The Validity of an Objective, Inexpensive Measure of Relaxation

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Relaxation techniques such as progressive relaxation and meditation have become an integral part of the vast majority of stress management programs (Woolfolk & Lehrer, 1984). Heart rate is one of the most widely used hard signs of relaxation (Lichstein, 1988; Shapiro & Walsh, 1984; Woolfolk & Lehrer, 1984). While sophisticated EKG equipment may provide the ideal in accuracy and objectivity, such equipment is costly and often requires extensive training. In addition, polygraph readings can be difficult to take in naturalistic settings. There are, however, convenient and feasible alternatives. Two researchers have advocated self-monitored measures of heart rate (Hiebert, 1980; Lamott, 1975). Here subjects simply take their own pulses (either wrist or neck) for 30 seconds. Hiebert, Dumka and Cardinal (1983) studied the validity of this procedure by comparing self-monitored and machine-monitored pulse rate. They reported a .94 correlation between the two techniques.

Although self-monitoring provides an inexpensive alternative to polygraph equipment, it presents two problems. Perhaps the most significant is subject bias (i.e., the tendency to misread or misreport on the basis of personal expectations). Further, self-monitoring is an intrusive procedure: the taking of one's own pulse may not only increase arousal, but interfere with completing an exercise sequence smoothly.

In the past several years rapid development in technology has led to new, inexpensive and convenient ways of measuring pulse. Typically such devices (often found in athletic supply stores at a cost of approximately $100) weigh less than one pound, are battery operated, and provide immediate digital feedback of heart rate. Three types of instruments are widely available. One involves a finger clamp; another, a monitor held in the hand; a third involves attaching a nonintrusive sensor to the earlobe. The aim of the present investigation was to examine whether such devices might provide a reasonable alternative to the polygraph.

METHOD

Subjects

The subjects were 20 patients (9 males, 11 females) who had come for annual physical examinations from two specialists in Internal Medicine. The age range of the subjects was 32 to 71 years, with a mean of 52.2.

Apparatus

The electrocardiogram (EKG) was taken with a 12-lead Burdick polygraph, model EK5A. Pulse rate was assessed using the Deluxe Pulseminder Heart Speedometer, model 8629 (Computer Instruments Corporation). With this device a photoelectric pulse sensor is clipped to the earlobe. The sensor is connected by wire to a small box (approximately 3″+5″×1″) which displays (a) direct pulse rate signalled by a flashing light (and, if desired, by a tone), (b) pulse rate in beats per minute (estimated) from the three previous beats), and (c) number of seconds and minutes elapsed.

Procedure

For the subject's EKG, an electrode was placed on each leg and shoulder. A fifth electrode was placed in the V1 position at the third and fourth intercostal space on the right side of the chest. To measure pulse, the pulse sensor was attached to the subject's earlobe. First the polygraph and the pulse monitor were turned on. After 10 seconds, a 20-second reading was taken. During this period the number of flashes on the pulse monitor was counted and recorded. (The indicator of the number of beats per minute was not used because this number changes rapidly, leading to the likelihood of considerable recording errors). A second experimenter counted the number of QRS complexes, the most pronounced and easily identifiable portion of the electrocardiogram. This experimenter was kept blind to the pulse monitor count.

RESULTS AND DISCUSSION

The mean number of pulses for the 20-second period as measured by both the polygraph and pulse monitor was 20.65 (*SD*=4.48). The correlation between the readings on the two devices was 1.0.

Results indicate that the pulse monitor is an accurate measure of pulse rate. Thus, the device appears to provide an inexpensive, objective means for therapists to monitor closely the progress made by clients learning relaxation techniques as well as a means for clients to monitor their own progress when practicing at home. While the EKG may provide significantly more information, such information is typically of little importance for those learning relaxation and is rarely reported in relaxation studies.

Clients could observe changes in heart rate just prior to beginning relaxation and at its conclusion with the device held in the client's hand or placed on a nearby table. Having an objective means of measuring progress may encourage clients to practice regularly as they may feel there is a more clear way to assess their progress. Therapists could indicate to clients that they should regularly chart changes at home which may provide further encouragement.

In addition, the pulse monitor could be used for research in both applied and laboratory settings. Because the device is inexpensive and requires little training, it opens up the opportunity for more research, particularly when research budgets are severely limited and high levels of portability are required.

References

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