

COMPARISON OF THREE MEASURES OF PRE-COMPETITION AROUSAL

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Abstract:

Arousal was assessed at a practice session and immediately prior to a competitive volleyball match using three measures, the sudorimeter and Palmar Sweat Index measures of palmar sweating and a state-anxiety inventory. Multivariate analysis of variance indicated a significant increase in arousal from practice to pre-competition. All three measures for 18 women increased, but low intercorrelations suggested idiosyncratic patterns of arousal.

Article:

Two techniques for assessing palmar sweating, the sudorimeter and the Palmar Sweat Index, and the State-Trait Anxiety Inventory were compared to determine their relative merits as measures of pre-competition arousal states. The sudorimeter measures the density of palmar sweat prints photometrically and the Palmar Sweat Index involves counting the number of active sweat glands within a 4 mm. square area from plastic impressions of the skin. The validity of the two techniques as measures of arousal has been demonstrated in a number of studies involving a variety of arousal-provoking situations (Bode & Brutton, 1963; Haywood, 1963; Johnson & Dabbs, 1967; Martens, 1969). The two measures of palmar sweating were compared with scores on the state-anxiety scale of the State-Trait Anxiety Inventory developed by Spielberger, Gorsuch, and Lushene (1970).

The investigation was conducted in a field setting to ensure realistic competitive arousal states. Baseline arousal measures were taken at a non-arousing practice session, and pre-competition arousal was assessed immediately prior to a competitive volleyball match. Because all three measures have demonstrated validity in other situations, an increase in all three measures from the practice to the pre-competition situation was hypothesized.

All 18 members of the University of Illinois women's intercollegiate volleyball team (age 18 to 21 yr.) participated in the study. A female graduate student recorded the baseline measures at the practice session 1 wk. prior to the tournament and assessed pre-competition arousal at the tournament site within 30 min. of the start of the first match. All measures were taken individually in a room away from the court. The anxiety inventory was administered first, and the sudorimeter and palmar sweat prints were taken simultaneously, using the left and right ring fingers, respectively. Sweat prints for all 18 team members were obtained within a 20-min. period and scored later.

As hypothesized, all three measures increased from practice to pre-competition; a one-way multivariate analysis of variance (Finn, 1972) indicated that the increase in arousal was statistically significant ($F_{1,11} = 6.22, p < .01$). The palmar sweat measure, which increased from 49.5 to 73.6, had the largest univariate value ($F_{1,17} = 12.13, p < .01$) and standardized discriminant coefficient (.81). The sudorimeter measure, which increased from 10.6 to 20.0, also had a significant univariate value ($F_{1,11} = 6.70, p < .05$), but the discriminant coefficient (.49) suggested less contribution to the multi-variate effect than the Palmar Sweat Index. The univariate F for the anxiety measure was nonsignificant, but scores did increase from practice ($M = 36.2$) to pre-competition ($M = 38.8$), and the discriminant coefficient (.37) suggests some contribution to the multivariate increase.

Although all three measures increased from practice to pre-competition, the inter-correlates among the three difference scores were surprisingly low (no correlations reached .20 and all were nonsignificant). Generally, the

volleyball players increased on all three measures but individual patterns varied considerably. The individual who increased a great deal on one measure did not necessarily increase a great deal on the other two measures.

Both palmar sweat measures differentiated practice and pre-competition arousal states but the Palmar Sweat Index was somewhat more effective. That measure is also generally cheaper, simpler, and less likely to have technical problems than the sudorimeter. The anxiety inventory did not discriminate practice and pre-competition arousal states very well in this study, but several studies (Martens, 1977) have demonstrated the effectiveness of the inventory as a measure of competitive anxiety. A self-report scale may be the only feasible option for many investigations with athletic teams.

The observed low intercorrelations are not atypical of arousal measures. Several authors (Duffy, 1962; Lacey, Bateman, & Van Lehn, 1953) emphasize individual variation and idiosyncratic response patterns. Although intuitive logic suggests two measures of palmar sweating should be positively correlated, the index and sudorimeter do not measure exactly the same thing. The sudorimeter measures density of sweat while the index is a count of the number of active sweat glands. As the current results suggest, two persons with the same number of active sweat glands can vary in the amount of sweat secreted.

The current findings suggest that all three measures detect the increase in arousal from practice to pre-competition. The lack of positive intercorrelations underscores the idiosyncratic nature of arousal states. Current measures of arousal may detect group and situational arousal differences quite well, but they are not valid indicators of interindividual differences in arousal.

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