The Relationships Among Self-Efficacy, Stress Responses, and a Cognitive Feedback Manipulation

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Abstract:
The influence of self-efficacy on physiological arousal and self-reported anxiety was examined in the first phase of this study. All 32 undergraduate females in the study performed five trials of both an easy task and a difficult task, with half of them performing the easy task first and half performing the difficult task first. A manipulation check revealed that the easy task clearly elicited higher self-efficacy than the difficult task. Individuals reported lower cognitive and somatic anxiety and higher self-confidence, as assessed with 1he CSAI-2, and had lower heartrate increases when performing the easy (high-efficacious) task. After the subjects finished both the easy and difficult tasks, half of them were given a cognitive feedback manipulation suggesting that elevated arousal levels were typical responses of good competitors under stress. Contrary to predictions, the manipulation did not induce higher self-efficacy and the manipulation group did not differ from the no-manipulation group on self-reported anxiety scores or heart rates. The findings support Bandura's contention that self-efficacy mediates arousal changes and demonstrate the influence of self-efficacy on multidimensional anxiety measures, but fail to demonstrate any influence of a cognitive feedback manipulation on self-efficacy or subsequent stress responses.

Article:
According to Bandura's (1977) theory of self-efficacy, all behavioral change is mediated by a common cognitive mechanism— self-efficacy—the belief that one can successfully perform desired behaviors. Perceived efficacy mediates behavior in various ways. People approach, explore, and try to deal with situations within their self-perceived capabilities; but they avoid dealing with stressful aspects of their environment perceived as exceeding their abilities (Bandura, 1977; 1982). Several studies show that people with higher self-efficacy persist in difficult tasks longer than do people with lower self-efficacy (Brown & Inouye, 1978; Schunk, 1981; Weinberg, Gould, & Jackson, 1979), and perceived efficacy is also an accurate predictor of performance (Bandura & Adams, 1977; Bandura, Reese, & Adams, 1982). The special interest of the current study is the relationship between self-efficacy and stress responses, including both physiological arousal and self-reported anxiety.

On one hand, self-efficacy is a good predictor of people's emotional arousal under stressful situations. Bandura (1978) indicated that low efficacy is generally accompanied by high performance arousal, whereas a strong sense of efficacy is associated with low performance arousal. This notion has been supported by Bandura, Reese, and Adams, (1982) using both a self-report fear scale and actual physiological arousal measures.

On the other hand, physiological arousal influences self-efficacy. According to Bandura, expectations of self-efficacy are based on four major sources of information: performance accomplishments, vicarious experiences, verbal persuasion, and physiological states. Individuals are less likely to expect success when they are viscerally agitated than when they are calm. Individuals differ not only on their perceptions of the magnitude of their own physiological arousal, but also on how they view arousal; certain physiological cues may have different influences on different individuals, or even on the same individual under different situations. Thus, as Bandura (1982) noted, "information that is relevant for judging capabilities, whether conveyed enactively, vicariously, persuasively, or physiologically, — is not inherently enlightening. Rather, it becomes instructive only through cognitive appraisal" (p. 127). Feltz supported this point in two studies in which college females performed a

modified back diving task. In a test of Bandura's model, Feltz (1982a) failed to find the predicted negative relationship between heart rate and self-efficacy. In a follow-up study, Feltz (1982b) included the Autonomic Perception Questionnaire as well as heart rate. Again, heart rate was not related to self-efficacy, but perceived autonomic arousal significantly influenced self-efficacy on all trials.

Because of the importance of the perception of physiological arousal, several studies have attempted to cognitively change such perceptions. One of these cognitive approaches, a relabeling method, attempts to manipulate the cognitive labeling of emotional arousal. Valins and Ray (1967) presumed that if phobics were led to believe that the things they had feared no longer affect them internally, such cognitive reevaluation alone would reduce avoidance behavior. However, as Ross, Rodin, and Zimbardo (1969) suggest, this technique creates conflicting information between internal feedback and the experimenter-apparatus feedback, which makes it very difficult for individuals to deny or minimize experienced arousal especially when the internal physiological response is intensive.

In another cognitive approach, "misattribution of emotional arousal," individuals are not asked to deny internal arousal but, instead, are led to attribute their arousal to some nonemotional source. Although Ross et al. (1969) demonstrated the effectiveness of the misattribution manipulation, the effects were limited to subjects who were only mildly fearful. As indicated by Borkovec (1976), if individuals have an extensive past history of associating a certain setting with a strong physiological response, successful cognitive misattribution appears unlikely. Bandura (1977) suggested that perceived self-competence can affect susceptibility to self-arousal. Feltz (1982b) further suggested that "if the athlete's interpretation of physiological arousal as fear can be manipulated and changed to interpretation of it as `psych' or `preparedness', self-efficacy may improve with the change in cognitions following from physiological reactions" (p. 10). So far, this cognitive manipulation approach has not been examined directly.

The current study had two major purposes. The first was to examine the influence of self-efficacy on stress responses, assessed with both self-report and physiological measures. Given the equivocal findings of previous research and the limited research with motor performance settings, further investigation seems warranted. Bandura predicts, and has reported, a negative relationship between self-efficacy and both physiological and self-reported arousal. However, Feltz examined Bandura's model with a sport task (diving) and reported a negative relationship between perceived arousal and self-efficacy, but not between physiological arousal and self- efficacy. The current study extends the examination of the relationship of self- efficacy to physiological and perceived arousal to another motor performance setting. Whereas Bandura and Feltz used anxiety-invoking tasks, the current task does not invoke anxiety. Instead, individuals performed the task in a competitive setting with performance evaluated against a standard. Because the relationship between self-efficacy and competitive anxiety was of concern, the newly developed Competitive State Anxiety Inventory-2 (CSAI-2; Martens, Burton, Vealey, Bump, & Smith, 1983) was used to assess perceived anxiety.

An important feature of the CSAI-2 is the assessment of cognitive worry and somatic (physiological) anxiety on two separate dimensions. During development of the CSAI-2, self-confidence emerged as a third component of competitive state anxiety. Thus, this sport-specific, multidimensional inventory includes three subscales: cognitive worry, somatic anxiety, and self-confidence. Martens et al. (1983) report high reliability and validity for all three subscales on the basis of extensive testing of the CSAI-2. An easy and a difficult task were used to elicit high and low self-efficacy for this phase of the experiment, and stress responses were assessed with heart rate, an index of physiological arousal, as well as the CSAI-2.

In the second phase of the study, the effect of a cognitive feedback manipulation on self-efficacy and stress responses was examined. Based on the suggestions of Bandura (1977) and Feltz (1982b), individuals were not asked to deny the agitated arousal or to attribute the arousal to a nonemotional source, but this cognitive feed-back manipulation tried to lead individuals to believe that the increased arousal was a typical response of good competitors under stressful situations.

For the first phase of the study, examining the influence of self-efficacy on stress responses, it was hypothesized that:

1. When individuals perform the easy task, which elicits higher self-efficacy, they have lower physiological arousal (as measured by heart rate) than when they perform the difficult task, which elicits lower self-efficacy.
2. When individuals perform the easy task, they have lower cognitive worry and somatic anxiety and higher self-confidence subscores of the CSAI-2 than when they perform the difficult task.

For the second phase of the study, examining the influence of a cognitive feedback manipulation on self-efficacy and stress responses, it was hypothesized that:

3. Individuals who receive the cognitive feedback manipulation have greater postmanipulation self-efficacy than individuals who do not receive the cognitive feedback manipulation.
4. Individuals who receive the cognitive feedback manipulation have lower postmanipulation cognitive worry and somatic anxiety and higher self-confidence subscores of the CSAI-2 than individuals who do not receive the cognitive feedback manipulation.

Method

Subjects

The subjects were 32 volunteer female undergraduate students enrolled in physical education skills classes who had no or little previous experience in the task of the experiment.

Task

A Merlin portable computer provided the experimental task. For the specific game used in the study, "Echo Game," the computer displays a series of numbers and the player must repeat the same numbers in the same order. If the player makes a mistake, the computer buzzes and, after the series is finished, it displays the total number of mistakes made in that series. Echo game has nine levels of difficulty. At level 1 the series includes only one number, at level 2 the series includes two numbers, and so on; level 9 includes nine numbers. Difficulty level 3 was used as an easy task and difficulty level 7 was used as a difficult task because, as pilot testing indicated, virtually everyone could repeat three numbers correctly but no one could repeat seven numbers in correct order consistently. The total number of correct numbers repeated in their proper places in the series was the player's score for that trial.

Dependent Measures

The Echo Game Efficacy measure was designed specifically to assess perceived self-efficacy in this study. The measure comprised four questions, one asking respondents to predict how many correct numbers they could get during five trials of the task, and three 5-point scale questions asking respondents to rate how well they expected to perform, how confident they were about performing well, and how confident they were about receiving the reward.

A Burdick electrocardiograph was used to assess heart rate. Four electrode straps with leads to the ECG were attached to the individual's wrists and legs, and amplifications of electrical heart activity were transmitted through a stylus and recorded on chart paper. A baseline heart rate measure was taken after a 10-minute rest and prior to introducing the experimental conditions in this study. This baseline measure was subtracted from each experimental heart rate measure and the difference scores were used as the dependent measures.

As previously noted, the CSAI-2 (Martens et al., 1983) was used to assess perceived cognitive worry, somatic anxiety, and self-confidence.

Design

To control for order effects, the 32 individuals were randomly assigned to one of two groups. Group A went from the easy task to the difficult task and Group B went from the difficult task to the easy task. Self-efficacy, heart rate, and perceived state anxiety were assessed before each task to test the influence of self- efficacy on stress responses. After the two tasks were performed, half of the subjects in each group were then given the cognitive feedback manipulation to test whether this manipulation influenced self-efficacy and stress responses.

Procedure

After arriving at the laboratory each individual completed an informed consent form, rested for 10 minutes, and her baseline heart rate was taken while she was sitting. The experimental task was then demonstrated and the individual was told that her heart rate would be taken during the study, that she would be requested to complete some short questionnaires, and that she would be asked to perform five trials on one easy task (difficulty level 3) and two sets of five trials on one difficult task (difficulty level 7). The individual was also told that if she got 12 correct numbers out of the total 15 numbers (80%) on the easy task, or 28 correct numbers out of the total 35 numbers (80°1o) on the difficult task, she would receive a reward. The rewards (Chinese paper-cuts) were used for motivation and to emphasize the competitive standard. All individuals achieved at least 12 correct numbers on the easy task but only one person achieved a 28 on the difficult task.

The Group A individuals were then given two practice trials on the easy task. After the practice trials, they completed the Echo Game Efficacy Measure and the CSAI-2 and their precompetition heart rates were taken. After the precompetition measures, they began the five trials on the easy task and the mid-competition heart rates were taken right after they finished the third trial. Postcompetition heart rates were taken 15 seconds after the last trial. After the Group A individuals had finished the easy task, they were given two practice trials on the difficult task. The procedure for doing the difficult task was the same as that for the easy task. Group B individuals did the difficult task first, then the easy task. All individuals received immediate feedback of their scores on each trial, but not of their heart rates. After both the difficult and easy tasks were completed, half of the individuals in Group A and half of those in Group B were given the following comments as the cognitive feedback manipulation:

Recently we did the same study on several school teams. We found out that for the best competitors, their heart rates always go up about 25o above their baseline in competition. This physiological arousal pattern may be very helpful to them, so that they can perform better. We are glad to find out that you have the same physiological arousal pattern as those good competitors. It seems that you are really prepared for the competition.

All individuals then performed five more trials on the difficult task, following the same procedures as for the easy and first difficult task. The same difficult task was used for this phase of the study because the experience of previous failure on that task was expected to elicit relatively high anxiety. The cognitive manipulation, then, was expected to lessen the perceived anxiety of the manipulation group.

Results

The results are reported in two major sections. First, the influence of self-efficacy on stress responses was examined. The order effect was also examined in these analyses by comparing Group A, who performed the easy task first and the difficult task second, to Group B, who performed the two tasks in reverse order. Specific analyses reported in the first section include: (a) an order x task (easy-difficult) (2 x 2) MANOVA on the four self-efficacy measures to test the assumption that the easy task elicits higher self-efficacy than the difficult task, (b) an order x task (2 x 2) MANOVA on the three CSAI-2 scores of cognitive worry, somatic anxiety, and self-confidence, and (c) an order x task x time (pre-, mid- and postcompetition) (2 x 2 x 3) ANOVA on heart rate difference scores.

The influence of the cognitive manipulation on self-efficacy and stress responses was examined in the second section. Separate one-way MANOVAs were performed to compare the two manipulation groups on (a) the four

self-efficacy measures, and (b) the three CSAI-2 scores. A group x time (pre-, mid-, and post- competition) (2 x 3) ANOVA was performed on the heart rate difference scores.

Self-Efficacy and Stress Responses

Self-Efficacy Manipulation Check. The basic assumption of the current study, that the easy task elicits higher self-efficacy than the difficult task, was tested first. The first question, the predicted correct numbers over the five trials, was converted to a percentage by dividing the predicted number by the total possible correct numbers (15 for the easy task, 35 for the difficult task).

The order x task (2 x 2) MANOVA on the four efficacy questions yielded an order main effect, F (4, 27) = 4.28, $p < .01$. Univariate ANOVAs revealed that only question 2, the rating of expected performance, had a significant order effect, F *(1,* 30) = 8.80, $p < .01$. Group B *(M* =3.59) rated expected performance higher than Group A *(M* = 3.00). Neither the overall order-by-task interaction nor the uni- variate interaction for question 2 reached significance, indicating that the task effect was not affected by the order. The expected task effect was significant, F(4, 27) = 20.00, $p < .0001$. Moreover, all the univariate Fs for the task effect were significant (see Table 1), strongly supporting the assumption that the easy task was a high-efficacious task whereas the difficult task was a low-efficacious task.

Self-Efficacy and Physiological Arousal. Heart rate was taken three times (i.e., pre-, mid-, and postcompetition) for each task. Hypothesis 1 predicted that individuals would have lower physiological arousal when performing the high-efficacious task than when performing the low-efficacious task. To minimize the individual differences, heart rate difference scores were calculated by subtracting the baseline heart rate from the pre-, mid-, and postcompetition measures. The order x task x time (2 x 2 x 3) ANOVA on the heart rate difference scores yielded no order main effect and no time main effect, but a highly significant task main effect, F*(1,* 30) = 9.48, $p < .005$. As predicted, individuals had significantly lower heart rates when they were performing the high-efficacious task *(M* = 5.19) than when they were performing the low-efficacious task *(M = 7.55).* The order-by-task interaction

Table 1

Mean Self-Efficacy Scores for the Task Effect

Self-efficacy measure	Mean for easy task	Mean for difficult task	Univariate *F*	Univariate *P*	Standardized disc. coeff.
Correct numbers	84.79	58.65	58.18	.001	– .048
Expected performance	4.03	2.56	74.80	.001	.022
Performance confidence	3.94	2.44	84.71	.001	– .633
Rewards	3.91	2.16	78.40	.001	– .392

Table 2

Mean Heart Rate Difference Scores for the Task × Time Interaction

Task	Time: Precompetition	Time: Midcompetition	Time: Postcompetition	Average
Easy	4.69	6.75	4.13	5.19
Difficult	9.28	6.75	6.63	7.55

Table 3

Mean CSAI-2 Scores for the Task Effect

CSAI-2	Mean for easy task	Mean for difficult task	Univariate *F*	*p*	Standardized disc. coeff.
Cognitive	15.13	18.69	19.92	.0002	.107
Somatic	12.75	14.38	20.03	.0001	– .444
Self-confidence	25.66	20.88	49.91	.0001	.852

and order-by-time interaction were nonsignificant, but the task-by-time interaction, F (2, 60) = 3.06, $p < .06$, nearly reached statistical significance, indicating that the task difference varied slightly over the three times. Although the easy task elicited lower heart rate difference scores than the difficult task at pre- and postcompetition, the heart rate difference scores did not differ at mid-competition. However, the overall task effect is quite strong, especially at precompetition, the measure most susceptible to the influence of preperformance efficacy expectations. Furthermore, the task effect held for both order groups. (For mean heart rate difference scores for the task x time interaction, see Table 2.)

Self-Efficacy and Self-Reported Anxiety. The data supported hypothesis 2, which predicted that individuals would have lower cognitive worry and somatic anxiety and higher self-confidence scores when they performed the high-efficacious task than when they performed the low-efficacious task. The order x task (2 x 2) MANOVA on the three subscores yielded no order main effect or order-by-task interaction, but a significant task main effect, $F(3, 28) = 18.54$, $p < .0001$. Univariate ANOVAs yielded significant F values for the task effect for all three subscores of the CSAI-2 (see Table 3). Individuals had lower cognitive worry and somatic anxiety and higher self-confidence when they were performing the high-efficacious task than when they were performing the low-efficacious task, and this task effect held for both order groups.

Cognitive Feedback Manipulation. After the individuals had finished the five trials on the high-efficacious task and five trials on the low-efficacious task, half of those in Groups A and B were given the cognitive feedback manipulation. Then they all performed the difficult task again following the same procedures. The postmanipulation measures including the self-efficacy measures, the CSAI-2 subscores, and heart rates of individuals who received the cognitive manipulation were compared with those measures of individuals who did not receive the manipulation.

Before comparing postmanipulation measures, several ANOVAs were conducted to test for premanipulation differences. The analyses yielded no significant differences on any of the self-efficacy scores, heart rate measures, or the cognitive worry and self-confidence scales of the CSAI-2, but the manipulation group (M = 12.94) had significantly, $F(1, 30) = 5.92$, $p < .02$, lower somatic anxiety subscores of the CSAI-2 than the no-manipulation group (M = 15.81) at the premanipulation measure. Because of the premanipulation differences, covariance analyses were performed on the CSAI-2 subscores.

Cognitive Manipulation and Self-Efficacy. It was hypothesized that individuals who received the manipulation would have greater postmanipulation self- efficacy than individuals who did not receive the manipulation, but this hypothesis was not supported by the data. A one-way MANOVA on the four efficacy questions showed no significant difference between the two groups.

Cognitive Manipulation and Self-Reported Anxiety. Individuals who received the manipulation were also hypothesized to have lower cognitive worry and somatic anxiety and higher self-confidence than individuals who did not receive the manipulation. Again, this hypothesis was not supported. A MANCOVA on the three subscores with the three premanipulation subscores as covariates yielded no significant difference between the

two groups. Furthermore, separate univariate covariance analyses for each subscore with its respective premanipulation subscore as covariate yielded no significant group differences.

Cognitive Manipulation and Physiological Arousal. The influence of the cognitive feedback manipulation on physiological arousal was examined with a group x time (pre-, mid-, postcompetition) ANOVA on heart rate difference scores. Neither the group main effect nor the group-by-time interaction was significant, but the time main effect, F (2, 60) = 6.76, $p < .003$, was significant. Individuals showed the greatest heart rate increases at precompetition (M = 9.72), decreased slightly at mid- competition (M = 8.03)), and dropped further at postcompetition (M = 4.84). Thus, the cognitive feedback manipulation had no effect on physiological arousal (and no effects were hyothesized), and heart rate changes over time were similar to those for the first difficult task.

Discussion

Self-Efficacy and Stress Responses

According to Bandura, self-efficacy is a common cognitive mechanism that mediates all behavioral change, including changes in arousal. Bandura (1978) indicated that low efficacy is generally accompanied by high performance arousal whereas a strong sense of efficacy is associated with low performance arousal. This notion has been supported by the current study.

First of all, the data clearly indicated that the easy task elicited higher self-efficacy than the difficult task; all four self-efficacy questions showed significant task effects. Thus, the basic assumption of the study, that the easy task is a high-efficacious task whereas the difficult task is a low-efficacious task, was strongly supported by the data.

It was shown that when individuals were performing the high-efficacious task, they reported significantly lower cognitive worry and somatic anxiety and higher self-confidence than when they were performing the low-efficacious task, supporting the hypothesis that higher self-efficacy leads to lower self-reported anxiety. Therefore, Bandura's prediction for the relationship between self-efficacy and stress responses has been supported in a competitive setting using a sport-specific and multidimensional state anxiety measure.

The heart rate data for the easy and the first difficult task showed a highly significant task effect. Individuals had significantly lower physiological arousal, as measured by the heart rate, when they were performing the high efficacious (easy) task than they were performing the low-efficacious (difficult) task. The marginal task-by-time interaction revealed that mid-competition heart rates for both low- and high-efficacious tasks were similar, and the greatest difference in heart rate measures occurred at precompetition. The difference at precompetition is of particular concern because the precompetition measure is the only one not affected by subsequent performance on the task. Preperformance expectations likely have a weaker influence on stress responses once the task has begun and performance accomplishments begin to exert influence.

Another possible explanation for the lack of self-efficacy effects on midcompetition heart rates is that playing the echo game requires considerable concentration. Perhaps while performing the individuals focused much of their attention on the tasks and very little on the elements that elicited their arousal; therefore they did not perceive the situation as threatening as they did before or after the competition, even when they had lower self-efficacy. Lacey (1967) reported that he and his colleagues had repeatedly found that attentive observation of the external environment is predictive of cardiac deceleration, cardiac stabilization, and either a decrease in blood pressure or a marked diminution of pressure increase. In a review paper, Fenz (1975) reported that experienced parachute jumpers, whose heart rates increased early in the jump sequence but dropped immediately before the jumps, were more externally task-oriented than novice jumpers, whose heart rates kept increasing before the jump and who dwelled on their own fears and expended energy defending against those fears. It would be worth testing whether task-orientation decreases excessive physiological arousal. If it does, task-oriented concentration can be used as a strategy to cope with excessive physiological arousal.

As an extra check on the influence of self-efficacy on stress responses, correlations between self-efficacy measures and CSAI-2 scores were examined. For both the easy task and the difficult task, each of the four self-efficacy questions correlated negatively with cognitive worry and somatic anxiety and positively with self-confidence, as expected. However, many correlation coefficients were nonsignificant and the patterns differed for the two tasks. For the easy task, cognitive worry was significantly related to three of the four efficacy questions *(r* range: -.32 to -.49), but more weakly and nonsignificantly related to somatic anxiety *(r* range: -.25 to -.33) and self-confidence *(r* range: .18 to .27). For the difficult task the correlations between self-confidence and the self-efficacy questions were much stronger and all significant *(r* range: .53 to .66), but self-efficacy was only weakly related to cognitive worry *(r* range: -.07 to -.16) and somatic anxiety *(r* range: -.03 to -.08).

Correlations between self-efficacy and CSAI-2 scores at the second difficult task, after the manipulation, revealed a similar pattern with somewhat stronger relationships. At least two of the efficacy questions were significantly correlated with each of the subscores. As before, cognitive worry *(r* range: -.20 to -.39) and somatic anxiety *(r* range: -.21 to -.47) were negatively related and self-confidence *(r* range: .31 to .71) was positively related to self-efficacy.

Generally, the correlations revealed the expected negative relationship between self-efficacy and anxiety. The weak relationships for the easy task may reflect the fact that nearly everyone expected to reach the standard and receive a reward. Uniformly high efficacy and low anxiety scores may well have restricted the range of scores resulting in relatively low correlations. The higher correlations at the second difficult task may reflect more accurate self-perceptions of efficacy and anxiety due to experience. Although the correlations were not a primary focus of this study, they do confirm some expected relationships and reveal some intriguing changes in relationships that might be pursued in further studies. The high correlations between self-efficacy and the self-confidence subscale of the CSAI-2 seem logical, but more thorough investigations might clarify the nature of the relationship. Heart rate was not related to either self-efficacy or perceived anxiety, corroborating Feltz's (1982b) findings.

In sum, the current study supported Bandura's theory about the relationship between self-efficacy and stress responses using both a sport-specific, multidimensional state anxiety measure (the CSAI-2) and a physiological measure (heart rate), and generalized Bandura's theory to a competitive setting. This self-efficacy-stress response relationship is important in sport because both self-efficacy and stress responses are related to performance. Instead of trying to reduce the anxiety levels alone, as attempted in most currently popular coping strategies, we might also work on self-efficacy.

Also, concentrating on the task may decrease physiological anxiety. If further studies support this relationship, task-oriented concentration might be developed to cope with anxiety.

Cognitive Feedback Manipulation

Feltz (1982b) suggested that if the athlete's interpretation of physiological arousal as fear can be manipulated and changed to an interpretation of it as "psych" or "preparedness," self-efficacy may improve. The current study tested this suggestion by using a cognitive feedback manipulation to lead individuals to believe that their agitated arousal was a typical and useful physiological arousal pattern of good competitors. The data revealed no manipulation effects.

One possible explanation for the lack of effects is that the manipulation was given after individuals finished the five trials on each task and knew the outcome of their performance. As indicated by Bandura (1977), performance accomplishment is an especially influential source of efficacy information because it is based on personal mastery experiences. Thus, any effects of the manipulation on individuals' interpretations of their physiological arousal may be overshadowed by performance accomplishment experiences. If, as Bandura suggests, self-efficacy mediates behavioral change, then the lack of manipulation effects on self-efficacy would imply that stress responses, including self-reported anxiety and actual heart rate, would not be likely to change. Indeed, the analyses failed to demonstrate manipulation effects on physiological or self-reported anxiety.

It may also be that misattribution is not a very powerful approach. Bootzin and Herman (1976) failed to replicate misattribution effects with insomnia, and recent work by Maslach (1979) and Marshall and Zimbardo (1979) suggests that physiological arousal tends to be perceived as negative affect regardless of the social environment. Thus the viability of the misattribution effect is in doubt. Certainly the cognitive manipulation was not at all effective in the current study. Further studies may determine whether misattribution or other cognitive manipulations can influence stress responses in other sport and motor performance settings.

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