MOOD AND PERFORMANCE: TEST OF A CONCEPTUAL MODEL WITH A FOCUS ON DEPRESSED MOOD

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Abstract

Objectives. The present study tested a conceptual model of mood-performance relationships (Lane, A. M., & Terry, P. C. [2000]. The nature of mood: Development of a conceptual model with a focus on depression. Journal of Applied Sport Psychology, 12, 16-33) which proposed that depressed mood would influence the intensity and inter-relationships of other mood responses, and moderate the anger-performance and tension-performance relationships.

Design. To promote ecological validity, the model was tested in a field setting using a cross-sectional design.

Methods. A sample of 451 schoolchildren (M = 12.4 yrs., SD = 1.3 yrs.) completed the Profile of Mood States - Adolescents (POMS-A: Terry, P. C., Lane, A. M., Lane, H. J., & Keohane, L. [1999]. Development and validation of a mood measure for adolescents. Journal of Sports Sciences, 17, 861-872) and stated a performance goal, approximately 10 minutes before a running event. Participants were divided into a depressed mood group (n = 273) and a no-depression group (n = 178) on the basis of responses to the POMS-A depression subscale.

Results. As hypothesised, the depressed mood group reported higher scores for anger, confusion, fatigue, and tension, and lower scores for vigour. Inter-correlations among these mood dimensions were stronger in the depressed mood group, who set easier goals and performed less well. Vigour was associated with facilitated performance regardless of depression. Anger was associated with debilitated performance in the depressed mood group and with facilitated performance in the no-depression group. Some support was shown for a moderating effect of depressed mood on the tension-performance relationship. The hypothesised curvilinear anger-performance and tension-performance relationships in the no-depression group did not emerge.

Conclusion. The Lane and Terry model was generally, but not totally, supported. Future research should continue to investigate the mechanisms underlying mood-performance relationships.

Key words: POMS-A, model testing, structural equation modelling, depression, emotion

Mood and performance: Test of a conceptual model with a focus on depressed mood.

A substantial number of investigations have sought to elucidate the relationship between mood and athletic performance (see LeUnes & Burger, 1998). Several narrative reviews of the findings have been published (e.g., Prapavessis, 2000; Renger, 1993; Terry, 1995; Vanden Auweele, De Cuyper, Van Mele, & Rzewnicki, 1993) and at least two objective summaries have been conducted using meta-analytic techniques (Rowley, Landers, Kyllo, & Etnier, 1995; Beedie, Terry, & Lane, 2000). To date, the collective evidence pertaining to mood and performance relationships remains equivocal.

At least three factors appear to have contributed to the equivocal findings. The first and most fundamental factor is the lack of clarity in the sport psychology literature about the nature of the mood construct. Indeed, most authors in the sport domain have not provided an explicit definition of mood (e.g., Cox, 1998; Gill, 1986; Renger, 1993; Rowley et al., 1995; Terry, 1995; Vanden Auweele et al., 1993), although a recent paper on the nature of mood (Lane & Terry, 2000) has attempted to address this conceptual ambiguity.

The second factor contributing to the equivocality of findings is the inconsistency of the methods used. The range of methodological inconsistencies is extensive and includes the use of different mood measures with varying degrees of psychometric integrity and relevance for the population of interest, and variations in the timing of mood assessment relative to the performance of interest (including the use of retrospective mood assessments). One methodological issue that is particularly germane to the present investigation is the choice of response set. Researchers have not always rationalised, and in many cases have not even reported, the response set used to assess mood. Some investigators have posed the question "How have you felt during the past week including today?" and others have asked "How are you feeling right now?" with little apparent consideration of how the response set used may influence reported mood. A consensual overview of mood-performance relationships will

likely remain elusive until such inconsistencies are eliminated.

The third factor that has contributed to the equivocality of findings is the dearth of theoretical frameworks to guide research. A broad array of studies have investigated the extent to which mood profiles can, for example, predict performance outcome, or distinguish between athletes of different levels of achievement or playing positions, or distinguish between athletes and non-athletes. The theoretical rationale for some of these research questions is difficult to discern. A corollary of the atheoretical nature of much research in this domain is that some reviews of the literature have failed to distinguish adequately between related but distinct research questions. To assess the importance of such distinctions, Beedie et al. (2000) conducted two meta-analyses of mood-performance research. The first meta-analysis summarised findings from studies that sought to link mood and athletic achievement by comparing the mood responses of elite and non-elite athletes, a research question for which the rationale is questionable (i.e., we would not expect the mood of an elite athlete and a club athlete to differ in any predictable way). The overall effect size (ES) was very small (Weighted Mean ES = 0.10, SD = 0.07), a finding consistent with the previous meta-analysis by Rowley et al. (1995).

The second meta-analysis by Beedie and his colleagues included studies that examined the relationship between pre-competition mood and subsequent performance, arguably a more productive line of enquiry (i.e., we would expect an athlete's mood to influence her/his performance). The overall effect was moderate (Weighted Mean ES = 0.31, SD = 0.12), with stronger relationships evident when self-referenced performance measures were used. Effects were moderate for confusion, depression and vigour, small for anger and tension, and very small for fatigue. Although all mean effects were in the direction associated with an iceberg profile (Morgan, 1980, 1985), the direction of mood-performance relationships for anger and tension varied across studies. High scores for anger and tension

were associated with poor performance in some studies (e.g., Gutmann, Pollock, Foster, & Schmidt, 1984; Hassmén & Blomstrand, 1991; Raglin, Morgan, & Luchsinger, 1990) and with good performance in other studies (e.g., Cockerill, Nevill, & Lyons, 1991; Hassmén & Blomstrand, 1995; Morgan & Johnson, 1978).

The nature of mood

Conceptual clarity is central to understanding the mood-performance relationship. Lane and Terry (2000) defined mood as "a set of feelings, ephemeral in nature, varying in intensity and duration, and usually involving more than one emotion" (p.17). Although a useful starting point, this definition does not address some aspects of mood, such as its function and structure. Some consideration of these issues is needed to appreciate the development of the conceptual model that is tested in the present investigation. The function of mood (i.e., what mood does rather than what mood is) has been debated extensively in the general psychology literature. Parkinson, Totterdell, Briner, and Reynolds (1996) proposed that "mood reflects changing non-specific psychological dispositions to evaluate, interpret, and act on past, current, or future concerns in certain patterned ways" (p.216). Morris (1992) posited that mood's affective content serves a signal function indicating to the individual the likelihood of success or failure in dealings with the environment. Both views suggest that mood has an influence on cognitions and behaviour.

The structure of mood and emotions has also been the subject of considerable debate. These constructs are variously conceptualised in terms of unipolar dimensions such as tension, depression, anger, etc. (e.g., McNair, Lorr, & Droppleman, 1971, 1992; Terry et al., 1999), as bipolar opposites such as happy-sad, relaxed-tense, etc. (e.g., Lorr & McNair, 1988), as broad orthogonal dimensions, such as negative and positive affect (Watson & Tellegen, 1985), or in terms of a circumplex with pleasant-unpleasant and activation-deactivation axes (e.g., Russell, 1980). The circumplex model, in which mood descriptors

can be systematically arranged around the perimeter of a circle, has been particularly pervasive in the recent literature (e.g., Russell & Feldman Barrett, 1999; Watson, Wiese, Vaidya, & Tellegen, 1999; Yik, Russell & Feldman Barrett, 1999) although there is disagreement about where on the circumplex particular emotions should be placed.

In their discourse on the nature of emotion, Russell and Feldman Barrett (1999) distinguished between prototypical emotional episodes where the object of the feeling is known -- being angry with someone, being tense about something -- and core affect to refer to "the most elementary consciously accessible affective feelings … that need not be directed at anything" (p.806), such as feeling tense for no apparent reason. In applying this distinction to the circumplex model, Russell and Feldman Barrett inferred that many prototypical emotions (e.g., anger, fear) represent discrete feelings with no bipolar opposite other than an absence of the emotion. Similarly, Watson and Tellegen (1985) proposed that positive and negative affect are independent dimensions rather than bipolar opposites.

Amid the huge complexity of understanding the nature of emotional responses, "dissecting the elephant" as Russell and Feldman Barrett (1999) referred to it, it appears that compelling arguments can be made to conceptualise mood in terms of unipolar, bipolar, or circumplex models. Indeed, Watson et al. (1999) acknowledged the limits of the statistical support for circumplex models of emotion and encouraged "future researchers to use a variety of approaches in seeking to understand this extraordinarily complex domain" (p.836).

A model of mood-performance relationships

In the present study we test a model of the relationship between mood and performance (Lane & Terry, 2000) that emphasises the influence of depressed mood. The term depression, used differentially by the clinician and the layperson, warrants clarification. In the context of the present study, depression was assessed by asking respondents how they feel in relation to four items, "depressed", "downhearted", "unhappy", and "miserable". Low

scores on these items may indicate a slightly depressed, although sub-clinical, mood state that is part of the normal human reaction to daily events (see Kendall & Hammen, 1995), whereas extremely high scores reported over a number of repeated administrations may, but do not necessarily, indicate a clinical mood disorder. Even maximum scores on the four depression items may represent extreme, but not clinically significant, dissatisfaction or distress in relation to a particular event or situation. To diagnose mood disorder would require far more information; clinical depression scales often address factors such as sleep disturbance, anhedonia, loss of appetite and libido, and social withdrawal. To avoid confusion with clinical depression, Lane and Terry (2000) used the term depressed mood to refer to elevated scores on the depression subscale.

The Lane and Terry (2000) model (see Figure 1) proposed that depressed mood is associated with an inability to regulate other mood dimensions, leading to increased anger, confusion, fatigue, and tension, and reduced vigour. There are at least four reasons for giving depressed mood a privileged position in the model. The first reason is derived from the negative self-schema that characterise depression. Markus (1977) defined self-schema as "cognitive generalizations about the self, derived from past experience, that organize and guide the processing of self related information contained in the individual's social experience" (p.64). Lane and Terry suggested that depressive cognitive generalisations have a pervasive effect across all mood dimensions and that at the pre-competition phase such feelings will result in anticipated failure. Depressed mood may act as a catalyst for other 'unpleasant' mood constructs. For example, in a study of mood responses from 1,317 athletes, Lane and Terry (1999b) found that 48% reported tension in the absence of depressed mood symptoms, 35% reported symptoms of both depressed mood and tension, 13% reported no tension or depressed mood symptoms, but only 4% reported depressed mood symptoms and no tension. They concluded that, among athletes, although tension is experienced both in the

presence and absence of depressed mood, by contrast depressed mood symptoms are rarely experienced in the absence of tension.

A second argument for the privileged position of depressed mood in the model is that it consistently shows significant correlations with all other mood dimensions (e.g., Grove & Prapavessis, 1992; Terry & Slade, 1995). According to circumplex models, depressed mood represents unpleasant deactivation and should be inversely related to vigour, which is typified by pleasant activation. Depressed mood and fatigue should be positively correlated, as both are associated with low arousal and unpleasantness. Depressed mood should also be positively correlated with tension when the perceived difficulty of the task is beyond perceived abilities, and with anger when it is directed internally. Depressed mood should show a positive relationship with confusion, as they tend to co-vary (Kendall & Hammen, 1995).

A third reason for the pivotal position of depressed mood is that research has shown depression to be associated with a tendency to focus on negative previous experiences, which may in turn reduce perceptions of ability and coping (see Rokke, 1993). A fourth reason for the emphasis on depressed mood is that some researchers take the line that mood functions as part of a regulatory process. It has been proposed that depressed mood requires more regulation than other elements of mood and therefore uses up more of a limited resource, reducing capacity for other types of regulation such as physical performance (see Muraven, Tice, & Baumeister, 1998).

Key to the Lane and Terry model is the notion that depressed mood moderates the mood-performance relationship for anger and tension. In contrast, even though depressive symptoms are proposed to reduce vigour and increase confusion and fatigue, vigour should remain facilitative of performance and confusion and fatigue should remain debilitative. The proposed moderating influence of depressed mood on some mood-performance relationships

but not others can be explained by the nature of anger and tension.

Spielberger's (1991) work suggested that anger-related thoughts are directed either inwardly towards the self (suppressed) or externally toward other individuals or objects (expressed). The distinction between suppressed and expressed anger is important for sport performance. According to Spielberger, the self-blame element of suppressed anger is proposed to intensify feelings of hopelessness, and thus lead to poorly motivated behaviour causing performance decrements. By contrast, expressed anger tends to be directed at the source of the original frustration, or else displaced toward another object or person. While this process would not in itself benefit performance, the anger may be channelled into, or manifest as, determination to succeed. Importantly, the tendency to suppress anger is closely associated with depression.

Tension, like anger, is associated with heightened arousal. Schwarz and Bless (1991) contended that states such as tension serve a functional role by signalling whether conditions warrant action. Pre-performance tension may signal the likelihood of poor performance unless some form of action is taken, such as increased effort or concentration. In this instance, tension may provide a motivating effect if performance outcome is considered by the individual to be important. In a depressed mood, rather than initiating a search for solutions, it is proposed that tension is directed toward negative self-thoughts, engendering a de-motivating effect.

The purpose of the present study was to test the tenets of the Lane and Terry (2000) conceptual model. In accord with the model, it was hypothesised (1) that participants who reported symptoms of depressed mood would report higher scores for anger, confusion, fatigue and tension and lower vigour scores than participants who reported no symptoms of depressed mood; (2) that relationships among anger, confusion, fatigue, tension and vigour would be stronger for participants who reported depressed mood; (3) that vigour would be

associated with facilitated performance, and confusion and fatigue would be associated with debilitated performance, regardless of depressed mood scores; and (4) that depressed mood would moderate the anger-performance and tension-performance relationships; more specifically, that among participants who reported symptoms of depressed mood, anger and tension would be associated with debilitated performance whereas among participants who reported no symptoms of depressed mood, anger and tension would show a curvilinear relationship with performance. Lane and Terry (2000) proposed these curvilinear relationships because the physiological arousal associated with anger and tension would tend to facilitate performance up to an optimum point beyond which performance would deteriorate, either progressively (Yerkes & Dodson, 1908) or catastrophically (Hardy & Parfitt, 1990).

The first and second hypotheses were supported by preliminary data during the developmental stages of the model (see Lane & Terry, 1998, 1999a, 1999b, Lane, Terry, Karageorghis, & Lawson, 1999). Preliminary findings were less supportive of the hypothesised debilitating effects on performance of confusion and fatigue but supported the notion that depressed mood does not moderate performance relationships for vigour, confusion and fatigue. In relation to the fourth hypothesis, preliminary findings have provided partial support. Anger and tension were associated with debilitated performance in depressed mood participants but there was only limited support for the hypothesised curvilinear anger-performance and tension-performance relationships among participants reporting no symptoms of depression. It should be noted that given the limited scope of these preliminary studies, the present investigation represents the first comprehensive test of the model.

Given the intimate link between emotions and cognitive processes (see Dalgleish & Power, 1999), there is significant potential for mood responses to influence the goal-setting

process. Indeed, some social-cognitive models of emotion (e.g., Champion & Power, 1995) specifically emphasise such a link. Therefore, to further extend understanding of mood-performance processes, the effect of depressed mood on goal-setting was also assessed. Based on the findings of Hirt, Melton, McDonald, and Harackiewics (1996) it was hypothesised (5) that participants in a depressed mood would set less challenging goals and perform less well in terms of achieving their pre-competition goal and improving upon their previous performance than participants who reported no symptoms of depressed mood.

Methods

Participants and setting

Participants were 451 children (230 boys and 221 girls) who were taking part in running events at two secondary schools. School 1 provided 239 participants (Age: M = 11.70 yr., SD = 5 months). School 2 provided 212 students (Age: M = 12.3 yrs., SD = 11 months). Participants were heterogeneous in terms of running ability, with personal best times ranging from 5 minutes to 10 minutes to run one mile. No incentives for participation were offered.

The running events were part of school physical education lessons. Running was chosen as the activity in which to examine mood and performance relationships for at least three reasons. First, it is largely self-paced and the relatively small skill contribution (compared to some sports) meant that variations in effort, a controllable factor for participants, were likely to be associated with variations in performance. Second, as an individual event, the potential confounding impact of group dynamics was eliminated. Third, as the running events were judged in terms of time or distance, this readily facilitated the process of self-referencing.

Measures

Mood states

Mood was assessed using the 24-item Profile of Mood States – Adolescents (POMS-A: Terry et al., 1999). The POMS-A asks respondents to rate how they feel "right now" on six dimensions of mood: anger, confusion, depression, fatigue, tension and vigour. Validation of the POMS-A involved 1,693 participants from two populations, school children and young athletes. Confirmatory factor analysis supported the factorial validity of a 24-item, six-factor model using both independent and multi-sample analyses. In addition, correlations between POMS-A scores and a range of previously validated inventories provided evidence of concurrent validity. Terry et al. (1999) concluded that the POMS-A showed evidence of construct validity for use with adolescents. Internal consistency coefficients in the present study were acceptable (alpha range .73 to .85).

POMS-A data were converted to standard T-score format using tables of normative data from Terry et al. (1999) who reported norms for 683 young athletes prior to competition and 594 school children in a classroom environment. The young athlete norms were used in the present study because, even though the competition was part of a normal school day, participants completed the mood measure in the context of a running competition. The transformation of raw scores to T-scores changed the level of data from ordinal to interval, thus meeting one of the assumptions of the statistical procedures used.

Depression groups

The mean score for depressed mood in the present study (M = 50.68, SD = 8.76) was consistent with norms for adolescent athletes (see Terry et al., 1999). Sixty percent of the sample (n = 273) reported some symptoms of depression and were allocated to the depressed mood group. The remaining 40% of the sample (n = 178) reported no symptoms of depression and were allocated to the no depression group.

Measure of Goal Difficulty

Goal difficulty was assessed by comparing the performance goal set by each participant with the outcome of a similar event organised by the researchers four weeks earlier. Participants were reminded of how well they ran in the earlier event immediately before they set their goal for the present event. To maintain ecological validity, running performance was assessed using the methods already in place in the schools. In School 1, performance was assessed in terms of the distance covered during a 12-minute run. Therefore, goal difficulty was calculated by deducting the distance covered in the previous race from the distance goal for the present race. In School 2, performance was assessed by the time taken to complete a 3,800m run. Here, goal difficulty was calculated by deducting the time goal for the present race from the time taken to complete the run previously. To standardise the two metrics, all data were transformed to T-scores ($M = 50$, $SD = 10$) with goal difficulty scores above 50 representing an improvement on previous performance.

Measure of Performance

For the purposes of the present study, the measure of performance needed to be both sensitive to individual differences and ecologically valid. In a recent meta-analysis of mood-performance relationships, Beedie et al. (2000) showed that mood is a better predictor of performance when the performance measure accounts for intra-individual fluctuations, in other words when it is self-referenced. There are different ways to assess performance using self-referenced techniques. For example, the relative success of a performance can be judged by comparing an objective measure of performance outcome, such as time or finish position, with a pre-performance goal (e.g., Hall & Terry, 1995; Lane & Karageorghis, 1997; Terry, 1993). Alternatively, it can be judged by comparing an objective performance measure with a personal best or previous performance for that event (e.g., Martin & Gill, 1991, 1995).

However, either method alone has limitations. For example, an athlete who sets a goal

of 20 minutes to complete a 5 km race and runs 22 minutes in the race may be said to have under-performed by two minutes. However, if the athlete's personal best time for 5 km was 23 minutes, and personal best was used to assess performance, then the athlete may be said to have over-performed by one minute. A performance measure that simply compares objective outcome with a pre-performance goal does not account for the relative difficulty of the goal. Using the above example, it is not possible to determine whether failure to achieve the performance goal was a consequence of setting a goal that was beyond current abilities, or due to some other factor such as lack of effort. Hence, the relative difficulty of the pre-competition goal is very important when assessing performance.

Research has also acknowledged the importance of considering previous experiences when assessing the relative difficulty of a goal. For example, Martin and Gill (1991, 1995) found that track and field athletes were able to accurately predict their finish position in races. They ascribed this to the comparative information gained during previous races against the same opponents, which provided a basis for predictions. They proposed that the combined knowledge of the characteristics of the course, the outcome of previous races and the degree of effort they were prepared to expend facilitated accurate predictions of finish time. Therefore, it is suggested that a true self-referenced measure of performance should involve a comparison of objective performance outcome with both a pre-performance goal and, as an indicator of goal difficulty, the result of previous performance(s). In the present study, the measure of running performance accounted for both the race goal set by each individual and, by comparison with previous performance, the difficulty of the goal for that individual.

In School 1, where the objective performance measure was distance, self-referenced performance was calculated using the formula: (Distance Covered – Previous Performance) + (Distance Covered – Race Goal). In School 2, where the objective performance measure was time, the calculation was: (Previous Performance – Finish Time) + (Race Goal – Finish

Time). All performance data were standardised using T-score transformations and were then merged into a single sample. Although it is parsimonious to combine two forms of self-referenced performance (i.e., previous performance and race goal) into a single measure, the argument that they should not be combined because they assess different aspects of performance is acknowledged. It is suggested that future studies might look at these two performance indicators separately.

Procedure

Consent to conduct the study was granted from the head teachers of the two schools. Data were collected in two stages. In Stage 1, participants completed the first running event to gain an understanding of the task and so inform subsequent goal setting. The first event provided the Previous Performance data. In Stage 2 (4 weeks later), participants completed the POMS-A and set a performance goal for the upcoming race approximately ten minutes prior to competition. Mood was assessed using the response set, "How are you feeling right now." Participants were given instructions from a prepared script.

Results

Descriptive statistics for pre-performance mood responses are contained in Table 1. A MANOVA showed a significant multivariate effect for depressed mood (Hotelling's T^2 = 141.02, $p < .001$, Eta squared = 0.24). Univariate differences showed that the depressed mood group reported higher scores for anger ($t = -7.85$, $p < .001$), confusion ($t = -6.83$, $p < .001$), fatigue ($t = -5.93$, $p < .001$), and tension ($t = -8.35$, $p < .001$), and lower vigour scores ($t = 4.50$, $p < .001$) than the no-depression group. Effect sizes, in the form of Cohen's d (Cohen, 1988), ranged from 0.42 to 0.89. The first hypothesis was therefore supported.

Inter-correlations of mood dimensions are contained in Table 2. In the no-depression group, there were significant correlations between anger and tension ($r = .16$, $p < .05$), confusion and fatigue ($r = .23$, $p < .05$), vigour and fatigue ($r = -.32$, $p < .01$), and vigour and

tension (r = .28, p < .01). In the depressed mood group, significant correlations were found between anger and confusion (r = .41, p < .01), anger and fatigue (r = .35, p < .01), anger and tension (r = .33, p < .01), confusion and fatigue (r = .37, p < .01), and confusion and tension (r = .29, p < .01). Cronbach alpha estimates were used to compare the strength of inter-correlations among mood dimensions in the two groups. Results showed a significant difference (p < .05) between the alpha coefficients in the no-depression group (alpha = .18) and the depressed mood group (alpha = .50). The second hypothesis was therefore supported.

A structural equation model to predict the performance of the two groups from their pre-performance mood responses is contained in Figure 2. Mood predicted 11% of the variance in performance in both groups. A multi-sample test of the model was used to assess whether depressed mood moderated mood-performance relationships, by placing equality constraints on the hypothesised relationships. Results showed strong support for the model (X^2 = 13.82, df = 5, p > .05; NNFI = 0.951; CFI = 0.965; GFI = 0.990; AGFI = 0.959; RMSEA = 0.063). Important statistics in this analysis derive from the Lagrange multiplier test (see Table 3), which tests specific mood-performance relationships in the two groups. Results showed no between-group differences in mood-performance relationships for vigour, confusion and fatigue. Also as hypothesised, vigour significantly predicted performance in both the no-depression group (standardised r = .30, p < .05) and the depressed mood group (standardised r = .16, p < .05). Results partially supported the third hypothesis for confusion and fatigue, to the extent that relationships with performance were the same in both groups. However, contrary to the hypothesis neither confusion nor fatigue showed a debilitative effect on performance.

Results of the Lagrange multiplier test showed that the anger-performance relationship differed significantly (X^2 = 7.375, p = 0.007) across groups. In the depressed mood group, anger was associated with debilitated performance (standardised r = -.27, p < .05), whereas in

the no-depression group, anger was associated with facilitated performance (standardised r = .11, $p > .05$) although this relationship was not significant. The difference in the tension-performance relationship across groups was close to significance ($X^2 = 3.161$, $p = .08$) although tension did not significantly predict performance in either group. This finding offers partial support for the fourth hypothesis that depressed mood moderates the effects of anger and tension on performance.

A curvilinear regression analysis to test the mood-performance relationships for anger and tension in the no-depression group found no significant relationship (anger-performance: $R^2 = .03$, $F = 2.94$, $p > .05$; tension-performance: $R^2 = .01$, $F = 0.95$, $p > .05$). This finding does not support the hypothesised relationships.

The results of a MANOVA to compare goal difficulty and performance scores between the no-depression and depressed mood group are contained in Table 4. Results showed, in support of the fifth hypothesis, that the depressed mood group set easier race goals ($t = 5.15$, $p < .001$, ES = 0.49) and performed less well than the no-depression group ($t = 3.83$, $p < .001$, ES = 0.38).

Discussion

The purpose of the present study was to test a theoretical model of relationships between mood and performance. Of the five hypotheses tested, two examined the influence of depressed mood on other mood dimensions, and three examined mood and performance relationships. Consistent with preliminary tests of the model (Lane & Terry, 1998, 1999a, 1999b; Lane et al., 1999) results provided strong support for the proposal that symptoms of depressed mood are positively associated with anger, confusion, fatigue and tension and inversely associated with vigour. Moreover, inter-relationships among anger, confusion, fatigue, tension and vigour were significantly stronger for participants in a depressed mood. These findings support the notion of a general dimension of negative mood that may be

precipitated by depressive feelings. Given that among the depressed mood group, depression scores were relatively low (the mean raw score was 2.63 on a scale of 0 – 16), it is possible that even minor symptoms of depression may act as a catalyst for a general negative mood, with subsequent debilitative performance effects (see Beedie et al., 2000). The implication of this finding for an applied sport psychologist is that interventions to address depressed mood should be given a high priority.

The results pertaining to mood-performance relationships in the present study were generally, although not totally, supportive of the Lane and Terry (2000) model. As hypothesised, results showed that depressed mood had no moderating effect on relationships with performance for confusion, fatigue and vigour. Vigour was associated with facilitated performance in both groups, although the hypothesised debilitative relationships with performance for confusion and fatigue were not found. As hypothesised, a significant moderating effect of depressed mood was shown for the anger-performance relationship. Anger was associated with facilitated performance in the no-depression group and debilitated performance in the depressed mood group. The effect of depressed mood on the tension-performance relationship was in the hypothesised direction but was not significant. The hypothesised curvilinear relationships with performance for anger and tension in the no-depression group did not emerge.

There are at least four explanations for why the hypothesised curvilinear relationships were not found. First, individual differences may be more influential than general trends. It is possible that some individuals have a tendency to perceive symptoms of anger and tension as facilitative (i.e., motivating or exciting) while others tend to perceive them as debilitative (i.e., threatening, unusual, or de-motivating). This is in accord with the findings of Hanin (2000), who showed that some athletes described feelings such as angry or tense as consistently facilitative of performance and others reported the same feelings as consistently

debilitative of performance.

Second, a learning effect may come into play. Hanton and Jones (1999) reported that athletes learn, both through direct experience and the advice of coaches, to view certain pre-competition feelings such as self-doubt and tension as necessary precursors to a good performance. It is possible that such individuals would not attempt to regulate feelings of tension in the absence of depressed mood but would make attempts at self-regulation if they simultaneously felt tense and depressed. It appears likely that an idiographic and longitudinal research design is more likely to detect the proposed curvilinear mood-performance relationships for anger and tension and we recommend such an approach for future research.

Third, although the current findings partially explain the ambiguous nature of the anger-performance and tension-performance relationships, situational factors such as the types of skills involved (e.g., open/closed, gross/fine) or the nature of the sport (e.g., team/individual), may also moderate these relationships. To date, tests of the model have examined mood-performance relationships in only a small number of sports. It is possible that in sports with different characteristics, different mood-performance relationships will be evident. The fourth explanation for why the proposed curvilinear relationships were not found is, of course, that the model is incorrect and does not accurately reflect the reality of mood-performance relationships. However, this conclusion would be premature until the model has been more thoroughly tested in a wider variety of sport environments.

The present results offer some empirical support for the proposal that depressed mood influences other moods and subsequent performance, although the mechanisms underlying any such effects have yet to be elucidated. Two conceptually opposite theories of depression may both be relevant to sports performance. Cervone, Kopp, Schaumann, and Scott (1994) found that depression raises the level of performance with which an individual will be satisfied, possibly indicating an attempt to relieve negative mood through a better than usual

performance. In contrast, Hirt et al. (1996) found that depression was associated with reduced interest in performance, and consequently reduced effort. The proposed tendency for a depressed individual to set difficult goals (Cervone et al., 1994) is likely to be at odds with that individual's perception, and the reality, of his or her ability to achieve them, probably leading to poorer performance and perhaps increased depression. Similarly, the reduced motivation proposed to be associated with depressed mood (Hirt et al., 1996) would be likely to result in poorer performances. Thus, despite their differing mechanisms, either tendency may lead to what Batson, Shaw, and Oleson (1992) described as a "spiral into depression" (p.299), a transactional process involving negative cognitions and experiences, perhaps exemplified best in sport by the concept of a 'slump' in performance over days, weeks or even months. The present results pertaining to the goal-setting characteristics of the two groups showed that, as hypothesised, the no-depression group set more difficult goals than the depressed mood group but were more likely to achieve them. This finding offers support for the proposals of Hirt et al. (1996) and runs counter to the process described by Cervone et al. (1994).

It is proposed that a major contribution of the present study to the mood-performance literature is that it tests one of the very few theoretical models in the sport domain. Much of the previous research in the area has focused on describing mood-performance relationships, emphasising the statistical rather than the theoretical significance of findings. Too often in previous research the mood construct has not been defined and no theoretical explanation of the influence of mood on performance has been proposed. The theory-driven methodology used in the present study has the additional advantage of guiding the statistical analysis. Mood research has typically relied on discriminant function analysis and multiple regression techniques to investigate mood-performance relationships. Without a theoretical foundation, the researcher has no basis for selecting the order of variables to be entered into such

analyses. Theory-driven research may be better tested using structural equation modelling (SEM), which assesses the extent to which data support hypothesised relationships specified by the researcher. SEM has the advantage of testing the entire model simultaneously, but also allows unique parts of the model to be analysed separately. Further, multi-sample SEM facilitates a test of the extent to which hypothesised relationships remain stable across different samples.

In conclusion, the present results generally, but not totally, supported Lane and Terry's (2000) conceptual model of mood-performance relationships. Findings were consistent with suggestions in the general psychology literature that the function of mood is to inform individuals, via an affective experience, as to the likelihood of success or failure in future dealings with the environment. We suggest that future research investigates the mechanisms underlying mood changes and mood-performance relationships.

1 References

2 Batson, C. D., Shaw, L. L., & Oleson, K. C. (1992). Differentiating affect, mood, and
3 emotion: Toward functionally based conceptual distinctions. In M. S. Clark (Ed.), Review of
4 personality and social psychology: Emotion (pp. 294-326). Newbury Park, CA: Sage.
5 Beedie, C. J., Terry, P. C., & Lane, A. M. (2000). The Profile of Mood States and
6 athletic performance: Two meta-analyses. Journal of Applied Sport Psychology, 12, 49-68.
7 Cervone, D., Kopp, D. A., Schaumann, L., & Scott, W. D. (1994). Mood, self-
8 efficacy, and performance standards: Lower moods induce higher standards of performance.
9 Journal of Personality and Social Psychology, 67, 499-512.
10 Champion, L. A., & Power, M. J. (1995). Social and cognitive approaches to
11 depression: Towards a new synthesis. British Journal of Clinical Psychology, 34, 485-503.
12 Cockerill, I. M., Nevill, A. M., & Lyons, N. (1991). Modelling mood states in athletic
13 performance. Journal of Sports Sciences, 9, 205-212.
14 Cohen, J. (1988). Statistical power analysis for the behavioural sciences (2nd Ed.).
15 New York: Academic Press.
16 Cox, R. H. (1998). Sport psychology: Concepts and applications (2nd Ed.). Dubuque,
17 IA: Wm. C. Brown.
18 Dalgleish & Power (Eds.) (1999). Handbook of cognition and emotion. New York:
19 Wiley.
20 Gill, D. L. (1986). Psychological dynamics of sport. Champaign, IL: Human Kinetics.
21 Grove, J. R., & Prapavessis, H. (1992). Preliminary evidence for the reliability and
22 validity of an abbreviated Profile of Mood States. International Journal of Sport Psychology,
23 23, 93-109.

Gutmann, M. C., Pollock, M. C., Foster, C., & Schmidt, D. (1984). Training stress in Olympic speed skaters: A psychological perspective. The Physician and Sportsmedicine, 12, 45-57.

Hall, A., & Terry, P.C. (1995). Predictive capability of pre-performance mood profiling at the 1993 World Rowing Championships, Roundnice, the Czech Republic [abstract]. Journal of Sports Sciences, 13, 56-57.

Hanin, Y. (2000). Successful and poor performance and emotions. In Y. Hanin (Ed.), Emotions in sport (pp. 257-289). Champaign, IL: Human Kinetics.

Hanton, S., & Jones, G. (1999). The acquisition and development of cognitive skills and strategies: I. Making the butterflies fly in formation. The Sport Psychologist, 13, 1-21.

Hardy, L., & Parfitt, G. (1991). A catastrophe model of anxiety and performance. British Journal of Psychology, 82, 163-178.

Hassmén, P., & Blomstrand, E. (1991). Mood change and marathon running: A pilot study using a Swedish version of the POMS test. Scandinavian Journal of Psychology, 32, 225-232.

Hassmén, P., & Blomstrand, E. (1995). Mood state relationships and soccer team performance. The Sport Psychologist, 9, 297-308.

Hirt, E. R., Melton, R. J., McDonald, H. E., & Harackiewics, J. M. (1996). Processing goals, task interest, and the mood-performance relationship: A mediational analysis. Journal of Personality and Social Psychology, 71, 245-261.

Kendall, P. C., & Hammen, C. (1995). Abnormal psychology. Boston, MA: Houghton Mifflin.

Lane, A. M., & Karageorghis, C. I. (1997). Discriminant effectiveness of goal confidence and goal difficulty in predicting goal attainment in junior high school cross-country runners. Perceptual and Motor Skills, 84, 747-752.

Lane, A. M., & Terry, P. C. (1998, August). Prediction of athletic performance from mood: Test of a conceptual model [abstract]. The Psychologist, p.109.

Lane, A. M., & Terry, P. C. (1999a). Mood states as predictors of performance: Test of a conceptual model [abstract]. Journal of Sports Sciences, 17, 606.

Lane, A. M., & Terry, P. C. (1999b). The conceptual independence of tension and depression [abstract]. Journal of Sports Sciences, 17, 605-606

Lane, A. M., & Terry, P. C. (2000). The nature of mood: Development of a conceptual model with a focus on depression. Journal of Applied Sport Psychology, 12, 16-33.

Lane, A. M., Terry, P. C., Karageorghis, C. I., & Lawson, J. (1999). Mood states as predictors of kickboxing performance: A test of a conceptual model [abstract]. Journal of Sports Sciences, 17, 61-62.

LeUnes, A., & Burger, J. (1998). Bibliography on the Profile of Mood States in sport and exercise, 1971-1995. Journal of Sport Behavior, 21, 53-70.

Lorr, M., & McNair, D. M. (1988). Manual for the Profile of Mood States – Bipolar form. San Diego, CA: Educational and Industrial Testing Service.

Markus, H. (1977). Self-schemata and processing information about the self. Journal of Personality and Social Psychology, 35, 63-77.

Martin, J. J., & Gill, D. L. (1991). The relationships among competitive sport orientation, sport-confidence, self-efficacy, anxiety, and performance. Journal of Sport and Exercise Psychology, 13, 149-159.

Martin, J. J., & Gill, D. L. (1995). The relationships among competitive orientations and self-efficacy to goal importance, thoughts, and performance in high school distance runners. Journal of Applied Sport Psychology, 7, 50-62.

McNair, D. M., Lorr, M., & Droppelman, L. F. (1971). Manual for the Profile of Mood States. San Diego, CA: Educational and Industrial Testing Services.

McNair, D. M., Lorr, M., & Droppelman, L. F. (1992). Revised Manual for the Profile of Mood States. San Diego, CA: Educational and Industrial Testing Services.

Morgan, W. P. (1980). Test of champions: The iceberg profile. Psychology Today, 14, 92-108.

Morgan, W. P. (1985). Selected psychological factors limiting performance: A mental health model. In D. H. Clarke and H. M. Eckert (Eds.), Limits of Human Performance (pp. 70-80). Champaign, IL: Human Kinetics.

Morgan, W. P., & Johnson, R. W. (1978). Personality characteristics of successful and unsuccessful oarsmen. International Journal of Sport Psychology, 9, 119-133.

Morris, W. N. (1992). A functional analysis of the role of mood in affective systems. In M. S. Clarke (Ed.), Review of personality and social psychology: Emotion (pp. 257-293). Newbury Park: Sage.

Muraven, M., Tice, D. M., & Baumeister, R. F. (1998). Self-control as a limited resource: Regulatory depletion patterns. Journal of Personality & Social Psychology, 74, 774-789.

Parkinson, B., Totterdell, P., Briner, R. B., & Reynolds, S. (1996). Changing moods: The psychology of mood and mood regulation. London: Longman.

Prapavessis, H. (2000). The POMS and sports performance: A review. Journal of Applied Sport Psychology, 12, 34-48.

Raglin, J., Morgan, W. P., & Luchsinger, A. (1990). Mood and self-motivation in successful and unsuccessful female rowers. Medicine and Science in Sports and Exercise, 22, 849-853.

Renger, R. (1993). A review of the Profile of Mood States (POMS) in the prediction of athletic success. Journal of Applied Sport Psychology, 5, 78-84.

Rokke, P. D. (1993). Social context and perceived task difficulty as mediators of depressive self-evaluation. Emotion and Motivation, 17, 23-40.

Rowley, A. J., Landers, D. M., Kyllo, L. B., & Etnier, J. L. (1995). Does the iceberg profile discriminate between successful and less successful athletes? A meta-analysis. Journal of Sport and Exercise Psychology, 16, 185-199.

Russell, J. A. (1980). A circumplex model of affect. Journal of Personality and Social Psychology, 39, 1161-1178.

Russell, J. A., & Feldman Barrett, L. (1999). Core affect, prototypical emotional episodes, and other things called emotion: Dissecting the elephant. Journal of Personality and Social Psychology, 76, 805-819.

Schwarz, N., & Bless, H. (1991). Happy and mindless, but sad and smart? The impact of affective states on analytic reasoning. In P. Forgas (Ed.), Emotion and social judgement (pp. 55-71). Oxford: Pergamon.

Spielberger, C. D. (1991). Manual for the State-Trait Anger Expression Inventory. Odessa, FL: Psychological Assessment Resources.

Terry, P. C. (1993). Mood state profile as indicators of performance among Olympic and World Championship athletes. In S. Serpa, J. Alves, V. Ferreira, & A. Paulo-Brito (Eds.) Proceedings of the VIIIth ISSP World Congress of Sport Psychology (pp. 963-967). Lisbon: ISSP.

Terry, P. C. (1995). The efficacy of mood state profiling with elite performers. A review and synthesis. The Sport Psychologist, 9, 309-324.

Terry, P. C., Lane, A. M., Lane, H. J., & Keohane, L. (1999). Development and validation of a mood measure for adolescents. Journal of Sports Sciences, 17, 861-872.

Terry, P. C., & Slade, A. (1995). Discriminant capability of psychological state measures in predicting performance outcome in karate competition. Perceptual and Motor Skills, 81, 275-286.

Vanden Auweele, Y., De Cuyper, B., Van Mele, V., & Rzewnicki, R. (1993). Elite performance and personality: From description and prediction to diagnosis and intervention. In R. N. Singer, M. Murphey, & L. K. Tennant (Eds.), Handbook of research on sport psychology (pp. 257-289). New York: Macmillan.

Watson, D., & Tellegen, A. (1985). Toward a conceptual structure of mood. Psychological Bulletin, 98, 219-235.

Watson, D., Wiese, D., Vaidya, D., & Tellegen, A. (1999). The two general activation systems of affect: Structural findings, evolutionary considerations, and psychobiological evidence. Journal of Personality and Social Psychology, 76, 820-838.

Yerkes, R. M., & Dodson, J. D. (1908). The relation of strength of stimulus to rapidity of habit formation. Journal of Comparative Neurology and Psychology, 18, 459-482.

Yik, M. S. M, Russell, J. A., & Feldman Barrett, L. (1999). Structure of self-reported current affect: Integration and beyond. Journal of Personality and Social Psychology, 77, 600-619.

Table 1

Comparison of mood responses between the no-depression (n = 178) and depressed mood (n = 273) groups

	No-depression		Depressed Mood			
	M	SD	M	SD	t	ES
Anger	46.16	3.75	52.21	9.83	7.85*	0.89
Confusion	46.02	5.11	51.06	8.96	6.83*	0.73
Fatigue	43.57	6.57	48.20	8.98	5.93*	0.61
Tension	49.32	7.12	57.02	10.86	8.35*	0.88
Vigour	51.35	10.41	47.11	9.38	4.50*	0.42

Hotelling's T^2 = 141.02, F (5,445) = 27.95, p < .001; Eta-squared = 0.24

* p < .001

Table 2

Correlations among mood responses in the no-depression (n = 178) and depressed mood (n = 273) groups

	Anger	Confusion	Fatigue	Tension
No-depression				
Confusion	.10			
Fatigue	.05	.23*		
Tension	.16**	.12	-.04	
Vigour	.11	.01	-.32*	.28*
Depressed Mood				
Confusion	.41*			
Fatigue	.35*	.37*		
Tension	.33*	.29*	.11	
Vigour	-.03	-.11	-.11	.03

* p < .01, ** p < .05

Table 3

Lagrange multiplier test results to investigate equality constraints on hypothesised mood-performance relationships in the no-depression (n = 178) and depressed mood (n = 273) groups

Constrained relationship	Multivariate increment	p	Univariate increment	p
Performance - anger	7.375	.007	7.375	.007
Performance - tension	10.536	.005	3.161	.075
Performance - confusion	11.643	.009	1.107	.293
Performance - fatigue	12.767	.012	1.123	.289
Performance - vigour	13.504	.019	0.737	.391

Table 4

Goal difficulty and performance scores for the no-depression (n = 178) and depressed mood (n = 273) groups

	No-depression		Depressed Mood				
	M	SD	M	SD	t_{449}	p	ES
Goal difficulty	52.86	9.53	48.41	8.61	5.15	.000	0.49
Performance	50.52	7.37	47.59	8.28	3.83	.000	0.38

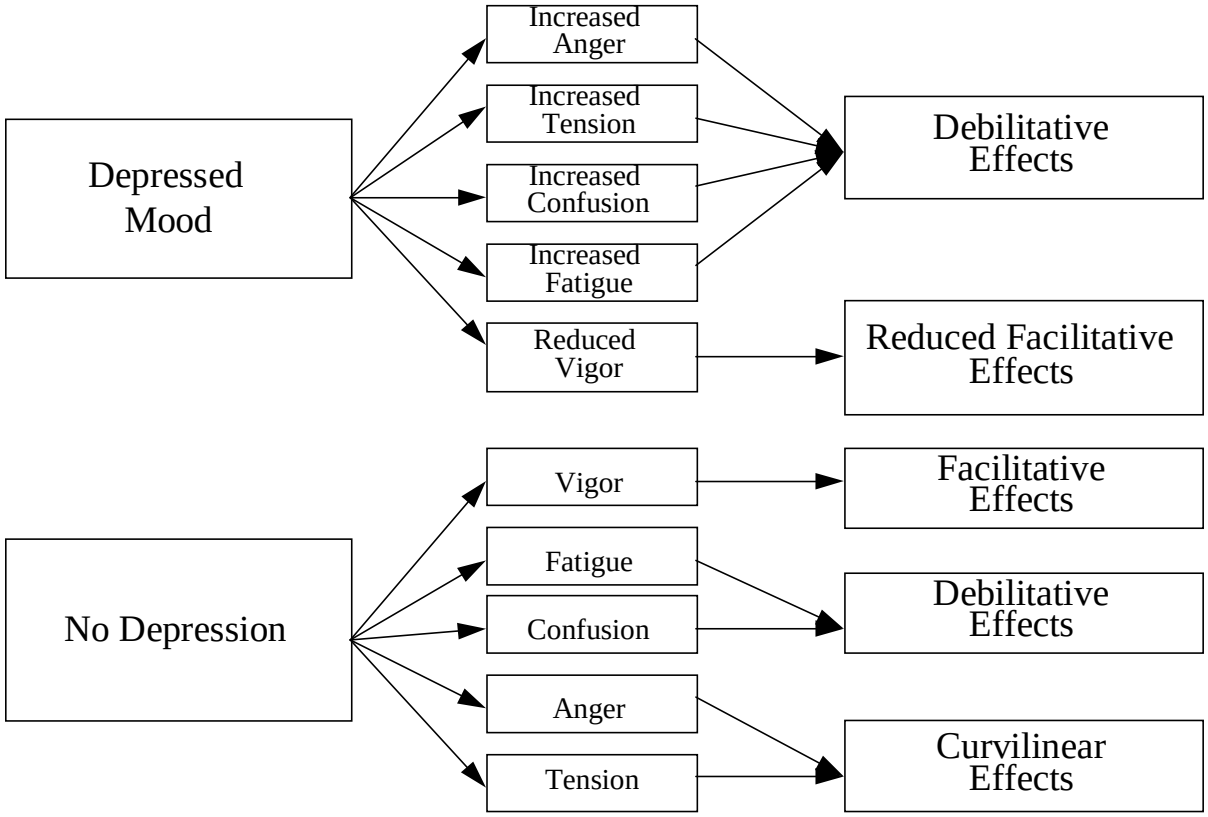
Hotelling's T^2 = 43.24, F (2,448) = 21.571, p < .0001; Eta-squared = .086

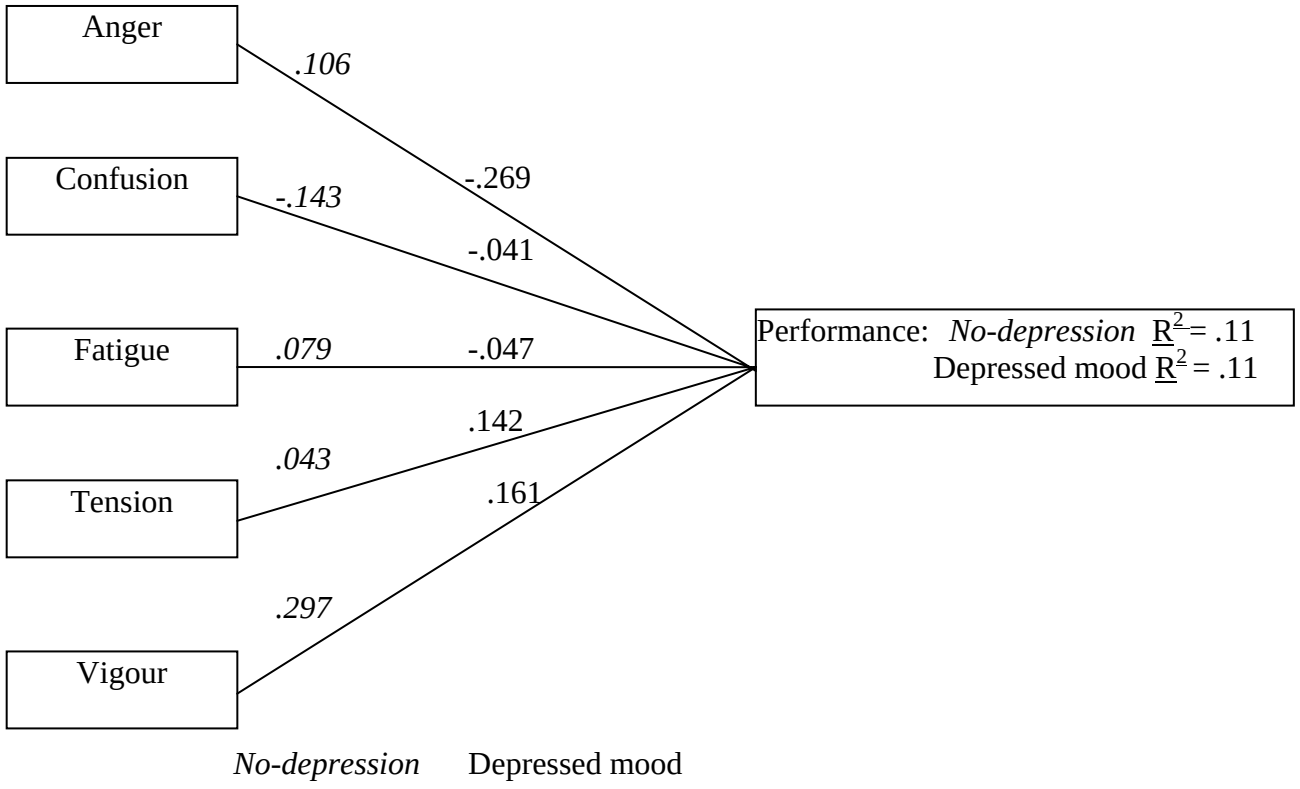
Figure 1

A conceptual model to predict performance from pre-performance mood (Lane & Terry, 2000)

Figure 2

Structural equation model to predict performance in the no-depression (n = 178) and depressed mood (n = 273) groups


Depressed Mood
Increased Anger
Increased Tension
Increased Confusion
Increased Fatigue
Reduced Vigor
Debilitative Effects
Reduced Facilitative Effects
No Depression
Vigor
Fatigue
Confusion
Anger
Tension
Facilitative Effects
Debilitative Effects
Curvilinear Effects


Anger
Confusion
Fatigue
Tension
Vigour
.106
-.269
-.143
-.041
.079
-.047
.142
.043
.161
.297
Performance: No-depression R^2 = .11
Depressed mood R^2 = .11
No-depression
Depressed mood

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