

Use of Mood Scores as Indices of Athletic Character and Stress Reactivity Among Musicians

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Abstract—Fifty-three professional musicians completed the Profile of Mood States (POMS) and, with 14 additional subjects, the Millon Behavioral Health Inventory (MBHI), and the results were compared with the POMS results from a study of the candidates for the 1974 U.S. national heavyweight rowing team. The MBHI data showed that musicians are similar to the general population in their coping styles, except for introversion, sociability, and confidence, where they score higher. Comparison of musicians' POMS scores with college athletes and psychiatric outpatient scores showed a much higher score for the positive trait of vigor in musicians, and much lower scores for all the negative traits of tension, fatigue, depression, and confusion. The finding that musicians are less prone than the general population to hypochondriasis and psychological exaggeration of pain emphasizes the primarily organic basis for their ailments and complaints. The finding that musicians with the "iceberg profile" of athletes demonstrate lower levels of self-reported stress suggests the use of this profile as a screening tool for impending burnout, excessive muscle tension in performance, and injury-proneness. *Med Probl Perform Art* 5:45-48, 1990.

The kinship between musicians and athletes has often been mentioned in the literature: "Like athletes, musicians perform for the public; and like professional athletes, they can lose their jobs if they don't perform. But only athletes work with physicians and trainers almost daily."¹ In another passage, the author stresses the fact that "asking a serious musician to give up his instrument is like asking an Olympic runner to give up sprinting. . . ."

More than a half a century ago, Singer² had already reported the high physical exertion level in musicians. He noted that a pianist consumes up to 180 calories per hour of performance and that a violinist's oxygen uptake can be as high as 400 cc per minute, with an increase of up to 160% in carbon dioxide release. The latter figure was noted to be in the order of 275% for kettle-drummers, 120% for

conductors, 111% for clarinetists, 70-90% for horn players, and 30-50% for pianists. Following the classic athletic leitmotiv of "no pain no gain," some string players have been known to practice passages over and over until their fingers bleed.¹

Illustrating musculoskeletal adaptive changes in athletes, Priest et al.³ described, in tennis players who started playing tennis as early as 8 years of age, a depression or droop of the dominant shoulder associated with apparent scoliosis that they called "tennis shoulder." They attributed this deformity to the increased mass of the hypertrophied racket-holding extremity pulling down on the shoulder. Many other such examples are reported in the sports medicine literature.

Early start before completion of musculoskeletal growth is even more characteristic of professional musicians. Bejjani et al.^{4,5} found that 39.4% of the musicians in their study started at age 6 or before, and 46.5% between ages 7 and 13. In another study,⁶ the authors compared musicians with various instruments to a matched group of nonmusicians who served as controls. Many significant differences were observed that were attributed to musculoskeletal adaptive changes induced by the instrument. For instance, in violinists the left shoulder was higher than the right, and the right upper extremity longer than the left. Cellists had a more elongated left hand and violists a longer left middle finger. Harpists had a relatively narrow first hand web bilaterally. Mild functional spinal deformities were found in 56% of all musicians. These were mainly changes in the thoracic kyphosis and scapular prominence, as well as various scoliotic curvatures. The nature of the latter varied with the instrument.

Besides their similarities in physical exertion, early start, and musculoskeletal adaptive changes, both musicians and athletes seem to be particularly sensitive to a certain psychological preparedness. Ziporyn¹ stressed the fact that the more tense the player, the more likely a physical injury would occur, and that any sort of psychological conflict can make a performer more injury-prone. Smith⁷ pointed out that such individual characteristics as anxiety proneness and

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low frustration tolerance play important roles in determining athletic burnout.

Morgan⁸ administered the Profile of Mood States (POMS), an adjectival checklist measure of mood, to candidates for the 1974 U.S. national heavyweight rowing team. An "iceberg profile" (Fig. 1) of above-average scores on vigor and below-average scores on negative factors such as tension, depression, confusion, anger and fatigue was found for those athletes who were chosen independently by their coaches for the final competitive team. Similar results were obtained in trials to predict selection for the U.S. Olympic wrestling team in 1972 and 1976,⁸ and for top marathoners and middle distance runners in a separate study of athletic ability.⁹

Morgan⁷⁻⁹ notes that athletic character has multiple determinates and therefore cannot be assessed using only one psychological measure. However, the consistency of the "iceberg profile" for diverse athletic groups makes it a useful instrument to assess the athletic character in various professional performers by means of the POMS. Furthermore, a significant inverse relationship was found between the tension score, as measured in the POMS, and musicians' finger temperature during performance.¹⁰ A similar relationship was also found between muscle tension and finger temperature, thus confirming the parallel between muscle tension and psychological tension in musicians.¹⁰

METHODOLOGY

Fifty-three professional musicians, 21 males and 32 females, with a mean age of 35 ± 11 , including 9 violinists, 9 violists, 2 bassists, 6 cellists, 10 pianists, and 5 guitarists, completed the POMS questionnaire as part of an overall

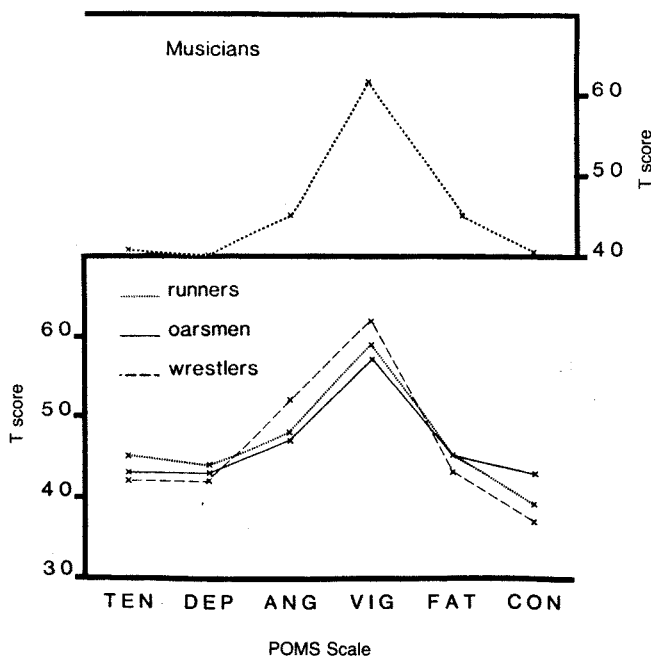


FIGURE 1. Comparison of mean POMS profile in musicians and other athletic groups.

clinical, biomechanical, and ergonomic study of occupational musculoskeletal disorders in this population. The POMS was administered at the beginning of Part II of the study, primarily consisting of biomechanical performance evaluation.

The same subjects, with an additional 14 others, had also completed the broader spectrum Millon Behavioral Health Inventory (MBHI) questionnaire. The MBHI was administered during Part I of the study, consisting of clinical and anthropometric data acquisition. Besides yielding information on their coping styles and psychological stressors, as compared to the general population, the MBHI data were also used for validation of the POMS scores obtained in Part II of the study.

The POMS is an analytically derived factor measure of mood that has been widely used in studies of emotional and physical response to stress.¹¹ The respondents are asked to rate 65 adjectives that describe experiences they may have had during the past week. Ratings are made on a scale from 0 for "not at all" to 4 for "extremely." Six subscores describing six areas of affective functioning can be determined: (1) tension-anxiety, (2) depression-dejection, (3) anger-hostility, (4) vigor-activity, (5) fatigue-inertia, and (6) confusion-bewilderment. This questionnaire has been extensively validated by its inventors on two types of populations, college students and psychiatric outpatients.

The MBHI is a self-reported inventory developed specifically for the assessment of psychosocial factors related to health.¹² It provides information on personality, coping styles, response to psychological stressors, and likely response to treatment for patients undergoing evaluation and/or treatment for physical ailments in medical settings. The MBHI has been extensively validated on more than 2,000 people representing all races, ages, genders, and occupations. Four scales were considered relevant for comparison with the POMS scores: (1) the chronic tension scale, (2) the recent stress scale, (3) the somatic anxiety scale, and (4) the inhibited personality style scale.

RESULTS

The MBHI data showed that musicians are similar to the general population in their coping styles, except for introversion, sociability, and confidence, where they score higher (Table 1). For the psychological stress factors, they show more self-imposed pressure than the general population, and less exogenous pressure, premorbid pessimism, hopelessness, social alienation, and hypochondriasis. The level of psychological participation in pain is also slightly lower (Table 2).

Comparison of musicians' POMS scores with the above-mentioned college students and psychiatric outpatient scores showed a much higher score for the positive trait of vigor in musicians, and much lower scores for all the negative traits of tension, fatigue, depression, and confusion. As compared with Olympic oarsmen,⁸ runners,⁹ and wres-

TABLE 1. Coefficient of Variation and Normalized Averages of the Scores of Coping Styles Measured with the MBHI in 67 Musicians, Including Strings, Keyboard, Guitar and Harp Instrumentalists

<i>Coping Styles</i>	<i>Total Mean Score</i>	<i>Coefficient of Variation</i>
Introverted	56.2%	24.0%
Inhibited	46.9%	24.7%
Cooperative	51.3%	20.3%
Sociable	69.6%	26.6%
Confident	67.6%	22.0%
Forceful	45.9%	20.2%
Respectful	52.0%	22.0%
Sensitive	48.3%	24.7%

TABLE 2. Coefficient of Variation and Normalized Averages of the Scores of Psychological Stressors Measured with the MBHI in 67 Musicians, Including Strings, Keyboard, Guitar and Harp Instrumentalists

<i>Psychological Stressors</i>	<i>Total Mean Score</i>	<i>Coefficient of Variation</i>
Considerable self-imposed pressure	58.2%	20.7%
Considerable exogenous pressure	38.6%	23.2%
Premorbid pessimism	28.6%	24.5%
Hopelessness	34.1%	25.8%
Social alienation	32.8%	25.2%
Hypochondriasis	36.1%	25.5%
Psychological participation in pain	45.2%	25.0%

ters,¹⁰ musicians as a group also showed the “iceberg profile” of below-average tension, depression, anger, fatigue, and confusion scores (less than the 50th percentile) and above-average vigor score (66th percentile) (Fig. 1).

When statistically comparing the POMS mood scores with the MBHI scores of self-reported stress, the vigor (positive trait) score showed a high inverse correlation with all four MBHI stress-related scales: inhibited personality style, chronic tension, recent stress, and somatic anxiety (Table 3). Moreover, the last two MBHI scales showed a high positive correlation with all the other (negative trait) POMS scores. The Inhibited Personality Style Scale was positively correlated with depression and confusion.

TABLE 3. Correlations Between POMS Scales and Select MBHI Stress Indices

<i>Pearson Correlation</i>	<i>MBHI Stress Indices</i>			
	<i>Inhibited</i>	<i>Tension</i>	<i>Stress</i>	<i>Anxiety</i>
POMS Scales				
Tension	0.14	0.07	0.28*	0.26*
Depression	0.25*	0.07	0.30*	0.28*
Anger	0.23	0.02	0.36**	0.31*
Vigor	-0.44**	-0.29*	-0.29*	-0.44**
Fatigue	0.21	0.19	0.29*	0.24*
Confusion	0.30*	-0.01	0.20	0.34**

* $P < .05$, ** $P < .01$.

When compared between musicians with and without the “iceberg profile,” the MBHI scores of self-reported scales showed that musicians with the profile reported significantly less inhibition ($t = 2.09$, $P < .05$), stress ($t = 2.46$, $P < .05$), and anxiety ($t = 2.09$, $P < .05$) than the musicians without the profile.

DISCUSSION AND CONCLUSIONS

The mean scores obtained (all close to 50% of total possible score) for the MBHI questionnaire, as well as the consistency of their respective coefficients of variation, validate the use of the MBHI for assessing coping styles and self-reported psychological stressors in this population. Moreover, the finding that musicians are less prone to hypochondriasis and psychological exaggeration of pain than the general population emphasizes the primarily organic basis for their ailments and complaints.

The correlation between the POMS scores and their corresponding MBHI scores further establishes the validity of the results.

Musicians as a group do indeed resemble other athletic groups in their mood profile, as well as in their physical exertion, musculoskeletal adaptive changes, and occupational disorders. The confirmation of the “iceberg profile” in yet another group that meets intensive demands for excellence in performance lends further support to Morgan’s conclusions.⁸⁻¹⁰

The finding that musicians with the “iceberg profile” demonstrate lower levels of self-reported stress suggests the use of this profile as a screening tool for impending burn-out,⁷ excessive muscle tension in performance,¹⁰ and injury-proneness.¹

In order to establish the “iceberg profile” as an efficient predictive and preventive measure of musicians’ occupational disorders, ongoing research is assessing the relative prevalence of such disorders between musicians with and without the profile.

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