

RELAXATION AS A MEANS OF PAIN CONTROL<sup>1</sup>

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The effectiveness of relaxation techniques as a means of increasing pain threshold and pain tolerance and of decreasing anxiety was tested. Forty-two physiotherapy students were divided into experimental and control groups and tested on pain threshold, pain tolerance and anxiety. The 21 experimental group subjects were given one session of relaxation and then re-tested. Their results showed that a single session of relaxation significantly increased their pain threshold and pain tolerance and decreased their anxiety about the situation. No such changes were noted when the control group was re-tested.

Relaxation techniques are not new: Jacobson (1938) advocated their utility in the relief of anxiety and pain, showing both clinically and experimentally their significance for these conditions. Sternbach (1968) listed them among the methods which provide some measure of relief from pain. Melzack (1973) offered a neurophysiological explanation for their usefulness in the treatment of pain.

Although, generally speaking, the medical profession has not adopted this method of pain relief, relaxation techniques are used by psychiatrists as one of the accepted methods for relief of anxiety. They are also recognized as an early stage of hypnotic induction.

Among clinical psychologists relaxation techniques are used extensively in behaviour therapy (Wolpe, 1969; Lazarus, 1970). Physiotherapists commonly use these techniques as a standard form of treatment of asthma and in obstetric work (Cosh, 1963).

While there is a widespread acceptance of use of relaxation techniques, there have been few attempts to experimentally validate and evaluate them in the treatment of pain in general. The present paper describes an ex-

periment designed to study the effectiveness of relaxation as a form of analgesia.

It was hypothesized that relaxation will increase both pain threshold and pain tolerance and will lower the state anxiety of the subjects.

## METHOD

*Subjects* were 42 physiotherapy students, 36 females and 6 males, aged between 19-21 years.

*Apparatus.* The noxious stimulator was based on Poser's (1964) apparatus. It consisted of a standard clinical sphygmomanometer with a pressure gauge calibrated to 300 mm/Hg. The pain stimulus was delivered by a series of pointed plastic projections arising from a cleat with a flat acrylic base, which was placed inside the cuff. The projections were sharp enough to discourage most subjects from tolerance of more than 260 mm/Hg of pressure, but not so sharp as to cause skin lacerations. A stopwatch, an instruction sheet for the subjects, a recording sheet, and Spielberger's (1970) anxiety state scale were also required.

*Design.* The subjects were divided into two groups, the experimental and the control. Both groups were tested on their pain threshold and pain tolerance and on Spielberger's measure of anxiety state. Pain measures were obtained by the use of a clinical sphygmomanometer and a cleat. The experimental group received one training session of group relaxation, while the control group received no treatment. Both groups were then re-tested on their pain threshold and pain tolerance and on their state anxiety.

*Procedure.* Each subject was asked to lie comfortably on a couch. The cuff of the sphygmomanometer was placed on his non-

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dominant arm, on the short head of the biceps (the radial surface of the arm). He was asked to report on the first awareness of pain (pain threshold) and on the point where he was no longer prepared to continue the stimulations (pain tolerance). They were told that this was not a test of endurance and they were not encouraged to suffer pain any longer than they wished.

The experimenter sat beside the subject, exerting a controlled amount of pressure upon the cuff by inflating it with the standard air pressure bulb of the sphygmomanometer. The arbitrary ceiling of the pressure was 260 mm/Hg. If the subject did not report his pain threshold prior to reaching this ceiling, this top value was entered on his record sheet and the measurement of pain tolerance was started from that point. As soon as the subject reached his pain tolerance, the cuff was deflated. The arbitrary ceiling of pain tolerance was established at 180 sec. Even if the subject did not report a wish to terminate the experiment, it was stopped at that point, and this top value was entered on his record sheet. The subject's arms were inspected following the experiment, and if the indentation produced by the cuff seemed deep, it was massaged to restore it to normal.

*Scoring.* Pain threshold was scored in mm/Hg and read off the sphygmomanometer. Pain tolerance was scored in seconds from the pain threshold to the termination of the experiment, and read off the stopwatch. The anxiety questionnaires were scored according to the standard key.

#### *Relaxation Techniques*

Subjects were trained in groups of seven. They were taught to assess the difference between tight and relaxed muscles; to contract and then "let go" the muscles of their bodies, joint by joint, and to feel the difference; the use of selective relaxation, that is, learning to relax only some parts of their bodies whilst other parts are held rigid; to practise breathing and relaxation together; to relax their minds by emptying them of every thought by concentrating only on the sound of the therapist's voice, and to use imagery — for example, to imagine that they are floating on air, or that they are on the beach and everything is quiet and peaceful and pleasant.

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The emphasis throughout the session was on the subjects' ability to control their bodies. It was stressed that they could tighten and control their muscles at will, which is a form of mental control. They could also control their mental activities by concentration on something other than pain, such as on breathing, or on the sound of the therapist's voice. They could further increase this mental control by "mind travel", moving away from their bodies and travelling mentally to the beach or elsewhere. It was stressed that if they left their bodies mentally, they could feel no pain in them. Finally, they were instructed to keep up these activities for as long as possible to prevent the noxious stimulus from appearing painful. However, they could give up at any time when they wanted to stop the experiment. (This was assumed to give them a further feeling of being in control.)

#### RESULTS AND DISCUSSION

Table 1 shows clearly that the mean scores of the experimental group on pain threshold, pain tolerance and anxiety state showed a significant change on post-test, whereas the scores of the control group did not show a significant change.

TABLE 1

Mean Values of Pain Threshold and Pain Tolerance for the Experimental and Control Groups on Pre- and Post-Tests

	<i>Experimental Group</i>		<i>Control Group</i>	
	<i>Pre-Test</i>	<i>Post-Test</i>	<i>Pre-Test</i>	<i>Post-Test</i>
Pain Threshold (mm/Hg)	166.7	191.4	180.9	173.0
Pain Tolerance	119.9	175.9	127.7	123.0
State Anxiety	272.0	237.0	252.0	249.0

The statistical tests shown in Table 2 indicate that the experimental group had a significantly higher pain threshold and pain tolerance, and that their anxiety was significantly lower on the post-test. These variables did not change significantly for the control group. It would appear that these changes occurred as a result of the experimental treatment of relaxation.

TABLE 2

Comparison of Pre- and Post-Test Results of the Experimental and Control Groups on Pain Threshold, Pain Tolerance and Anxiety State, using Wilcoxon's Matched Pairs, Signed Ranks Test ( $n = 42$ )

	Experimental Group ( $n = 21$ )		Control Group ( $n = 21$ )	
	$n$	$T$	$n$	$T$
Pain Tolerance	15	6.5**	14	39
Pain Threshold	19	52.0*	19	78
State Anxiety	19	29.0*	19	71

\*Significance at or beyond 0.05 level of confidence for 1-tailed test.

\*\*Significance at or beyond 0.005 level.

In the present experiment one single group induction of relaxation was sufficient to increase the subject's pain threshold and pain tolerance. Several factors could have contributed to this result. Firstly, allaying the subject's anxiety by the use of muscular and mental relaxation is known to produce pain relief (Jacobson, *op. cit.*). Secondly, focusing the subject's attention on something other than pain (for example, going to the beach, in imagination) reduces the experience of pain (Franks, 1965). Thirdly, a suggestion that these activities will produce pain relief, particularly when given in a relaxation session, can reduce anxiety and pain (Hilgard, 1969). Finally, that the subject is at all times in full control over the intensity of pain he wishes to endure, and over the termination of the experiment, as well as in control of his physiological processes by the methods taught in relaxation, can exert a powerful effect on the subject's pain experience (Rachman, 1965). It is also suggested that a combination of all the above elements inherent in the relaxation training produce a strong placebo effect which, as shown by Beecher (1959), is as powerful as morphine in 35 per cent of patients as a form of analgesia.

There is a renewed interest in both medicine and psychology in relaxation techniques. This may be partly due to Melzack's (*op. cit.*) gate control theory, which drew attention to the psychological variables in pain experience and to the growing empirical evidence of the effectiveness of relaxation in allaying anxiety

and pain in clinical and experimental situations. The new developments in biofeedback research have also shown that man can control his own physiological processes which till now were considered to be strictly autonomous, such as blood pressure, heart beat and so on. Similar control is possible as a result of relaxation training.

Physiotherapy is the only profession where relaxation training is taught to undergraduates as a form of clinical expertise. Physiotherapists know how to use relaxation in relieving pain in childbirth. However, many of them have not generalized this knowledge to other areas of physiotherapeutic practice, such as orthopaedics, arthritic complaints, burns and so on.

There is sufficient data in the psychological literature (Hilgard, *op. cit.*) to suggest that relaxation training may be useful as an adjunct to other types of treatment in dealing with all painful conditions. Although the evidence of one experiment may not be convincing, the work of other researchers confirms the usefulness of relaxation as a form of pain relief. Hence it is suggested that a more thorough study of this area should be attempted by physiotherapists.

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