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The Role of Choice in Enhancing Tolerance to Acute Pain[1]

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The ability of choice of treatments to enhance tolerance to pain was investigated. Results showed that subjects who were given a choice of coping strategies tolerated the cold pressor for a longer period of time than those not given a choice. The mechanism by which choice exerts its influence, however, remains unknown. In contrast to our predictions, having a choice of treatments did not increase perceptions of treatment credibility or a sense of self-efficacy. Post hoc analyses revealed that subjects who were not given a choice, but who were nevertheless assigned to their preferred treatment, did not differ from subjects given a choice on tolerance time, but reported less pain and found the treatment more credible than subjects given a choice. The mechanisms by which choice influences treatment outcomes, including the nature and role of treatment preferences, require further investigation.

KEY WORDS: choice; stress-inoculation training; pain; treatment preferences.

Previous research has suggested that giving a subject a choice about the therapy received has a beneficial impact on treatment outcome. This has been demonstrated for relaxation training (Gordon, 1976), speed reading (Kanfer & Grimm, 1978), snake phobia (Devine & Fernald, 1973), and weight reduction (Mendonca & Brehm, 1983). Stress inoculation training is an approach to increasing tolerance for pain which has traditionally offered and even encouraged clients to

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make choices about the coping strategies they use (Turk, Meichenbaum, & Genest, 1983). A variety of coping strategies are offered "cafeteria-style" with the rationale that having a menu to choose from increases the involvement and collaboration of the client and allows the treatment to be tailored to the client's perceived needs and skills. Offered as a package treatment and in separate components, stress inoculation training has been shown to be effective in increasing tolerance to laboratory pain (Horan, Hackett, Buchanan, Stone, & Demchik-Stone, 1977; Klepac, Hauge, Dowling, & McDonald, 1981; Turk et al., 1983; Worthington & Shumate, 1981) and in reducing clinical pain (Rybstein-Blinchik, 1979; Turk et al., 1983). No studies, however, have been conducted which specifically address whether a choice of strategies contributes to the effectiveness of this approach.

Studies which are related to this issue include those on the use of multiple strategies and the use of a self-management approach. Two studies have investigated the utility of offering multiple coping strategies in comparison to a single strategy and have not found that training in the use of several strategies is more beneficial (Berntzen, 1987; Scott & Barber, 1977). Though having a choice may be an implicit part of training in multiple coping strategies, it does not appear that simply having more alternatives available necessarily enhances coping. Avia and Kanfer (1980) conducted a study in which subjects either were taught a single coping strategy or were taught that strategy and also presented with several other possible strategies. Subjects in the second condition were encouraged to choose among the possible strategies and to develop a sense of personal competence and an ability to cope. The results indicated that even though the majority of subjects in the self-management condition chose to use the same strategy that had been taught to the single-strategy condition, subjects in the self-management condition obtained higher tolerance times and reported lower discomfort ratings than those in the single-strategy condition. In this case, the ability to choose among alternatives may have helped to increase the subjects' sense of control and personal competence. The specific effects of choice, however, cannot be separated from the other instructional influences on expectancy that were included in the self-management training.

None of the studies investigating choice have attempted to test hypotheses about why choice might be effective. It has been suggested that giving the client a choice forces the individual to take responsibility for the consequences of that choice (Gordon, 1976; Mendonca & Brehm, 1983). In other words, providing a choice of therapeutic options produces cognitive dissonance (after Festinger, 1957). Following a choice the client should evaluate the treatment more highly and expend more effort during treat-

ment in order to demonstrate that the right choice was made. Choice may also have a beneficial effect on outcome because subjects are able to select the strategy that best matches their own skills and abilities. If individuals select a coping strategy that fits their abilities, they are more likely to believe that they can perform the behaviors necessary to reduce the aversiveness of a painful event and increase their perceptions of control. A sense of self-efficacy has been shown to be associated with better coping and increased tolerance to laboratory pain (Klepac, Dowling, & Hauge, 1982; O'Leary, 1985; Vallis & Bucher, 1986) as well as pain associated with childbirth (Manning & Wright, 1983). The combination of high levels of self-efficacy with an increased perception of control seems to be especially beneficial (Litt, 1988b).

The present study was conducted in order to assess whether giving subjects a choice about the coping strategies they use actually helps them cope with aversive stimulation. In addition, if choice does make a difference, we wanted to begin to explore why it might. Subjects were randomly assigned to conditions in which they were either given a choice or were not given a choice about the strategy to be used to cope with pain induced by a cold pressor. It was hypothesized that subjects in the choice condition would obtain longer tolerance times and report less pain following training than would subjects who were not given a choice. It was also hypothesized that subjects in the choice condition, in comparison to those in the no-choice condition, would report higher levels of treatment credibility (i.e., would value the treatment more and believe that the coping strategy would be more effective for them), would show increases in their level and strength of self-efficacy, and would show improved response expectancies, that is, have more positive expectancies for reduced pain (Council, Ahern, Follick, & Kline, 1988; Kirsch, 1985).

METHOD

Subjects

Seventy-one undergraduate psychology students (50 of whom were female) received extra credit toward their course grade for participating in this study. They ranged in age from 18 to 41 with a mean of 21.7 years. Twelve subjects had volunteered but were excluded from participation because of medical contraindications to placing their hand in cold water, e.g., Reynaud's disease, arthritis, or previous trauma to the hand. In addition, because a maximum exposure time of 5 min had been established to ensure subject safety, a 3 $^1/_2$-min limit was placed on the

pretreatment tolerance times in order to allow room for improvement from pretreatment to posttreatment. Four subjects whose initial cold pressor tolerance time exceeded 3 $^1/_2$ min were excluded. Four additional subjects, two each from the choice and no-choice conditions, reached the 5-min exposure time on the posttreatment tolerance test and were asked to remove their hand from the cold pressor. The data from these subjects were retained in the analyses even though their tolerance times were artificially limited to 5 min. Both of the subjects in the no-choice condition who reached the 5-min exposure limit had been assigned to their preferred treatment.

Apparatus

A 2-gal styrofoam pail was used for the ice bath. A wire mesh cylinder was used to keep crushed ice from coming in contact with the subject's hand, and an aquarium air pump was used to keep the water circulating. The water was maintained at a constant temperature between 0 and 1 °C.

Measures

Pain. Two measures of pain were used to assess the effects of the choice manipulation on treatment outcome. Subjects were instructed to keep the nondominant hand in the cold water "for as long as possible, until you can't take it any more." The length of time the subject kept the hand in the water was recorded in seconds as a measure of pain tolerance. Subjects also completed the adjective portion of the McGill Pain Questionnaire (MPQ; Melzack, 1975) immediately after the cold pressor task to describe the most intense pain they experienced while their hand was in the water. A total pain score was derived from the MPQ by summing the scores across all adjective categories.

Expectancies. Three measures assessing different types of expectancies were obtained. These included treatment credibility, self-efficacy, and response expectancy. Treatment credibility was assessed by a four-item scale that was adapted from Borkovec and Nau (1972). This scale included items on how logical the technique was, how confident the subject was that it would successfully reduce pain, whether the subject would recommend it to someone, and how likely the individual would be to use the strategy if faced with a painful medical procedure. These items were rated on 7-point (0 to 6) scales and then averaged for a

single credibility score. Higher numbers reflected higher levels of perceived credibility.

Self-efficacy was assessed by an 11-item questionnaire titled the "Personal Ability Scale" (Glasgow, Klepac, Dowling, & Rokke, 1982). The 11 items of this questionnaire ask whether the subject will be able to tolerate the cold pressor for different lengths of time arranged in order from 15 sec to 5 min. With the exception of the first two items, which differ from each other by 15 sec, the rest of the items progress in 30-sec time intervals. Subjects first report whether or not they will be able to keep their hand in the water for the specified length of time and then rate their degree of certainty on a 100-point scale from *completely uncertain* to *completely certain I can keep my hand in this long.* Two scores are derived from this measure, the number of items the subject stated he or she could complete, and the average certainty rating of those items which could be completed. These measures are conceptually related to Bandura's notions of level and strength of self-efficacy (e.g., Bandura & Adams, 1977).

Response expectancy was measured by a modified version of the MPQ. Subjects were asked to circle the words on the adjective portion of the MPQ that best described the pain they "expected" to experience. A total score was derived by summing across the 20 categories of adjectives.

Procedure

Following a description of the purpose of the study and informed consent, subjects were instructed to place their nondominant hand in the cold pressor for 10 seconds. This exposure session was provided so that subjects would have enough information about the nature of the task to be able to state their self-efficacy and response expectancies. After these two expectancy measures were obtained, subjects were pretested on their tolerance to the cold pressor and completed the MPQ.

Four coping strategies were presented to the subjects in written and oral forms. These strategies were derived from work by Turk et al. (1983) and consisted of distraction (counting backwards), relaxation, pleasant imagery, and somatization (paying attention to and describing the sensations one is experiencing, but describing them in nonpainful terms). After reading short (one-paragraph) descriptions of the strategies, subjects rated the credibility of each. Subjects were also instructed to indicate on a separate form which of the four strategies they would "prefer to use" if given a choice, that is, which strategy they thought would "really work best" for them. Subjects recorded these ratings out of view of the experimenter. They were told to turn their ratings upside down and leave them on an adjacent table where they remained until

the end of the experimental session. These procedures were strictly followed to minimize the possibility that subjects would not believe that assignment to conditions was randomly predetermined, but rather might assume that their preference ratings were used in assignment decisions.

Subjects were then randomly assigned to one of two conditions. Half of the subjects were given a choice of strategies to learn to use for a second trial on the cold pressor. The remaining subjects were told that due to the requirements of experimental methodology, they had been preassigned to learn a particular strategy. These subjects served as yoked controls and were assigned to a strategy that had been previously chosen by a subject in the choice condition. The training was very brief, lasting only 5 to 6 min, and the format was standardized across all strategies. Experimenters instructed each subject in how to use the strategy and encouraged the subjects to generate their own strategy content, i.e., images, descriptors, labels, and distracters. Subjects rehearsed the strategy in imagination and described to the experimenter what they were thinking as they rehearsed. Following the training period, but prior to the final cold pressor trial, subjects rated the credibility of the strategy they were using and again completed the self-efficacy and response expectancy questionnaires. Subjects completed a second trial of the cold pressor task and rated their pain on the MPQ.

RESULTS

Preliminary Analyses

Prior to the primary analyses, a few descriptive statistics of interest will be reported. First, it should be noted that subject preferences for the four strategies were unevenly distributed. Forty-nine (69%) subjects preferred distraction, 12 (17%) preferred imagery, 8 (11%) preferred relaxation, and 2(3%) preferred somatization. Prior to stating their preferences, subjects rated the credibility of each strategy. A repeated-measures analysis of variance showed that the four strategies differed in credibility, $F(3, 210) = 31.22$, $p < .001$. Followup analyses using Tukey's correction for the experimentwise error rate, with alpha set at .05, revealed that distraction ($M = 4.39$, $SD = 1.0$) was rated as being significantly more credible than all other strategies. The relaxation ($M = 3.68$, $SD = 1.2$) and imagery ($M = 3.70$, $SD = 1.3$) strategies were not different from each other, but were both rated as being more credible than somatization ($M = 2.78$, $SD = 1.1$). The strategies did not differ from each other in effectiveness as measured by tolerance time, $F < 1.0$, and by the MPQ, $F < 1.0$.

The Role of Choice

Pain Measures. A 2 (Choice Condition) × 2 (Gender) analysis of covariance was conducted on each of the pain measures obtained at posttest using the appropriate pretreatment scores as covariates. (This and all subsequent analyses included gender as an independent variable. For the sake of brevity, the statistics involving gender will not be reported, except in those few cases where the effect was significant. All means reported have been adjusted to account for pretreatment variability.) Subjects who were given a choice of treatments tolerated the cold pressor for a significantly longer period of time (M = 118.9 sec) than subjects who were not given a choice (M = 89.4 sec), $F(1, 66) = 5.52, p < .05$. On the MPQ, choice subjects reported higher levels of pain than subjects who did not receive a choice, $F(1, 66) = 4.39, p < .05$. The means were 33.9 and 28.6, respectively.

Expectancies. The posttreatment measures of perceived treatment credibility, level and strength of self-efficacy, and response expectancy were each analyzed in a 2 (Choice Condition) × 2 (Gender) univariate analysis of covariance using pretreatment measures as covariates. The mean credibility rating was higher for subjects who were not given a choice (M = 4.69) than it was for subjects who had a choice (M = 4.10), $F(1,66) = 6.28, p < .05$. None of the main effects or interactions on any of the other expectancy measures were significant, all $p > .05$.

The Role of Preference

In order to test whether subject preferences made a difference in outcome independently of the choice manipulation, we divided the no-choice condition into two groups and reanalyzed the data with three conditions. The no-choice preferred condition consisted of subjects who were assigned to their preferred coping strategy (n = 18), and the no-choice nonpreferred condition was made up of subjects who had been assigned to a strategy that was not their preferred strategy (n = 18). All subjects in the choice condition had chosen the strategy which they had indicated was their preferred treatment. Although strategy assignments for subjects in the no-choice condition were yoked to subjects in the choice condition, we did not control for the use of particular strategies between those who received either a preferred or nonpreferred strategy within the no-choice condition. Chi-square analyses were conducted to test for differential strategy use among the conditions. The choice and no-choice preferred conditions did not differ from

Table I. Observed and Adjusted Mean Tolerance Times and Pain Ratings for Each Condition[a]

Condition	Pretest	Posttest	Adjusted	*n*
	Tolerance Time in Sec			
C	47.5 (26.5)	99.0 (73.6)	125.6[b]	35
NC-P	69.1 (49.4)	128.8 (87.4)	119.6[b]	18
NC-NP	46.3 (24.7)	60.9 (38.8)	84.4[c]	18
	McGill Pain Questionnaire Scores			
C	30.0 (15.5)	31.6 (17.2)	34.3[b]	
NC-P	39.4 (9.6)	27.8 (10.1)	21.9[c]	
NC-NP	33.2 (11.5)	32.0 (12.4)	33.2[b]	

[a]*Note:* C = choice, NC-P = no choice preferred, NC-NP = no choice nonpreferred. Adjusted means with unmatched superscripts *b* and *c* are significantly different from each other, $p < .05$. Numbers in parentheses are standard deviations.

each other in the relative frequency that each strategy was used, $\chi^2(2, n = 53) = 3.46$, $p > .30$. There was, however, a differential use of strategies between the two no-choice conditions $\chi^2(3, n = 36) = 11.78$, $p < .05$. The frequency of use of each strategy for preferred and nonpreferred conditions, respectively, was as follows: distraction 16:6, relaxation 1:5, somatization 0:1, and imagery 1:6.

These analyses provide some guidance for how the following results might be interpreted. Because subjects in both the choice and no-choice preferred conditions used the same strategies and used preferred strategies, any differences between them would be due to the act of choosing. When comparing the two-no-choice conditions with each other, it must be kept in mind that they differ from each other in more ways than simply receiving a preferred or nonpreferred treatment. Although previous analyses showed that the coping strategies did not differ from each other in effectiveness, any differences in outcome between the no-choice preferred and no-choice nonpreferred conditions may be due to differential strategy use or differences in factors associated with those treatments, e.g., treatment credibility. In any case, these analyses are *post hoc* and must be considered in terms of their exploratory nature.

Pain measures. Posttreatment tolerance times and MPQ scores were each analyzed in a 3 (Condition) × 2 (Gender) analysis of covariance with the pretreatment scores on these measures serving as covariates. The analysis of tolerance times yielded a significant main effect for condition, $F(2, 64) = 4.44$, $p < .05$. *Post hoc* analyses in this case and those following consisted of conducting pairwise analyses of covariance. All of the probability values reported reflect the Tukey correction for the number of comparisons (Keppel, 1982). Table I presents the observed and adjusted mean tolerance times for each condition. It can be seen that the choice and no-choice-preferred con-

Table II. Observed and Adjusted Means on Credibility and Level of Self-Efficacy[a]

Condition	Pretest	Posttest	Adjusted	*n*
		Treatment credibility		
C	4.66 (1.1)	4.29 (1.2)	4.12^{b}	35
NC-P	4.90 (0.7)	4.97 (0.8)	5.06^{c}	18
NC-NP	3.52 (1.3)	3.79 (1.1)	4.46^{bc}	18
		Level of self-efficacy		
C	4.32 (2.2)	4.17 (1.6)	3.94	
NC-P	3.94 (1.5)	4.50 (1.4)	5.23	
NC-NP	3.16 (1.4)	3.61 (1.6)	4.16	

[a]*Note:* C = choice, NC-P = no choice preferred, NC-NP = no choice nonpreferred. Adjusted means with unmatched superscripts *b* and *c* are significantly different from each other, $p < .05$. Numbers in parentheses are standard deviations.

ditions did not differ from each other, $F < 1$. Both the choice and the no-choice-preferred conditions evidenced significantly higher tolerance times than the no-choice-nonpreferred condition, $F(1, 48) = 7.92$, $p < .05$, and $F(1, 31) = 6.47$, $p < .05$, respectively.

Analysis of the McGill Pain Questionnaire scores yielded a significant main effect for condition, $F(2, 64) = 6.06$, $p < .05$. Table I also shows that subjects who were not given a choice, but who did receive their preferred treatment, reported experiencing less pain than subjects given a choice, $F(1, 48) = 10.23$, $p < .01$, and subjects not given a choice or their preferred treatment, $F(1, 31) = 7.99$, $p < .05$. The choice and no-choice nonpreferred conditions did not differ from each other in their pain reports, $F < 1$.

Expectancies. Posttreatment credibility ratings, level and strength of self-efficacy, and response expectancy scores were each analyzed in a 3 (Condition) × 2 (Gender) analysis of covariance using the appropriate pretreatment measures as covariates. The analyses of treatment credibility ratings yielded a main effect for condition, $F(2, 64) = 3.89$, $p < .05$. The effect for gender was significant, $F(1, 64) = 4.43$, $p < .05$, with men reporting higher adjusted levels of perceived credibility ($M = 4.80$) than women ($M = 4.25$). The condition by gender interaction was not significant, $F(2, 64) = 1.04$, $p > .30$. Table II illustrates the observed and adjusted mean credibility scores for each condition. It can be seen that subjects in the no-choice preferred condition reported higher levels of perceived credibility than subjects in the choice condition, $F(1, 48) = 7.15$, $p < .05$, but did not differ from subjects in the no-choice nonpreferred condition, $F(1, 31) = 3.08$, $p > .05$. The choice and no-choice nonpreferred conditions did not differ from each other in their ratings of perceived credibility, $F(1, 48) = 1.70$, $p > .10$.

Analyses of the *level* of self-efficacy scores yielded a trend for a difference among the three conditions, $F(2, 64) = 2.95$, $p < .06$. Men reported

a higher level of self-efficacy (M = 4.89) than women (M = 3.99), $F(1, 64) = 4.59$, $p < .05$. The Gender × Condition interaction was not significant, $F(2, 64) = 1.81$, $p > .10$. Table II illustrates the trend for subjects in the no-choice preferred condition to have higher levels of self-efficacy than subjects in either of the other conditions. Analyses of the strength of self-efficacy and response expectancy measures did not yield any significant results.

DISCUSSION

Stress inoculation training is a multicomponent treatment for reducing the stress and discomfort associated with painful medical procedures. The developers of this treatment approach have traditionally recommended that clients be allowed to select and choose among appropriate strategic alternatives. This is done, in theory, to encourage the client to become more actively involved in and committed to the treatment process as well as to allow the treatment to be tailored to the individual's needs and circumstances (Turk et al., 1983). Previous research conducted on the role of choice in psychological interventions has suggested that giving subjects a choice has the potential to improve treatment outcomes. The results of the present study support this claim. Subjects who were given a choice of coping strategies obtained longer tolerance times than subjects who were not given a choice. The effectiveness of choice would have been even more clearly demonstrated had subjects in the choice condition also reported less, or at least equivalent, levels of pain despite the longer exposure times. A clear interpretation of the higher pain reports made by choice subjects cannot be made because they are confounded by longer exposure to the painful stimulus (cf. Klepac, Dowling, & Hauge, 1981).

Understanding why choice makes a difference, however, has proven to be a difficult matter. In contrast to our predictions, choice did not influence expectancies as we measured them. Unlike Gordon (1976), whose subjects valued their treatment more when given a choice, we did not find that being given a choice increased ratings of treatment credibility. Our results are similar to those of Mendonca and Brehm (1983), who also found that a choice of treatments did not increase subjects' perceptions of the likely effectiveness of treatment. While these findings do not clearly discount the cognitive dissonance hypothesis, they do cast some doubt about the ability of choice to improve subjects' attitudes about the treatment received.

Giving subjects a choice of coping strategies also failed to have any influence on ratings of self-efficacy and response expectancy. We had ex-

pected that subjects who were given a choice of strategies would choose the strategy that they could best utilize. This should have led to improved perceptions of control (Langer & Rodin, 1976; Schulz, 1976) and a greater confidence in their ability to cope with the cold pressor (Litt, 1988a). It may be that a general sense of control is important and is influenced by choice, but this was not reflected in our measure of the related concept of self-efficacy.

Post hoc analyses suggested that using a preferred coping strategy, whether it was assigned or chosen, may have been responsible for the increased tolerance times. In fact, subjects who were assigned to a strategy that was their preferred strategy not only obtained tolerance times that were not different from those given a choice, but reported less pain and higher perceived treatment credibility and tended to report higher levels of self-efficacy. Although we know that these differences cannot be due to differential strategy use or preference, we are not sure why the no-choice preferred subjects reported higher expectancies, and perhaps, therefore, performed better. It is possible that these subjects, who were expecting to be assigned to a less desirable treatment, had a positive emotional response when they were told that they would be able to use their preferred strategy. Thus, they may have been relieved and even encouraged that they would be able to use their preferred strategy after all.

In summary, this study supports previous research done in other contexts with different treatment approaches and problems. We can conclude that providing individuals with a choice of coping strategies can improve pain tolerance. Additionally, we attempted to look at potential explanations for why choice is beneficial. Unfortunately our data raise more questions than they answer. *Post hoc* analyses suggest that stating a preference in the absence of control followed by permission to use the strategy is more effective than initially giving a choice. Further research is needed to examine the potential mechanisms by which choice works, including the nature and role of treatment preference (cf. Grantham & Gordon, 1986), skills matching, cognitive dissonance, and perceived control. We would caution the reader to keep in mind that the data derived from healthy young adults in an analogue situation may not be readily generalizable to clinically induced pain or to treatment settings in which the therapeutic process as well as the number and kind of choices available are very different.

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