Anxiety Reduction Following Exercise: Methodological Artifact or “Real” Phenomenon?

Steven J. Petruzzello
University of Illinois at Urbana-Champaign

A great deal of research has been done over the past 25 years that has examined the efficacy of exercise, particularly aerobic exercise, as a vehicle for reducing negative affective states. The most commonly investigated negative affects have been depression (see for example North, McCullagh, & Tran, 1990) and anxiety (see Landers & Petruzzello, 1994; Petruzzello, Landers, Hatfield, Kubitz, & Salazar, 1991). It is also important to note that the Office of Prevention of the National Institute of Mental Health, through a consensus workshop held in 1984, identified anxiety, among other topics, as one requiring immediate attention. In particular, much remains to be done to understand the potential and limitations of exercise as a means of coping with anxiety and stress (Dishman, 1986; Morgan & Goldston, 1987).

The overall consensus in the literature regarding the anxiolytic effects of exercise is that acute exercise is associated with small to moderate reductions in state anxiety. This effect has been shown to last for between 2 and 4 hours following the cessation of exercise, eventually returning to preexercise levels (Raglin & Morgan, 1987; Seeman, 1978). While generally well-accepted, there have been those who have questioned whether the reduced anxiety seen following exercise is due to the exercise itself or, instead, to a sense of relief that a stressful event has been terminated. Implicit in the argument is the issue of whether preexercise anxiety is a reflection of the subject’s “normal” resting anxiety or is elevated because of some apprehension about performing exercise in a potentially threatening environment. Others have also discussed the appropriateness of preexercise measures. For example, Gauvin (1989) noted the following:

Studies should be designed to account for the fact that subjects are subjectively tense when they enter the laboratory setting and to insure that the decrease in tension following exercise is not simply due to becoming accustomed to the testing situation. (p. 107)

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Steven J. Petruzzello is with the Department of Kinesiology at the University of Illinois at Urbana-Champaign, 906 South Goodwin Avenue, Urbana, IL 61801.
More recently, Gauvin and Brawley (1993) pointed out that the "level of prior mood state seems to be an important consideration in research where a change in mood is expected to be induced by presentation of an exercise stimulus" (1993, p. 149).

This concern is not unique to exercise psychology research. Farha and Sher (1989) designed a study to examine the effects of an upcoming aversive procedure (painful electric shock) on autonomic and self-report measures of anxiety. Specifically, they were interested in determining whether the knowledge of an upcoming procedure would alter "baseline" measures. Various psychophysiological and self-report measures of anxiety were recorded before and after subjects were informed of the upcoming shock.

Subjects were initially recruited to participate in a study designed to monitor physiological activity while seated and relaxed (Farha & Sher, 1989). After obtaining informed consent, subjects were prepped for psychophysiological recording (heart rate, pulse transit time, skin temperature, skin conductance, body movement), were allowed to adapt for 8 min, and then rested quietly while a 2.5-min "naive" baseline recording took place. Subjects were then told that the actual purpose of the study was to examine reactions to a brief, painful electric shock. They were told they would have a warning before the shock was administered, and then a second informed consent was obtained. Two "shock" electrodes were then placed on each subject's arm, an 8-min adaptation period followed, and then a 2.5-min "informed" baseline recording took place. Although not important for the present discussion, the remainder of Farha and Sher's study involved monitoring reactions in anticipation of the shock (which was never delivered), and then monitoring a poststressor recovery period.

The results of the study are depicted in Figure 1. While the countdown and poststressor baselines are interesting in their own right, the naive and informed baselines have more direct relevance to the issue at hand. Notice that simply being informed of the upcoming aversive procedure had the effect of significantly increasing psychophysiological and self-report indices of anxiety. Although an upcoming bout of exercise may not be quite as stressful as an upcoming electric shock, a procedure like that used by Farha and Sher does allow an assessment of the degree to which anxiety levels may be elevated by such knowledge. Thus, the purpose of this paper is to present findings from two separate data sets in which steps were taken to examine the validity of the notion that preexercise anxiety (or any affective measure) may not reflect a "true" resting anxiety level and may be elevated as a result of subjects knowing they will soon be required to execute a potentially stressful task (e.g., exercise in a laboratory environment).

**Study 1**

A modified Farha and Sher (1989) paradigm was used to examine whether knowledge about an upcoming exercise bout would influence preexercise anxiety. Male subjects ($N = 18$, age $= 21.8 \pm 2.6$ years) were recruited for a study purporting to assess "coping strategies and psychological control." As with the Farha and Sher study, a resting baseline assessment of psychophysiological and self-report anxiety were collected over a 2.5-min period. A 10-item version of Spielberger's State Anxiety Inventory (SAI; Spielberger, 1979) was completed