, & Petren, 1997; Woodruffe-Peacock, Turnbull, Johnson, Elahi, & Preston, 1998). Another delimitation with the present study was to focus exclusively on sport performance of able-bodied athletes. Thus, research that has used the POMS to investigate exercisers of different ability (e.g., Frazier, 1998), disabled athletes of different levels of success (e.g., Fung & Fu, 1995), anaerobic power/muscular endurance (e.g., Lee, 1990), training adaptation (e.g., Morgan, Brown, Raglin, O'Conner, & Ellickson, 1987), and recovery from sport injury (e.g., Daly, Brewer, Van Raalte, Petitpas, & Sklar, 1995), was also not covered.

Overview of the Literature

A great deal of research has been conducted to discriminate between successful and less successful athletes from their mood states prior to competition. For instance, Gutman, Pollock, Foster, and Schmidt (1984) administered the POMS to Olympic speed skaters. Results showed that those who qualified for the team reported less tension, anger, depression, fatigue, and confusion as well as more vigor than those who failed to qualify. Similar findings were reported by Silva, Schultz, Haslam, and Murray (1981) with National junior wrestlers and Silva, Schultz, Haslam, Martin, and Murray (1985) with Olympic wrestlers.

Other studies, however, have not been able to demonstrate mood state

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differences between successful and less successful athletes. For example, Durtschi and Weiss (1986) assessed the mood states of elite and nonelite marathoners using the POMS prior to an important race. Results showed no significant differences in mood states between the two groups. Similar results were reported by Craighead, Privette, Vallianos, and Byrkit (1986) with basketball players; Daiss, LeUnes, and Nation (1986) with football players; DeMers (1983) with divers; Miller and Miller (1985) with netball players; Terry and Youngs (1996) with field hockey players; and Tharion, Strowman, and Rauch (1988) with ultramarathoners.

Support for the iceberg profile has been somewhat more consistent when actual performance has been assessed instead of comparing successful versus less successful athletes. For instance, Cockerill, Nevill, and Lyons (1991) used a regression model to show that tension, depression, and anger could collectively predict finish time among cross-country runners. Interestingly, they found tension and anger scores facilitated cross-country performance. Following a similar design, Mahoney (1989) found depression and anger to be related to weight lifting performance, and Friend and LeUnes (1990) found anger and vigour to be related to a range of baseball performance indicators.

Using win/loss as the performance criteria, Terry and Slade (1995) found that winning karate performance was in line with the iceberg profile (except for above average anger) whereas losing performance was not associated with the profile. In contrast, Hassmen and Blomstrand (1995) investigated relations between a soccer team's collective pre-game mood state scores and performance outcome (i.e., win/loss/draw) over a 22 game season. They found that less than 4% of the variance of team-level precompetitive mood could be linked to the outcome of the game played. Their data showed that a team-level iceberg profile was demonstrated irrespective of whether the game was won, lost, or tied.

A number of studies by Terry and colleagues (Hall & Terry, 1995; Terry, 1993, 1994, 1995a) have operationalized performance using post-event self-ratings by the athletes (e.g., athlete either performed or failed to perform to his/her expectations). Using this performance assessment method, Hall and Terry (1995), and Terry (1993, 1995a) were able to correctly classify between 64.7% and 100% of bobsledding, karate, and rowing performances on the basis of precompetitive mood state scores. In contrast, cricket players' performances could not be correctly classified based on their mood state scores (Terry, 1994).

The above evidence, taken together, provides some support for the iceberg profile and Mental Health Model proposed by Morgan in predicting athletic success. However, just how strong is the association between mood and athletic success? Rowley, Landers, Kyllo, and Etnier (1995) used meta-analysis techniques—a quantitative summary of research that describes the strength of the effect (cf. Glass, McGraw, & Smith, 1981)—to answer that question. Based on 33 studies they found an overall effect size of .15 that accounted for less than 1% of the variance. The findings suggest that across many different individual and team sports and mea-

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sures of performance, successful athletes demonstrate a mood profile slightly more positive than less successful athletes. These findings raise serious questions about the utility of the iceberg profile, as assessed by the POMS, in predicting athletic success.

It may, however, be premature to dismiss the iceberg profile based on the Rowley et al. (1995) data. One reason is that the five studies mentioned above by Terry and colleagues were not included in his meta-analysis. Four of these studies reported that the POMS discriminated between successful and less successful performances whereas one study found that the POMS had no discriminatory capability. It appears, then, that had these studies been included in the meta-analysis, they would have increased the overall effect size.

Another reason (to question the Rowley et al. data) is that certain moderating variables were not coded in his meta-analysis that could potentially influence mood—performance relations. For instance, Terry (1995b) has argued and shown through his own work (see Hall & Terry, 1995; Terry, 1993, 1994, 1995a) that the utility of the iceberg profile in predicting sport performance increases when (a) the sample is homogeneous in skill and conditioning, (b) the sports selected are of short duration (e.g., less than 10 minutes), and (c) successful vs. less successful performances are compared rather than successful vs. less successful athletes. The failure of their meta-analysis to examine these moderating variables may, therefore, also account for the small effect size. The above two reasons, considered in concert, provide support for the suggestion that the effect size reported in the Rowley et al. study is as much an issue of research design as the predictive effectiveness of mood.

Important Issues in Mood State Profiling

If robust and meaningful relations are to be consistently shown between precompetitive mood states and athletic performance, researchers in the area will have to first address certain interpretative, conceptual, and methodological issues. These issues are discussed below.

Interpretation (misplaced cause and effect). Studies showing that successful athletes demonstrate the iceberg mood state profile to a greater extent than less successful athlete have often been interpreted by researchers to mean that the profile produced the good performance. This interpretation is confounded, however, by the fact that the precompetitive status of the athlete could just as easily produce the mood state profile. Highly ranked athletes who are assured selection are not likely to be overly stressed during qualifying for team selection, and as a result they should demonstrate positive precompetitive mood states. In contrast, borderline athletes are more likely to perceive pressure (and negative mood states) because they are less likely to be selected. In short, athlete status could determine both mood profiles and performance rather than mood profiles determining performance and status.

Support for this proposition is provided from research reported by Hey-

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man (1982). He reanalyzed a series of articles comparing the psychological profile of successful and unsuccessful athletes and found that the successful ones had significantly better season records, more experience, and came from superior training programs. Thus, events prior to the psychological testing and performance criteria appear to have influenced the observed mood state differences. In addition, it has been shown that individual difference variables grounded in emotionality (e.g., neuroticism) influence both performance (Morgan, O'Connor, Ellickson, & Bradley, 1988) and precompetitive mood (Prapavessis & Grove, 1994a, 1994b). Hence, personality could spuriously inflate relations between mood and performance.

Based on the above evidence, it would seem paramount that stratified sampling procedures be used in future research to match athletes on precompetitive status and events preceding mood state testing. It also would seem important to statistically control for personality variables that are related to both mood and performance. In short, adopting such measures facilitates the examination of mood effects only.

Conceptual approach (considering alternative perspectives). As described earlier, Morgan's (1980) Mental Health Model (iceberg profile) has been used as a means for predicting the pattern of data likely to be found when examining mood state—performance relations. The general acceptance of the Mental Health Model is based largely on Morgan and colleagues earlier work (Morgan, 1980; Morgan & Johnson, 1978; Morgan & Pollock, 1977; Nagle et al., 1975) which according to Renger (1993) has been misunderstood by researchers. He pointed out that "some of the confusion regarding the utility of the POMS stems from a failure to adequately define what is meant by success, the dependent measure" (p. 83). For instance, when these landmark studies compared elite athletes (successful) with non-athletes (unsuccessful), then the iceberg profile reliably differentiated these groups. In contrast, when these studies compared success relative to level of ability within a given sport (e.g., those that made a National squad—successful vs. those that didn't—unsuccessful), then the iceberg profile failed to reliably differentiate these groups. According to Renger (1993), researchers have incorrectly interpreted the original findings of Morgan and his colleagues and continue to examine an issue (i.e., differentiating athletes of different ability using the POMS) that has limited empirical support.

Although Terry (1995b) has argued and shown through his own research (see Hall & Terry, 1995; Terry, 1993, 1994, 1995a) that the utility of the iceberg profile in predicting sport performance improves when certain moderating factors are taken into account, perhaps the major reason why the profile does not reliably predict performance is that it ignores individual mood state differences. Even Terry (1995b) acknowledged that individual mood state differences can be great, and it is not uncommon for athletes to perform well despite having a negative profile or perform poorly despite having a positive profile.

An alternative approach to the study of relations between precompe-

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titive mood states and performance, that takes into account individual differences, has been proposed by Hanin (1980, 1986, 1989, 1995, 1997). According to Hanin, each individual has a zone of optimal function (IZOF), and performance efficiency is maximized when the level of one's subjective emotional experience falls within this zone. In other words, the IZOF model predicts that some individuals will have their best performance when highly emotional, while others when less emotional.

Empirical evidence for Hanin's model is based on the testing of athletes over many competitions and thereby demonstrating the validity of the IZOF (Hanin, 1980, 1986). Specifically, Hanin found a correlation of .74 between successful athletic performance and the degree to which each athlete was able to achieve his or her optimal precompetitive anxiety as measured by the State-Trait Anxiety Inventory (STAI; Spielberger, 1972). Since then, the IZOF model has been applied to multidimensional state anxiety (e.g., Gould, Tuffey, Hardy, & Lochbaum 1993; Krane, 1993; Woodman, Albinson, & Hardy, 1997), positive and negative affect (e.g., Hanin, 1995; Hanin & Syrja, 1995, 1996), and mood states (Prapavessis & Grove, 1991).

Insofar as mood states are concerned, Prapavessis and Grove (1991) conducted a study to test the utility of Hanin's IZOF and Morgan's Mental Health Model. They administered a shortened version of the POMS (Shacham, 1983) to clay-target shooters over a 12 month period. In order to provide a full test of Hanin's model, two absolute difference scores were obtained for each mood state variable: (a) differences between optimal and acceptable performances, and (b) differences between optimal and worst performances. Support for Hanin's Model would come from absolute mood difference scores between optimal and acceptable performances yielding smaller values than absolute mood difference scores between optimal and worst performances. A graphic representation of these results is presented in Figure 2. Results show that differences are evident across acceptable and worst performances for all mood state subscales except tension.

In order to test the utility of Morgan's Mental Health Model, raw mood state scores were compared across the different performance categories (optimal, acceptable, and worst). Results show (see Figure 3) no differences are evident across optimal, acceptable, and worst performances for any of the six mood state subscales. In short, when mood states were examined in relation to intrasubject variation, significant differences were found across performance whereas when mood states were examined without respect to intrasubject variation, no such differences were obtained. These findings provide initial evidence that Hanin's IZOF model is a useful framework for understanding how precompetitive mood states are related to sport performance.

New IZOF developments that can be applied to mood. An athlete's IZOF can be determined using a stepwise recall scaling procedure (see Hanin, 1997). Research has shown that skilled athletes are aware of and able to report their subjective emotional patterns associated with success-

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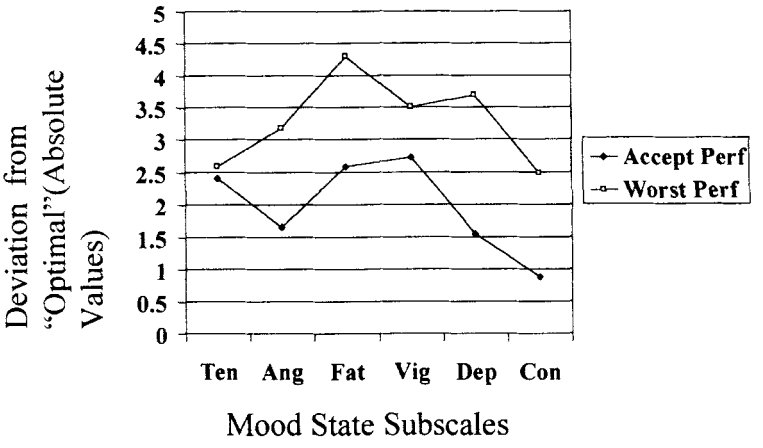

Figure 2. Absolute values for difference scores of mood state ratings obtained from shooters during the precompetitive period. From "Precompetitive emotions and shooting performance: The Mental Health and Zone of Optimal Function Models", by Harry Prapavessis and J. Robert Grove, 1991, *The Sport Psychologist, 5*, 223–234. Copyright 1991 by Human Kinetics. Reprinted with permission.

ful and unsuccessful performances (Hanin & Syrja, 1996). The first step is to identify optimal and dysfunctional emotions, or in this case optimal and dysfunctional mood states. The athlete selects four or five positive and four or five negative POMS scale items that best describe moods

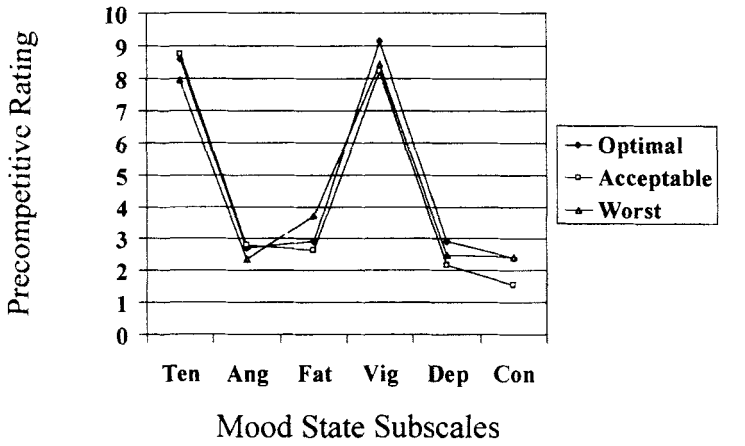

Figure 3. Raw scores for mood state ratings obtained from shooters during the precompetitive period. From "Precompetitive emotions and shooting performance: The Mental Health and Zone of Optimal Function Models", by Harry Prapavessis and J. Robert Grove, 1991, *The Sport Psychologist, 5*, 223–234. Copyright 1991 by Human Kinetics. Reprinted with permission.

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associated with previous successful performance. Dysfunctional mood state patterns are identified in a similar manner. The athlete selects four or five positive and four or five negative items that describe moods related to unsuccessful performance. Beside each item selected, the athlete then rates on a Likert-type scale the intensity level of these moods. This exercise is repeated on several occasions so that a profile may develop. The recall profile is then compared with the athlete's actual pre-match profile. It is important to remember that IZOF is not concerned with the direction of mood, but only the amount it deviates from optimal (once optimal mood is established). Hence, when mood falls outside the zone (i.e., higher or lower), the quality of performance should deteriorate.

The notion of a zone, therefore, is applied to positive and negative mood states that have both optimal and dysfunctional effects on performance. In other words, there are zones of optimal function for some positive and negative moods where the probability of performance success is high. In contrast, there also are dysfunctional zones for positive and negative moods where the probability of performance failure is high. In addition, the optimal and dysfunctional effects on performance can occur separately or in a conjunctive manner. That is, in some instances, examining optimal and dysfunctional moods together is necessary but not individually sufficient to maximize the prediction successful performance. Recent IZOF research has shown that positive and negative emotions can be functionally optimal, dysfunctional, or both (e.g., Hanin & Syrja, 1995, 1996). IZOF research has also shown that the joint impact of negative dysfunctional and positive optimal emotions is the best predictor of soccer (Syrja, Hanin, & Personen, 1995) and racquet sport (Syrja, Hanin, & Tarvonen, 1995) performance.

The major criticism against the IZOF model is that "no explanation has been forwarded by Hanin or any subsequent IZOF investigators as to why best performance occurs when an athlete is within his or her IZOF. . ." (Gould & Tuffy, 1996, p. 59). This criticism in my view is premature. Using the IZOF model, a systematic line of research has been conducted by Hanin and others to test how emotions are related to sport performance. Advancing mechanisms to account for this relationship is the next logical step in the scientific process (cf. Zanna & Fazio, 1982).

Insofar as mood is concerned, it is conceptually difficult to defend the notion that, for some individuals, performance will suffer when moods such as depression, confusion, and fatigue drop below optimal. These mood states are typified by negative self-perception and affect and cannot facilitate performance. In contrast, a strong argument can be made that mood such as vigor, tension, and anger can have both facilitative and debilitative effects upon performance. That is, for some individuals performance will suffer when vigor, tension, and anger drop below optimal while for other individuals performance will suffer when these same moods rise above optimal. Clearly more research is needed to document how intraindividual mood state fluctuations are related to fluctuations in individual performance.

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Methodology (improving our research design). One important methodological issue is the comprehension of precompetitive mood states using the POMS. Grove and Prapavessis (1992) pointed out that item clarity on the POMS is a problem for some participants. For instance, words such as bushed, full of pep, and blue have been established in North American culture and thus may not be universally understood. It is recommended that researchers have a list of culturally appropriate adjectives ready to substitute for POMS items that might be misunderstood (cf. Albrecht & Ewing, 1989).

A second methodological issue is the content relevancy of the POMS. That is, are POMS items relevant and task specific measures of emotions in sport? Syrja and Hanin (1997), for example, showed that the content of positive and negative affect items generated by athletes was dissimilar with items in the POMS scale as well as with items in other normative scales used to assess emotion (i.e., State-Trait Anxiety Inventory; STAI; Spielberger et al., 1970; Positive and Negative Affect Scale; PANAS; Watson, Clark, & Tellegen, 1988). Replication studies are needed to determine the functional significance of POMS scale items in sport settings.

A third methodological issue is how performance is assessed. As discussed earlier, previous studies have used a variety of operational definitions to measure sports performance (e.g., personal best, ranking, selection for team, starters/nonstarters, winning/losing, and subjective measure). The different ways in which performance has been assessed may partly explain the equivocal findings in the literature. Particularly disturbing is the fact that the Rowley et al. (1995) meta-analysis showed that studies with unclear measures of performance had larger ESs than studies with clear measures of performance. Thus, there seems to be a need for uniformity in measuring performance. The difficult question, however, is just what is the best way to do this? Terry (1995b) has argued that performance categorized on a relative (i.e., subjective rating by performer) rather than an absolute basis, provides a more sensitive indicator of performance outcome. In contrast, others have argued for more precision (e.g., compare current level of performance to seasonal average or personal best) in the assessment of performance (Ebbeck & Weiss, 1988; Weinberg, 1990). In my view, both subjective and objective measures of performance should be assessed in order to determine their unique and combined association to mood.

A fourth issue is what sports to select when examining relations between precompetitive mood and performance. For instance, it would seem advantageous to choose sports where the temporal proximity between mood state and performance assessments is small (e.g., rowing, wrestling, shooting, bobsledding, sprinting). This would help reduce fluctuations in mood states and thus increase their predictive capabilities. Another way to reduce the temporal proximity between mood and performance is to assess mood as close to competition as possible (e.g., within 1 hour). Short versions of the POMS (e.g., Shacham, 1983; Terry, Keohane, & Lane, 1996) have been developed to combat precompetitive time con-

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straints and minimize disrupting the athlete's preparation. It is recommended, however, that participants be screened for potential response suppression/distortion effects during this period (Miller & Edgington, 1984). Completion of a social desirability scale (e.g., the short form of the Marlowe-Crowne Social Desirability Scale; Reynolds, 1982) prior to mood state assessment would serve this purpose.

A fifth issue is whether mood state assessment should be accompanied with some measure of physiological arousal to predict performance, especially in research designs that assess precompetitive mood only once. In competitive anxiety research, for instance, Hardy and colleagues (Edwards & Hardy, 1996; Hardy, Parfitt, & Pates, 1994; Woodman, Albinson, & Hardy, 1997) have demonstrated that the beneficial or detrimental effects of cognitive anxiety on performance are dependent on the nature of the physiological arousal. Specifically, both cognitive anxiety and physiological arousal must be high for performance to suffer. Extending these findings to mood states one could then test the following proposition: (a) moods such as tension, anger, and vigor accompanied by high levels of physiological arousal should be detrimental to performance; (b) these same moods accompanied by moderate levels of physiological arousal, however, should be beneficial to performance; and (c) moods such as depression, confusion, and fatigue should be detrimental to performance because these moods are associated with lower levels of physiological arousal (motivation effects).

A sixth and final issue is to attempt to offer some sort of explanation as to why precompetitive mood states might be either beneficial or detrimental to sport performance. Once again, the anxiety/stress literature offers some interesting and testable tenets that can be easily applied to mood. For example, it is suggested through both Carver and Scheier's (1988) control theory model of anxiety and Lazarus's (1991) model of emotion that perceived control over coping and goal attainment serve to mediate how anxiety and positive and negative emotions are interpreted. Hence, positive expectations of goal attainment and control would likely lead to facilitative mood states and superior performance whereas negative expectations of goal attainment and control would lead to debilitative mood states and inferior performance.

Conclusions

Based on the current literature the following conclusions can be made. The Mental Health Model (iceberg profile) may not be the most suitable framework for understanding how precompetitive mood states are related to sport performance. Although the utility of the model in predicting performance improves when certain moderating factors are taken into account, the model can be criticized on the grounds that it fails to consider individual mood state differences. A promising alternative approach for understanding how mood states are related to sport performance is Hanin's Individual Zone of Optimal Function (IZOF) model.

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If significant and meaningful relations are to be consistently found between mood and performance researchers, must (a) control for confounding factors (i.e., status and events preceding mood state profiling that can potentially determine both mood and performance), (b) have a list of culturally appropriate adjectives ready to substitute for POMS items that might be misunderstood, (c) determine the functional significance of POMS scale items by comparing them with athlete generated items, (d) assess performance in a consistent manner, (e) choose sports where the temporal proximity between mood and performance assessment is small to reduce mood state fluctuations, (f) control for social desirability effects, (g) assess mood with some measure of physiological arousal, especially when a single assessment mood states paradigm is followed, and (h) begin to offer some sort of explanation as to why precompetitive mood states are related to sport performance.

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