Development and initial validation of the Music Mood-Regulation Scale (MMRS)

Ruth M. Hewston (R.Hewston@warwick.ac.uk)
University of Wolverhampton, UK

Andrew M. Lane (A.M.Lane2@wlv.ac.uk)
University of Wolverhampton, UK

Costas I. Karageorghis (costas.karageorghis@brunel.ac.uk)
Brunel University, West London, UK

Abstract

This study designed a measure to assess the perceived effectiveness of music as a strategy to regulate mood among a sport and exercise population. A strategy of assessing and comparing the integrity of competing hypotheses to explain the underlying factor structure of the scale was used. A 21-item Music Mood-Regulation Scale (MMRS) was developed to assess the extent to which participants used music to alter the mood states of anger, calmness, depression, fatigue, happiness, tension, and vigor. Volunteer sport and exercise participants (N = 1,279) rated the perceived effectiveness of music to regulate each MMRS item on a 5-point Likert-type scale. Confirmatory factor analysis (CFA) was used to test the integrity of four competing models, and results lend support to a correlated 7-factor structure for the MMRS (RCFI = .94; RMSEA = .06). Cronbach alpha coefficients were in the range of 0.74 – 0.88 thus demonstrating the internal reliability of scales. It is suggested that the MMRS shows promising degrees of validity. Future research should assess the extent to which individuals can develop the ability to use music as a strategy to regulate mood in situations in which disturbed mood might be detrimental to performance.

Keywords: Self-regulation; psychometric; measurement; music; affect.

Development and initial validation of the Music Mood-Regulation Scale

There is a consensus in the literature that individuals monitor, evaluate, and employ several conscious and sub-conscious processes to regulate their moods (see Parkinson, Totterdell, Briner, & Reynolds, 1996; Thayer, 1989, 1996; Thayer, Newman, & McClain, 1994). Mood-regulation strategies are thoughts and behaviors intended to eliminate, maintain, or change emotional states (Parkinson et al., 1996). Most mood-regulating strategies focus on increasing or maintaining the intensity of positive mood states and decreasing or eliminating negative moods (Ben-Ze'ev, 2000).

The value of strategies to regulate mood states is important in activities that require individuals to perform at their optimum under conditions that might elicit intense psychological states. Examples of such activities include performances in front of large audiences (e.g., musicians, Steptoe, 2001), performing tasks of critical importance (e.g., armed forces, Liu, Gong, Zhao, & Wu, 2000), or performing in front of an important audience (e.g., job interview; Fox & Spector, 2000). One set of activities closely associated with intense mood states is competitive sport (Terry & Lane, 2000). Applied sport psychologists have suggested that as the demand on elite athletes to perform at optimum levels grows, it is important to gain a better understanding of the techniques that may be used to cope with performance threatening moods (Terry, 1995). Research indicates that mood states assessed shortly before competition are predictive of performance (Beedie, Terry, & Lane, 2000) and that mood-regulation expectancy skills are associated with improved mood (Totterdell & Leach, 2001).

Few studies have explored the mood-regulating strategies used by athletes. Perhaps the most comprehensive study on mood-regulation was conducted by Thayer et al. (1994), who investigated strategies used as part of everyday life rather than focusing on a specific population or activity. Thayer et al. (1994) proposed that mood-regulation is the raising and lowering of energy levels and reducing of tension levels. By extension, successful mood regulation lies in the identification of individual energy and tension levels, and the ability to modulate them to optimal levels. Thayer et al. assessed the strategies that individuals use to regulate mood across three studies (Study 1: N = 102; Study 2: N = 308; Study 3: N = 26). Despite focusing more on the self-regulation of negative moods than positive moods, their findings suggest there may be an overlap between strategies used to change a bad mood and those used to reduce tension and raise energy levels. Results indicated that

"listening to music" was rated as an effective behavioral strategy for self-regulation of mood. In particular, it was rated as a successful strategy for increasing energy, reducing tension, and changing a bad mood.

The potent effect that music has over the mood states of athletes has been cited in numerous anecdotal reports (e.g., Gluch, 1993). Similarly, in examining the effectiveness of music, Kodzhaspirov, Zaitsev, and Kosarev (1988) found that 100% of weightlifters interviewed claimed that music improved their mood. Indeed, the effect of music in sport and exercise contexts has attracted interest from researchers and music has long been considered a means by which to change mood (Karageorghis & Terry, 1997; Karageorghis, Terry, & Lane, 1999). However, in selecting music for mood enhancement, researchers have often failed to control for types of music selections used. Karageorghis and Terry emphasized that research to examine the effects of music is fraught with methodological problems. Several methodological limitations have led to inconsistencies in positive findings, and on many occasions researchers have failed to take into consideration important aspects of musicality, sociocultural background of participants, and appropriate dependent measures in research design. A further limitation in the literature is that a valid measure to assess the effectiveness of music as a mood-regulating strategy does not exist. The existence of an appropriate measure would allow researchers and practitioners to gain a fuller understanding of the utility of musical interventions in sport and exercise contexts. In addition, researchers interested in the effects of music on mood enhancement have not considered the extent to which individuals actively use music to enhance or regulate mood.

In summary, if athletes use strategies such as listening to music to improve mood, and if mood-enhancement leads to superior performance, researchers should seek to develop a more detailed understanding of how athletes use music to improve mood. Hence, a greater understanding of the interventions employed to improve mood could be used to enhance sport performance. The absence of a validated measure presents a serious hurdle to the furtherance of this line of investigation. The purpose of the present study was to develop and initiate the validation of a measure designed to assess the perceived effectiveness of music as a strategy to regulate mood among a sport and exercise population: The Music Mood-Regulation Scale (MMRS). The validation process comprised a thorough test of the factorial validity and internal consistency of the instrument.

Method

Participants

Volunteer sport and exercise participants (N = 1,279; male n = 574; mean age = 24.10 years, SD = 8.3 years; 17 did not report age; female n = 565, mean age = 24.19 years, SD = 7.86 years; 25 did not report age) completed the 21-item MMRS. Participants included undergraduate sports science students from a university in central England and a university in West London, postgraduate dance students from East London, and volunteer gym and sport facility users from private health clubs in central England.

Development of the Music Mood-Regulation Scale

The nature of mood has been the subject of considerable debate (Lane & Terry, 2000; Watson & Tellegen, 1985). Mood-performance research has predominantly used the Profile of Mood States (McNair, Lorr, & Droppleman, 1971, 1992) description of mood that assesses anger, confusion, depression, fatigue, tension, and vigor. Lane and Terry (2000) presented a case for investigating discrete mood dimensions rather than using general measures of positive and negative mood, as suggested by Watson and Tellegen (1985). Lane and Terry (2000) based their recommendations on meta-analysis results that show each mood state influences performance differently. Further, Ekkekakis and Petruzzello (2002) suggested the use of the circumplex model as a conceptual and measurement model for studying affect in the context of exercise. A limitation of the POMS model of mood is that it does not address the full range of positive mood states with recent research suggesting that positive mood dimensions, such as happiness and calmness, may also influence sports performance (Hanin, 2000).

The Music Mood-Regulation Scale was based upon the POMS model of mood with the addition of two positive mood states. The decision was made not to include the confusion construct. Although confusion is assessed by the POMS, and is associated with poor performance, the construct appears to assess cognition rather than affective state (Lane & Terry, 2000). Confusion is proposed to be an antecedent, consequence, or correlate of mood states such as tension and depression. Inclusion of confusion in the POMS is plausible given the scale was designed to assess manifestations of mood disorders (Rust & Golombok, 1999). It should not be surprising that conceptualization of confusion as a mood state scale is almost exclusive to researchers who use the POMS. Therefore, the proposed scale was designed to assess four unpleasant mood states (anger, depression, fatigue,

and tension) and three pleasant mood states (calmness, happiness, and vigor).

Adjectives to assess the affective component of each item for the mood states of anger, depression, fatigue, tension, and vigor were selected from The Brunel Mood Scale (BRUMS: Terry, Lane, Lane, & Keohane, 1999; Terry, Lane, & Fogarty, 2003). The BRUMS is a 24-item measure that assesses the same mood dimensions as the POMS (McNair et al., 1971, 1992) and was rigorously validated for use with athletic samples. Items to assess calmness and happiness were selected from the UWIST Mood Adjective Checklist (Matthews, Jones, & Chamberlain, 1990). The MMRS is a 21-item measure that assesses seven factors, each of which are represented by three items.

The format for the items in the MMRS was developed by modifying the measure used by Thayer et al. (1994) which asked participants to rate the effectiveness of each strategy for regulating bad moods, decreasing tension and increasing 'energy'. The present study focused on the effectiveness of music as a regulation strategy and sought to develop constructs of music mood regulation. Items were rated on a 5-point Likert-type scale, ranging from 0 (*not at all*) to 4 (*extremely*). Examples included, "If you need to feel lively, how effective is listening to music as a strategy to achieve this feeling?" and "If you are feeling unhappy, how effective is listening to music as a strategy to change this feeling?"

Procedure

Participants were approached on whether they wished to take part in a project that looks at how music can alter mood states. They were asked to think back to situations when they experienced mood states and consider what strategies they used to manage these moods. The MMRS was then administered with participants being informed that there were no right or wrong answers, with confidentiality assured.

The MMRS was administered in one two locations: The reception area of health clubs or in university lecture theatres. Exercise participants were approach either before or after an exercise session, while students were approached either before or after a lecture.

Model testing

Four competing models were tested with multisample confirmatory factor analysis employed to test the invariance of models that showed acceptable fit with the data by gender. Gender was chosen as a potential moderator variable as previous research has found evidence of differences in mood regulation between males and females (Thayer et al., 1994). The first was a correlated 7-factor model in which the effectiveness of music to regulate the discrete mood dimensions of anger, calmness, depression, fatigue, happiness, tension, and vigor was considered. In this model, it was proposed that there would be commonality between each mood state that would be indicated by moderate correlations. As the items used to describe mood states were taken from validated scales that have shown factorial validity within a correlated model (Mathews et al., 1990; Terry et al., 1999, 2003), it was expected that this model would be supported. The second model assessed a 7-factor model in which music would regulate each mood state independently, and an uncorrelated model was tested accordingly. The third model tested was a 1-factor congeneric model, based on the hypothesis that participants did not distinguish between discrete mood dimensions in using music to self-regulate mood. The fourth model tested was a 2-factor model, based on the hypothesis that participants would differentiate between using music to self-regulate positive and negative mood states (cf. Watson & Tellegen, 1985).

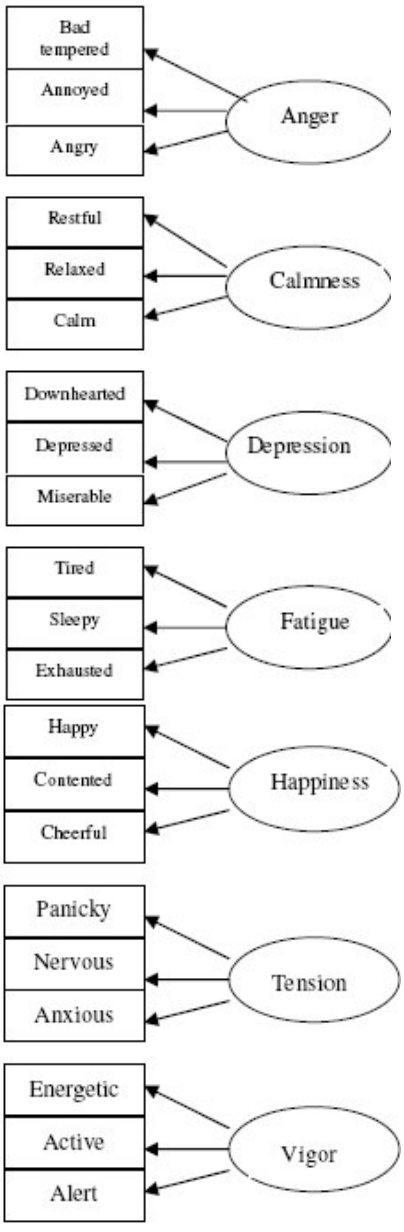

Figure 1. Hypothesized factor loadings for the Music Mood-Regulation Scale (MMRS).

The procedure for multisample CFA is to test an unconstrained model in order to obtain a baseline measure with subsequent analyses adding progressively more equality constraints (Bentler, 1995).

Data were analyzed using confirmatory factor analysis (CFA) on EQS V5 (Bentler & Wu, 1995). The hypothesized 7-factor model is presented in Figure 1. Multivariate normality was assessed using Mardia's (1974) coefficient. Preliminary investigation indicated that the data were not normally distributed (Mardia's coefficient = 366.10). Significant positive kurtosis was also identified, indicated by a large normalized estimate value (Normalized estimate = 210.63). Although these values are statistically significant, Mardia (1974) highlighted that large sample sizes may positively bias this coefficient. Bentler (1995) suggested that when the normality assumption was reasonable, the Maximum Likelihood Estimation Method is preferred, particularly when applied to sample sizes of > 500.

The χ^2 statistic is generally considered the most stringent of fit indices (Bentler, 1995). However, there is widespread agreement that model fit should be examined using a number of acceptable fit indices, particularly given the inability of the χ^2 statistic to indicate model appropriateness among larger samples (Hu & Bentler, 1999). The Comparative Fit Index (CFI: Bentler, 1995) assesses the model fit relative to other models. In the present study, the Robust CFI was used as data demonstrated multivariate non-normality. Bentler (1995) recommended that the CFI should be considered the best indicator of model fit, with values above .90 being considered as adequate.

The Root Mean Square Error of Approximation (RMSEA) measures the extent to which a model is supported per degree of freedom. Hu and Bentler (1999) proposed that the RMSEA should be below an upper boundary of .08 for adequate fit. The Akaike Information Criterion (AIC: Akaike, 1987) is a goodness-of-fit measure which adjusts model chi-square to penalize for model complexity. The lowest AIC value represents the best fitting model.

As gender has been found to influence the regulation process (Thayer et al., 1994; Ben-Ze'ev, 2000), a multisample CFA was conducted to test factorial invariance across genders. Internal consistency of subscales was also examined by calculating Cronbach (1951) alpha coefficients.

Results

CFA was used to test a number of competing models for the MMRS. Table 1 indicates that, in accordance with theoretical predictions, there is general support for the hypothesized 7-factor model. The goodness-of-fit indices for the 1 and 2-factor models and uncorrelated 7-factor model indicated a poor fit to the data (RCFI < .90, RMSEA < .06). As Table 1 indicates, results for the 7-factor correlated model showed better fit than the three competing models and produced the smallest AIC value.

Table 1
Goodness-of-fit Indices for Competing Models of the MMRS among a Sport and Exercise Sample (N = 1,279)

Fit statistics	7-factor correlated model	7-factor uncorrelated model	1-factor model	2-factor model
χ^2	896.67* (*df* = 168)	5928.78* (*df* = 187)	4688.35* (*df* = 187)	5928.78* (*df* = 187)
RCFI	.94	.54	.64	.54
AIC	721.88	6714.88	5353.53	6714.88
RMSEA	.06	.17	.15	.17

* $p > 001$.

Standardized solutions and error variances (in brackets) are contained in Table 2 for the 7-factor model. The standardized solution for factor loadings ranged from .59 (contented) to .90 (annoyed) (see Table 2). Means, standard deviations, and correlation coefficients among mood dimensions for the 7-factor model are contained in Table 3. Significant moderate and strong correlation coefficients were found between all mood dimensions, other than a weak significant correlation coefficient between vigor and calmness.

Table 2
Standardized Solutions and Error Variance for the MMRS among a Sport and Exercise Sample (N = 1,279)

	Standardised factor loading (error variance in brackets)
Anger	
Angry	.88 (.48)
Bad tempered	.78 (.63)
Annoyed	.90 (.44)
Calmness	
Relaxed	.81 (.58)
Restful	.72 (.70)
Calm	.66 (.75)
Depression	
Downhearted	.89 (.47)
Miserable	.77 (.64)
Depressed	.87 (.50)
Fatigue	
Tired	.84 (.54)
Sleepy	.79 (.62)
Happiness	
Happy	.76 (.65)
Cheerful	.79 (.62)
Contented	.59 (.80)
Tension	
Anxious	.80 (.60)
Panicky	.79 (.62)
Nervous	.80 (.60)
Vigor	
Energetic	.71 (.71)
Alert	.63 (.78)
Active	.85 (.53)

Table 3
Descriptive Statistics and Correlation Coefficients Between Mood Dimensions among a Sport and Exercise Sample (N = 1,279)

	M	*SD*	Anger	Calmness	Depression	Fatigue	Happiness	Tension
Anger	5.39	3.13						
Calmness	7.82	2.55	.38*	-				
Depression	6.40	3.06	.62*	.40*	-			
Fatigue	4.78	2.91	.58*	.34*	.57*	-		
Happiness	7.50	2.32	.40*	.50*	.54*	.45*	-	
Tension	4.55	2.85	.77*	.40*	.62*	.62*	.44*	-
Vigor	8.00	2.55	.35*	.26*	.33*	.47*	.70*	.34*

* $p < .001$.

Although mood regulation scores were correlated, a Friedman repeated measures (all seven MMRS scores failed the Kolmogorov-Smirnov test of normality, $p < .001$) analysis indicated a significant effect, $\chi^2_{6,1279} = 2426.10$, $p < .001$. Wilcoxon matched-pairs test results revealed significant differences between all mood-regulation states. Participants reported that music was more effective in regulating vigor followed by calmness, happiness, depression, anger, fatigue, and tension. Thus, although music mood-regulation factors are correlated, participants indicate that music is more effective at changing positive mood states than negative mood states.

Multisample analysis results to examine the hypothesized model among male and female sport and exercise participants showed support for the 7-factor model. CFA results indicated an acceptable fit (CFI = .91, RMSEA = .05) among both samples. Cronbach alpha estimates of internal consistency ranged from .74 to .88 (anger α = .88, calmness α = .81, depression α = .87, fatigue α = .83, happiness α = .74, tension α = .84, vigor α = .75).

Discussion

The aim of the present study was to develop and initiate the validation process for a measure designed to assess the perceived effectiveness of music as a strategy to regulate mood. Results of CFA lend support to the integrity of the proposed 7-factor model assessing anger, depression, calmness, fatigue, happiness, tension, and vigor. Further, although previous research has suggested that gender influences the regulation process (Thayer et al., 1994), multisample confirmatory factor analysis results show evidence of invariance of the effectiveness of music as a regulation strategy. It should be noted that multisample CFA is proposed to provide a rigorous test of the invariance of a factor structure (Bentler, 1995; Hu & Bentler, 1999). Internal consistency coefficients are above acceptable cutoff values of .70 which, it should be noted, are particularly high values for three-item scales (Loewenthal, 2001).

Although correlation coefficients revealed positive, significant correlations between all the seven mood-dimensions, Friedman's non-parametric ANOVA results show that music is more effective at regulating vigor, calmness, and depression and less effective at regulating happiness, tension, anger, and fatigue. Thus, although mood states are related, the effectiveness of music as a regulation strategy tends to vary, suggesting that each dimension should be treated as being relatively independent. Collectively, results demonstrate the factorial validity and internal consistency of the MMRS.

We suggest that the development and validation of the MMRS fills a needy gap in the literature. Previous research in this area has used single-item measures to assess expected self-regulation strategies (Thayer et al., 1994) rather than developing constructs for mood-regulation. Given the inherent relationship between measurement and theory testing, findings derived from a single-item measure could be seen as questionable given that no attempt to account for error measurement is made (Anastasi & Urbina, 1997). If the construct validity of the instrument is questionable, then it is not possible to accurately test the theory under investigation. It is suggested that the development of a valid measure of the theoretical construct to be examined should be the first step in the research process, and we propose that the MMRS fulfils this need.

As highlighted by Anastasi and Urbina (1997), validation of psychometric questionnaires is an ongoing process. Construct validity is evidenced through an accumulation of evidence that shows that scores on the target inventory are consistent with theoretical predictions. Four possible lines of investigation are suggested for future research. First, the validation of the MMRS should be extended to include criterion validity through investigating relationships with previously validated scales. Clearly, the lack of a previously validated measure of music mood-regulation measure in the literature means that a traditional test of concurrent validity is problematic. Examination of relationships between MMRS scores and dispositional constructs such as coping (Carver, Scheier, & Weintraub, 1989), self-esteem (Rosenberg, 1965), and emotional intelligence (Goleman, 1995; Schutte, Malouff, Hall, Haggerty, Copper, Golden, & Dornhein, 1998) would provide valuable information on the nature of using music as a mood regulation strategy. It is plausible to suggest that the ability to regulate mood through listening to music is associated with effective coping skills (Terry, 1994; Thayer et al., 1994), and high self-esteem (Campbell, 1990). In addition, the ability to use music to regulate mood could be an expression of emotional intelligence, as both constructs require identification of current mood, an understanding of factors that influence mood, and beliefs that mood states influence subsequent behavior (Parker, 2000).

Second, research should investigate the test-retest stability of the MMRS. Cantanzaro and Mearns (1990) reported acceptable test-retest correlations for a measure of negative mood-regulation expectancies. However, this measure assesses a range of different behaviors and strategies, and therefore, it is plausible that the nature of music could well influence the stability of its effectiveness. The influence of music as strategy to regulate mood is likely to depend on an interaction between the ability to identify current mood and the availability of appropriate music. If an individual changes the music they listen to, this might be associated with an enhanced capability to regulate

mood. On the other hand, pieces of music may cease to be effective in the regulation of mood states following prolonged listening. In addition, the stability of using music as a mood-regulation strategy might depend on the extent to which individuals can find music that matches their desired mood states.

The third line of investigation for future research should involve examination of the extent to which MMRS scores can predict changes in mood states following listening to appropriately selected music. For example, high scores on the MMRS should be associated with the ability for individuals to alter negative mood states through listening to music. Fourth, it is suggested that the factorial validity of the MMRS be extended to other populations that elicit intense mood states such as dancers, actors, and musicians. Further, future research should use multisample CFA to cross-validate the findings from the present study to different populations[1].

It is suggested that the MMRS could provide practitioners with baseline scores on the effectiveness of using music as a strategy to regulate mood. A great deal of the work of applied sport psychologists involves dealing with mood states that might impair or inhibit performance (Terry, 1995). Assessment of psychological skills is often seen as an integral part of the work of an applied sport psychologist (e.g., Thomas, Murphy, & Hardy, 1999). One method of assessing the psychological skills of athletes is by using psychometric instruments, but the utility of such measures depends fundamentally upon their validity and reliability. Although the use of music has been suggested as a strategy to regulate mood, the absence of a previously validated scale has restricted examination into the potential of music to alter mood states. Evidently the demonstration of factorial validity and internal consistency of the MMRS provides practitioners with a scale that could be used to assess interventions designed to sharpen the use of music as a mood-regulation strategy.

In conclusion, CFA supported the factorial validity of a 21-item 7-factor model among a volunteer sport and exercise sample. Although future validation work is desirable, the present study has used robust methods to evidence factorial validity and internal consistency that should facilitate use of the MMRS to in testing theoretical propositions regarding the nature of mood-regulation (Parkinson et al., 1996; Thayer et al., 1994).

References

Akaike, H. (1987). Factor analysis and AIC. *Psychometrika, 52,* 317-332.

Anastasi, A., & Urbina, S. (1997). *Psychological Testing* (7th ed.). New York: Prentice-Hall.

Beedie, C., Terry, P. C., & Lane, A. M. (2000). The Profile of Mood States and athletic performance: Two meta-analyses. *Journal of Applied Sport Psychology, 12,* 49-68.

Bentler, P. M. (1995). *EQS Structural equation program manual.* Los Angeles, CA: Multivariate Software Inc.

Bentler, P. M., & Wu, E. J. C. (1995). *EQS/Windows user's guide.* Los Angeles, CA: Multivariate Software Inc.

Ben-Ze'ev, A. (2000). *The subtlety of emotions.* Cambridge, MA: MIT Press.

Campbell, J. D. (1990). Self-esteem and clarity of the self-concept. *Journal of Personality and Social Psychology, 59*, 528-549.

Cantanzaro, S. J., & Mearns, J. (1990). Measuring generalized expectancies for negative mood-regulation: Initial scale development and implications. *Journal of Personality Assessment*, *54*, 546-563

Carver, C. S., Scheier, M. F., & Weintraub, J. K. (1989). Assessing coping strategies: A theoretically based approach. *Journal of Personality and Social Psychology, 56*, 267-283.

Cronbach, L. J. (1951). Coefficient alpha and internal structure tests. *Psychometrika, 16,* 297-334.

Ekkekakis, P., & Petruzzello, S. J. (2002). Analysis of the affect measurement conundrum in exercise psychology: IV. A conceptual case for the affect circumplex. *Psychology of Sport and Exercise, 3,* 35-63.

Fox, S., & Spector, P. E. (2000). Relations of emotional intelligence, practical intelligence, general intelligence, and trait affectivity with interview outcomes: It's not all just 'G'. *Journal of Organizational Behavior*, *21,* 203-220.

Gluch, P. (1993). The use of music in preparing for sport performance. *Contemporary Thought, 2,* 33-53.

Goleman, D. (1995). *Emotional intelligence: Why it can matter more than IQ.* New York: Bantam.

Hanin, Y. L. (Ed.). (2000). *Emotions in sport.* Champaign, IL: Human Kinetics.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indices in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6,* 1-55.

Karageorghis, C. I., & Terry, P. C. (1997). The psychophysical effects of music in sport and exercise: A review. *Journal of Sport Behavior, 20,* 54-68.

Karageorghis, C. I., Terry, P. C., & Lane, A. M. (1999). Development and validation of an instrument to assess the motivational qualities of music in exercise and sport: The Brunel Music Rating Inventory. *Journal of Sports Sciences, 17,* 713-724.

Kodzhaspirov, Y. G., Zaitsev, Y. M., & Kosarev, S. M. (1988. The application of functional music in the

[1] Researchers interested in using data from the present study for multisample analysis should contact the corresponding author.

training sessions of weightlifters. *Soviet Sports Review, 23,* 39-42.

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

Liu, S., Gong, D., Zhao, H., & Wu, M. (2000). Armymen's emotions of anxiety and depression, 2: Leading factors and their interaction. *Psychological Science, 23*, 52-54.

Loewenthal, K. M. (2001). *An introduction to psychological tests and scales (2nd ed.*). London: UCL Press Limited.

Mardia, K. V. (1974). Applications of some measures of multivariate skewness and kurtosis in testing normality and robustness studies. *Sankhya B, 36,* 115-128.

Matthews, G., Jones, D. M., & Chamberlain, A. G. (1990). Refining the measurement of mood: The UWIST Mood Adjective Checklist. *British Journal of Psychology, 81,* 17-42.

Mayer, J. D., & Salovey, P. (1995). Emotional intelligence and the construction and regulation of feelings. *Applied and Preventive Psychology, 4,* 197-208.

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

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

Parker, J. (2000). Emotional intelligence: Clinical and therapeutic implications. In R. Bar-On and J. Parker (eds), *The Handbook of Emotional Intelligence* (pp. 490-504). San Francisco, CA: Jossey-Bass.

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

Rosenberg, M. (1965). *Society and the adolescent child*. Princeton, NJ: Princeton University Press.

Rust, J., & Golombok, S. (1999). Modern Psychometrics: The Science of Psychological Assessment. London: Routledge.

Schutte, N. S., Malouff, J. M., Hall, L. E., Haggerty, D. J., Copper, J. T., Golden, C. J., & Dornhein, L. (1998). Development and validation of a measure of emotional intelligence. *Personality and Individual Differences, 25,* 167-177.

Steptoe, A. (2001). Negative emotions in music making: The problem of performance anxiety. In Juslin, P. N., & Sloboda, J. A. (Ed.). Music and emotion: Theory and research. Series in affective science. (pp. 291-307). viii, 487pp.

Terry, D. J. (1994). Determinants of coping the role of stable and situational factors. *Journal of Personality and Social Psychology, 66*, 895-910.

Terry, P. C. (1995). The efficacy of mood state profiling among elite competitors: A review and synthesis. *The Sport Psychologist, 9,* 245-260.

Terry, P. C., & Lane, A. M. (2000). Normative values for the Profile of Mood States for use with athletic samples. *Journal of Applied Sport Psychology*, *12*, 93-109.

Terry, P. C., Lane, A. M., & Fogarty, G. (2003). Construct validity of the Profile of Mood States-A for use with adults. *Psychology of Sport and Exercise*, *4*, 125-139.

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

Thayer, R. E. (1989). *The biopsychology of mood and arousal.* New York: Oxford University Press.

Thayer, R. E. (1996). *Origins of everyday moods: Managing energy, tension, and stress.* New York: Oxford University Press.

Thayer, R. E., Newman, R., & McClain, T. M. (1994). Self-regulation of mood: Strategies for changing a bad mood, raising energy, and reducing tension. *Journal of Personality and Social Psychology, 67,* 910-925.

Thomas, P.R., Murphy, S., & Hardy, L. (1999). Test of performance strategies: Development and preliminary validation of a comprehensive measure of athletes' psychological skills. *Journal of Sports Sciences, 17*, 697-711.

Totterdell, P., & Leach, D. (2001). Negative mood regulation expectancies and sports performance: An investigation involving professional cricketers*. Psychology of Sport and Exercise, 2,* 249-265.

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

Correspondence to: Prof. Andrew Lane, School of Sport, Performing Arts and Leisure, University of Wolverhampton, Gorway Road, Walsall, WS1 3BD, United Kingdom.
Tel: ++ 00 (0)1902-322862
E-mail: A.M.Lane2@wlv.ac.uk

Research Profile

Dr Ruth Hewston is a Senior Research Fellow at the University of Warwick. She is author of over fifty conference papers and articles on music, psychology and education and has presented her work across Europe, America, Australia, Asia and Africa. She currently serves on the editorial board for the International Journal of Music Education. Ruth is also a qualified Kindermusik Educator licensed to teacher the Kindermusik music and movement curricula to parents and their children from birth to seven years and an Associate Partner of the meNet European Network

Project for Music Education. Dr Hewston's scholarly achievements have recently been recognised by entry into the Marquis Who's Who in the World (2006) and the Dictionary of International Biography (2007).

Prof Andrew Lane is a Professor of Sport and Learning at the University of Wolverhampton. He has authored over 100 peer refereed publications and authored an edited book on mood and human performance. His research features on factors that influence performance, particularly in sport and exercise settings, but also educational and organisational. He is accredited sport psychological by the British Association of Sport and Exercise Sciences for research and scientific support and is Chartered by the British Psychological Society. He is the editor of *The* Sport and Exercise Scientist and on editorial boards for the Journal of Sports Science and Medicine and Journal of Hospitality, Sport, Tourism, Education. He is an applied practitioner working with athletes from a number of sports, although specialises in athletes in combat sports.

Dr Costas Karageorghis is the author of more than 100 scholarly articles in the area of sport and exercise psychology. He has also made some 60 conference presentations – mainly in the area of the psychophysical effects of music, which he has been researching for 15 years. Dr Karageorghis is currently a Reader in Sport Psychology and academic area leader for Sport Psychology and Coaching at Brunel University, West London. He has been a visiting lecturer on the MSc Science and Medicine of Athletic Performance at Oxford University for 5 years. He is a double-accredited member of the British Association of Sport and Exercise Sciences for research and scientific support. In his spare time, Dr Karageorghis enjoys playing live music and is an accomplished jazz pianist. He performs regularly with vocalist Jess Blatchley in the west London area.