Effects of State Humor, Expectancies, and Choice on Postsurgical Mood and Self-Medication:
A Field Experiment

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It was hypothesized that repeated exposure to humorous material reduces distress, pain, and medication following surgery. This hypothesis was tested in a field experiment by randomly assigning 78 postsurgical patients to either a control group or 1 of 8 experimental groups formed by the factorial crossing of type of videotape (humorous vs. serious), perceived control (choice vs. no choice), and expectation (positive vs. none). Multivariate analyses of variance disclosed that humor reduced requests for minor medication, combined with expectations to reduce pain, but increased use of heavy analgesic when patients were deprived of choice. Although more research needs to be done, the findings suggest that hospital patients benefit from humorous and distracting material when exposure is voluntary.

Belief in the healing powers of humor appears to be fairly widespread. This belief is reflected, and perhaps encouraged, by articles (e.g., Goldstein, 1982; Long, 1987; Mann, 1986) and books (e.g., Metcalf & Felible, 1992; Moody, 1978) that portray humor as a cure for whatever ails a person. Cousins (1989), in his last book, listed several hospitals that have incorporated humor into the treatment that patients receive.

It is probably safe to assert that books and articles by Norman Cousins (1976, 1979) are largely responsible for current interest in the health effects of humor. Popular works frequently begin by describing how Cousins overcame a typically fatal form of arthritis by watching Candid Camera episodes and Marx Brothers movies. Cousins' cure has also been described in the introduction of scientific reports on the health effects of humor (e.g., Lefcourt &

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Martin, 1986; Rotton, 1992). However, after mentioning Cousins’ recovery, psychologists have approached humor as a trait rather than a state.

Trait humor can be defined as a readiness to find or create humor in different situations. This type of humor is usually regarded as a coping mechanism that moderates relations between stressful events and well-being (Nezu, Nezu, & Blisset, 1988). Rotton (1992) proposed the term “state humor” to describe emotions (e.g., mirth) that link amusing stimuli and physiological responses, including laughter. Generally, nonsignificant results have been obtained in studies (e.g., Friedman, Tucker, Tomlinson-Keasey, Schwartz, & Wingard, 1993; Porterfield, 1987) that have examined relations between trait humor and health. This fact led Rotton (1992) to suggest that more promising results might be obtained if investigators turned “their attention to situational variables such as the introduction of humorous material in hospital settings (p. 265).”

Humorous movies are frequently used in laboratory studies (e.g., Forgas, 1993; Stroessner, Hamilton, & Mackie, 1992) to assess the effects of emotional states on behavior. We were able to locate only two studies that had examined the effects of positive affect in a hospital setting. In one, Adams and McGuire (1986) concluded that elderly patients who watched humorous movies reported more positive affect than patients who watched serious movies, but this conclusion was based on graphs rather than statistical analyses. In the other study, Ljungdahl (1989) tested eight outpatients after they had participated in a “humor group” for 13 weeks. Although participation in the groups produced a significant increase in general well-being, Ljungdahl cautioned that his findings should be regarded as preliminary; in his words, the results were based on “a small sample size, the lack of control group, possible selection bias, and the uncertainty of measurements” (p. 558).

The effects of humorous material were assessed in this experiment by allowing patients to watch one of two types of movies following surgery. Half of the patients watched videotapes of movies that critics had labeled as comedies; the other half watched action and adventure movies. This comparison was made because it is possible that effects attributed to humor might be due to momentary changes in physiological arousal (Berlyne, 1972). Laboratory experiments indicate that humorous material causes increases in heart rate, respiration, and galvanic skin response (e.g., Fry, 1986; Godkewitsch, 1976; Langevin & Day, 1972). These changes appear to be mediated by mirth-induced reductions in stress hormones such as cortisol and epinephrine (Berk et al., 1989).

This experiment’s design is similar to one reported by Ulrich (1984), which found that patients required less medication when they could view greenery (i.e., trees and shrubs) from their windows than when their view was limited to
the unadorned side of a building. As in Ulrich's study, our dependent variables were dosages of heavy and minor medication that patients received following surgery. Unfortunately, the manipulation of humor introduces complications that Ulrich (1984) did not have to address. Ulrich could vary the view from a window without arousing suspicion, but it would be hard (and possibly unethical) to expose patients to humor without their realizing that they were taking part in an experiment. This introduces the possibility that demand characteristics (Dubitsky, Weber, & Rotton, 1993) are responsible for observed effects.

We took three steps to reduce the threat posed by demand characteristics. First, following Ulrich's (1984) lead, we obtained unobtrusive measures of drug usage from hospital records. Second, we tried to direct attention away from the study's true purpose by informing patients that we were interested in the effects of pain on evaluations of movies. Third, we directly manipulated expectancies (Levine, Gordon, & Fields, 1978; Ross, Krugman, Lyerly, & Clyde, 1962) by reinforcing beliefs about the movies. Some patients were asked to read an article that described humor's beneficial effects; others read an article that suggested that exciting movies improve healing. The latter constitutes a placebo control, because we have never encountered a report (even one in the newspaper) that portrayed excitement as having salubrious effects.

However, Leventhal (1992) suggested that distraction might reduce pain if it induced positive emotions. This raises the possibility that watching exciting movies might also have beneficial effects. Although generally weak results have been obtained in laboratory studies on distraction (Cogan, Cogan, Waltz, & McCue, 1987; McCaul, Monson, & Maki, 1992), we expanded our design to include an untreated control group of patients who did not watch movies.

In addition, on the basis of Cousins' (1976) description of his recovery, it was anticipated that the effects of humor might only be observed when individuals chose the movies they watched. There is ample evidence that choice increases feelings of perceived control, which have been linked to health and well-being in institutional settings (Peterson & Stunkard, 1989; Rodin, 1986). Perceived control was manipulated in this experiment by allowing half of the patients to choose the movies they watched.

Finally, it is a well-known fact (e.g., Provine, 1992) that individuals laugh more when they are in groups than when they are alone. Because we could not control the number of individuals that might be present when the movies were shown, we asked patients to indicate how many persons were in their rooms. Their responses were subsequently employed in an analysis of covariance (ANCOVA) to statistically control for the possibly facilitating effects of group laughter.
Method

Overview and Design

The effects of humor, expectancies, and choice on postsurgical medication, pain, and distress were assessed in a between-within factorial design with an appended control group (Winer, 1971). The between-subjects factors were type of movie (humorous vs. serious), expectancy (positive vs. none), choice (present vs. absent), and gender (male vs. female). The within-subject factor was time (first vs. second day following surgery).

It was anticipated that the effects of viewing humorous movies would be as large as looking out a hospital window, which Ulrich (1984) was able to detect with a sample size of 46 patients. A formal assessment of power (Rotton & Schonemann, 1978) indicated that 64 cases would suffice to detect what Cohen (1988) termed a “large effect size” at an alpha of .05 and a Type II error rate (beta) of .15. The latter is smaller than the beta of .20 that Cohen advocated. It should be noted that power computations did not include the 14 patients in the untreated control group.

Subjects

Ninety-five patients were approached before orthopedic surgery. Three of these patients did not speak English. Two did not know how to read and write. Two other patients were taken to intensive care rather than to their rooms following surgery. Eight patients (8.4% of the sample) chose not to participate. Another two subjects dropped out of the study after seeing the first movie.

The final sample consisted of 39 males and 39 females. They were classified by hospital administrators as Hispanic (n = 22), African American (n = 23), and non-Hispanic White (n = 33). Their ages ranged from 18 to 65 (M = 43.03, SD = 9.84). The patients had been admitted for surgery to correct disk sprains (32.0%), spinal injuries (6.4%), back problems (44.9%), osteoporosis of the hip (6.4%), and broken ribs (10.3%).

Procedure

After introducing himself as a graduate student majoring in Communication Arts, the experimenter informed patients that he was doing his thesis on the effects of pain on the evaluation of media material. He told each person that he had decided to employ patients as subjects because one cannot “expose people to painful stimuli just to find out how pain affects judgments.” The
experimenter then obtained informed consent by asking patients to sign a sheet that allowed him to gain access to their medical records. This sheet also stated that patients could withdraw from the experiment at any time. The study’s protocol was approved by the institutional review boards of the hospital and the experimenter’s university.

After informed consent had been obtained, patients were randomly assigned to one of eight experimental conditions or a control group. Patients in the experimental groups were informed that the experimenter would set up a videocassette player in their rooms, during the morning and afternoon, on the 2 days following surgery. The experiment was designed to last for 2 days, because physicians had advised us that patients were sometimes released 3 days after surgery. Patients in the untreated control group were asked to complete self-report measures at the same time of the day as the experimental subjects.

Choice. Half of the experimental patients (high choice) were given a list of 20 movies from which they were asked to choose 4 that they would like to watch. The other half of the patients (low choice) served as yoked controls. Each subject in the low-choice condition was asked to watch a movie that a subject in the high-choice condition had selected. This manipulation was evaluated at the end of the experiment by asking subjects “who determined which movies you saw” (self vs. graduate student) and “how much choice you felt you had in selecting movies.” The last was to be answered by circling a number between 1 (no choice) and 7 (a lot of choice).

Humor. Half of the experimental subjects viewed videotapes of movies that media critics had described as humorous; the other half viewed serious (action and adventure) movies. To conserve money, only 5 of the movies in each set were recent releases; the other 15 were selected because they were rated highly in a book that summarized movie plots (Wiener, 1990). Classic movies in the humorous set were Amazon Women on the Moon, Bananas, Bill Cosby: 49, Duck Soup, A Fish Called Wanda, The Gods Must Be Crazy (Part I), Horse Feathers, It's a Mad Mad Mad Mad World, Naked Gun, The Odd Couple, The Pink Panther, The Producers, A Shot in the Dark, Some Like It Hot, and The Twelve Chairs. Recent releases were, at the time, Cadillac Man, Ghost, Gremlins II, My Blue Heaven, and Weekend at Bernie’s. Classic movies in the serious set were The Anderson Tapes, Brigadoon, Casablanca, Colossus, Dr. No, Eight Men Out, Fantastic Voyage, The Great Train Robbery, King Solomon’s Mines,

In this experiment, recovery rates ranged from 3 to 46 days ($M = 8.70, SD = 7.99$), with 12.8% of the patients being released on the third day following surgery. This experiment’s manipulations did not affect recovery rates (all ps > .08), probably because patients were debriefed before they were released.
Labyrinth, Legend, The Mirror Crack'd, Phar Lap, Wait Until Dark, and When Worlds Collide. Recent releases were Die Hard II, The Hunt for Red October, Impulse, Presumed Innocent, and Scandal. As a check on the manipulation, patients rated each movie on four 7-point bipolar scales, which were anchored at amusing-not amusing, entertaining-not entertaining, good-bad, and boring-interesting.

Expectancy. Positive expectancies were manipulated by asking half of the experimental subjects to read one of two articles. Sixteen patients in the humorous movie condition were given an article (Long, 1987) that described the benefits of humor. A corresponding number of patients in the serious movie condition were given an article, which was written for this study, that presented exciting movies as salutary. During the initial interview (after half of the patients read the article), subjects indicated how optimistic they were that their recovery will be rapid on a 7-point scale ranging from 1 (not at all) to 7 (very optimistic). They also indicated how long they expected their stay in the hospital to be on a scale that ranged from 1 day to 20 or more days.

Dependent Variables

Self-report measures. In keeping with this experiment's cover story, patients were asked to complete a visual analogue scale after watching each movie. This 100 mm scale was anchored by the words no pain and pain as bad as it could be (Scott & Huskisson, 1976). Patients were also asked to indicate how they were feeling on the Affect Grid (Russell, Weiss, & Mendelsohn, 1989). Russell et al. described this instrument as yielding relatively independent measures of pleasure and arousal. However, in this sample, ratings of pleasure and arousal were nearly collinear (r = .94). Consequently, we averaged the two ratings and subtracted the result from 10 in order to create a single measure of distress.

Medication. Hospital records were consulted to determine how much medication patients received (in mg) on each day of the study. Drugs were classified as major or minor analgesics. The major analgesics were meperidine hydrochloride (Demerol), hydromorphone hydrochloride (Dilaudid), and oxycodone hydrochloride-oxycodone terephthalate (Percodan). Data on this measure were obtained from records on the patient-control (PC) pumps. The minor analgesics were aspirin and mild tranquilizers.

Social interaction. Patients in the experimental groups were asked to indicate the number of persons in their rooms as they watched each movie.

4A copy of this article, which was set in newsprint, may be obtained from the first author.
Results

Checks on Manipulation

Reliability analyses indicated that, across the four movies, alpha coefficients were .93 (amusing-not amusing), .91 (entertaining-not entertaining), .47 (good-bad), and .57 (interesting-boring). Summing over ratings of the four movies that each patient watched, a comparison for type of movie yielded a significant Hotelling's $T^2$, $F(4, 59) = 107.04, p < .001$. Compared with the serious movies, the humorous movies were rated as more amusing ($M_s = 6.48$ vs. 2.91), $F(1, 62) = 407.68, p < .001$, and entertaining ($M_s = 6.35$ vs. 3.86), $F(1, 62) = 387.91, p < .001$; but the two types of movies did not differ in ratings of good-bad ($F < 1$) and interesting-boring ($F < 1$).

A check on the manipulation of choice disclosed that every patient correctly indicated who selected the movies they watched, and all of the patients in the low-choice condition checked the lowest score (1) when they were asked to indicate how much choice they felt. The mean for patients in the high-choice condition was 6.50. These means are reliably different, using the formula for a one-sample $t$ test, $t(63) = 50.02, p < .001$. In contrast, nonsignificant results were obtained for the manipulation of expectancy. Patients in the two conditions did not differ in reported optimism ($F < 1$), nor did they differ in how long they expected to stay in the hospital ($F < 1$).

Experimental Effects

A logarithmic (Base 10 + 1) transformation was applied to major and minor analgesics, because preliminary analyses indicated that the distribution for each was badly skewed. Correlations between the transformed measures and subjective reports are presented in Table 1. Based on the results in Table 1, as well as the distinction between obtrusive and unobtrusive measures (Webb, Campbell, Schwartz, Sechrest, & Grove, 1981), we decided to perform two multivariate analyses of variance. The dependent variables in one of the analyses were major and minor drug use; the variables in the other analysis were pain and distress. Gender did not attain significance in either analysis, nor did it interact with any of the other factors (all $ps > .15$). Therefore, this classification factor was dropped from subsequent analyses.

Self-report ratings. Significant main effects were obtained for the contrast of control versus experimental groups, multivariate $F(2, 68) = 8.11, p < .001$; the main effect of time, multivariate $F(2, 68) = 68.67, p < .001$; and their interaction, multivariate $F(2, 68) = 14.70, p < .001$. Univariate ANOVAs disclosed that patients reported more distress in the experimental groups than in the control group, $F(1, 69) = 16.45, p < .01, \omega^2 = .19$, and distress declined over
Table 1

*Correlations Among Verbal and Analgesic Measures*

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<td>Major analgesic</td>
<td>.23*</td>
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<tr>
<td>Distress</td>
<td>.07</td>
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<td>Pain</td>
<td>-.04</td>
<td>.32**</td>
<td>.63**</td>
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*p < .05, **p < .01.

time, $F(1, 69) = 61.36, p < .01, \omega^2 = .47$. However, these main effects were qualified by the interaction shown in Figure 1, $F(1, 69) = 17.12, p < .01, \omega^2 = .20$. An analysis of simple main effects disclosed that the experimental and control groups did not differ on the first day following surgery, $F = 1.35$; however, by the second day, patients in the experimental group reported less distress than patients in the control group, $F(1, 69) = 20.03, p < .01$. As may be discerned from the top graph in Figure 1, ratings of distress declined in the experimental groups, $F(1, 69) = 137.52, p < .001$, but increased slightly (though not significantly) in the control group, $F < 1$.

Similar results were obtained for pain ratings. Once again, significant effects were obtained for time, $F(1, 69) = 113.19, p < .001, \omega^2 = .62$, and the contrast comparing experimental and control groups, $F(1, 69) = 5.64, p < .05, \omega^2 = .07$. And again, the two factors interacted, $F(1, 69) = 20.82, p < .001, \omega^2 = .23$. From the bottom graph in Figure 1, it can be seen that patients reported similar amounts of pain on the first day following surgery, $F < 1$. However, pain ratings declined for patients in the experimental groups, $F(1, 69) = 241.38, p < .01$, but not the control group, $F < 1$. As a consequence, by the second day of the study, patients in the experimental groups reported experiencing less pain than did patients in the control group, $F(1, 69) = 12.46, p < .01$. The means in Figure 1 indicate that the experimental and control groups did not differ in how much distress they reported on the first day following surgery, $F(1, 69) = 1.35$; however, by the second day, patients in the experimental group reported less distress than patients in the control group, $F(1, 69) = 20.03, p < .01$. Simple main effect analyses also disclosed that whereas distress declined for patients in the experimental groups, $F(1, 69) = 137.52, p < .001$, it did not change over time for individuals in the control group, $F < 1$. 


**Figure 1.** Ratings of distress and pain in experimental (movie) and control groups across time. Vertical lines depict standard errors of the mean.

*Medication.* Significant multivariate $F$ ratios were obtained for Time, $F(2, 68) = 6.73$, $p < .01$, and humor, $F(2, 68) = 3.31$, $p < .05$. An ANOVA indicated that patients self-administered lower doses of the major analgesics 2 days after surgery than they did on the day following surgery ($Ms = 0.87$ vs. $1.13$), $F(1, 69) = 4.55$, $p < .05$, $\omega^2 = .06$. Patients also requested smaller doses of minor medication on the second than the first day postsurgery ($M = 2.46$ vs. $2.82$), $F(1, 69) = 9.47$, $p < .01$, $\omega^2 = .12$. 
Univariate tests indicated that humor did not affect use of the PC pump, $F(1, 69) = 1.12$, $ns$, but a main significant effect was obtained for requests for minor medication, $F(1, 69) = 5.49$, $p < .01$, $\eta^2 = .07$. Patients who watched the humorous movies took lower doses of minor medication ($M = 2.40$, $SD = 1.00$) than patients who watched the serious movies ($M = 2.96$, $SD = 0.80$).

Humor interacted with choice to affect dosage levels of major analgesics, $F(1, 69) = 4.82$, $p < .05$, $\eta^2 = .06$. Simple main effects tests indicated that amount of choice did not matter when patients were shown serious movies, $F < 1$; however, as Figure 2 shows, when patients were shown humorous movies, those deprived of choice gave themselves higher doses of analgesics than did patients who could choose the movies they watched, $F(1, 69) = 8.80$, $p < .01$. As will be discussed, this univariate test followed a nonsignificant multivariate test, $F(4, 66) = 1.38$.

Choice also interacted with expectancies, multivariate $F(2, 68) = 5.35$, $p < .01$. Univariate tests disclosed that choice and expectations combined to affect amounts of both major (i.e., PC-delivered) and minor analgesic; $F(1, 69) = 4.72$, $p < .05$, $\eta^2 = .06$, for major analgesic, and $F(1, 69) = 6.37$, $p < .05$, $\eta^2 = .08$, for minor analgesic. From the graph in Figure 3, it can be seen that choice did not seem to matter when patients had been led to believe that the movies would have beneficial effects, $F < 1$, by simple main effects. However, when such expectancies had not been established, patients deprived of choice took stronger medication than did those who could choose the movies they watched, $F(1, 69) = 8.72$, $p < .01$.

The combined effects of choice and expectancies on requests for minor medication are portrayed in Figure 4. As expected, simple main effects indicated that choice reduced the amount of medication that patients requested when they had not been led to believe that the movies would have a beneficial effect, $F(1, 69) = 10.59$, $p < .01$. This result is consistent with past research on the effects of choice. However, as will be discussed, choice increased the amount of medication that patients requested when they had been informed that watching the movies would be beneficial, $F(1, 69) = 16.07$, $p < .01$.

Subsidiary Analyses

Three ANCOVAs were performed to identify potential mediators. One employed each movie’s running time (i.e., duration) as a covariate. Another examined the role that contagion might play by employing the number of visitors in the room as a covariate. The covariate in the third set of analyses was rating of amusement. In none of these analyses did the covariates attain significance (all $p_s > .09$).
Discussion

This field experiment's results are consistent with the popular beliefs (e.g., Cousins, 1989; Goldstein, 1982) about the salutary effects of humor. It is possible to evaluate humor's beneficial effects by computing the percentage by which humor reduced requests for medication, because this dependent variable was assessed on a ratio scale. Compared with serious movies, humorous ones
produced a 61.4% (1780.41/2898.22 mg) reduction in minor medication. This reduction can also be appreciated by noting that the effect size for this manipulation equaled $d = 0.58$ ($\omega^2 = 0.05$), which Cohen (1988) has described as being "large enough to be visible to the naked eye" (p. 26).

This experiment's generally encouraging results are complicated by the fact that humor increased the amount of medication that patients administered to themselves via the PC pump when they were not allowed to choose the movies they watched. This unanticipated result is probably due to the fact that humor preferences are idiosyncratic, and few things are as irritating as being exposed
to material that fails in its attempt to be funny. From an applied standpoint, our results suggest that care should be taken to determine a patient’s preferences before humor is introduced into a hospital setting.

However, there may be some who will object that the multivariate test for humor’s interaction did not attain significance. This objection ignores two facts. First, statisticians are not at all agreed about the necessity of obtaining a significant multivariate test before interpreting results from univariate ANOVA (Huberty & Morris, 1989). Second, and perhaps more important, it can be argued that it would have been irresponsible for us not to report that there were times that humor increases analgesic usage. Our findings highlight a previously unrecognized limitation to humor’s effects, which have been

Figure 4. Effects of choice and expectation on requests for minor analgesics. Vertical lines depict standard errors of the mean.
described as universally salutary. If one were to liken humor to a drug (i.e., a pleasant pill), we would be negligent if we failed to report what most would regard as an undesirable side effect (i.e., greater self-medication) on identifiable (low choice) occasions.

Choice also interacted with expectations to affect the amount of medication patients received. The greatest use of the PC pump was among patients who had been deprived of choice and who were not informed that watching the movies would have beneficial effects. This finding suggests limits to the generalizability of results from investigations (Rodin, 1986; Thompson & Spacapan, 1991; but, cf. Folkman, 1984) which have portrayed choice as universally desirable. This experiment’s results raise the possibility that the beneficial effects of choice in previous investigations may have been due, at least in part, to beliefs that experimenters communicated to patients.

Reinforcing positive expectancies also reduced requests for minor medication when patients could choose the movies they watched; however, for reasons that not entirely clear, the largest doses of minor analgesics were requested by patients who chose the movies they watched and who were led to believe that watching the movies would be beneficial. This unanticipated result may be due to the fact that our dependent variables were not only correlated but also linked in a complex causal fashion. It is possible that patients responded to pain by taking stronger doses of major analgesics via the PC pump which, in turn, reduced their pain and their desire for minor analgesics.

However, before too much credence is placed in this admittedly post hoc explanation, it should be recalled that the checks on the expectancy manipulation did not attain significance. It may be that our checks were not successful because the questions we asked were too general and not related to behavior we subsequently assessed. Research on what has been called the “attitude-behavior problem” (Ajzen & Fishbein, 1977; Newcomb, Rabow, & Hernandez, 1992; Weigel, Vernon, & Tognacci, 1974) indicates that specific attitudes predict (specific) behaviors better than general attitudes. In this study, we asked patients to indicate how optimistic they were that their recovery would be rapid, but we assessed improvement by examining data on pain and drug usage. It is possible that our check would have been successful if we had asked patients to indicate how much pain and distress they expected.

**Distraction**

By the second day of the experiment, patients exposed to either type of movie reported that they were experiencing less pain and distress than patients in the no-movie control group. This finding can be understood in terms of Pennebaker’s (1982) competition-of-cues hypothesis, which is based on the
idea that there are limits to the amount of information individuals can process. Pennebaker proposed that awareness of internal states is a function of the ratio of internal to external information (or cues). The more external cues an individual has to process, the less he or she will be aware of internal cues (e.g., symptoms). For example, Pennebaker found that coughing during segments of a movie was negatively correlated with independent ratings of the segments' interest value.

At first glance, the present experiment's findings may appear to be contradicted by results obtained in laboratory studies (Anderson, Baron, & Logan, 1991; Cogan et al., 1987) on distraction. For example, Cogan and colleagues found that undergraduates were more willing to endure pain after listening to comedy routines than to an academic lecture. However, there are two important differences between this field experiment and Cogan et al.'s study. First, the dependent variables in our experiment were ratings of pain and distress, whereas Cogan et al. measured how much pressure from an arm cuff undergraduates were willing to endure. It is likely that the subjects in Cogan et al.'s study interpreted their pain as a challenge; in contrast, the patients in this study were suffering from pain that satisfied the usual definition of a stressor (Dienstbier, 1989). Second, Cogan et al. manipulated distraction by asking subjects to multiply three-digit numbers, whereas patients in this experiment watched entertaining movies. Leventhal (1992) has suggested that distraction may only be effective when it elicits positive affect. Future work might benefit from drawing a distinction between distraction and diversion. The latter can be defined as an event that not only produces a shift in attention (i.e., distraction) but also induces positive emotions.

However, it should be cautioned that demand characteristics of the situation might be responsible for the reported reductions in pain (Dubitsky et al., 1993). It is not unreasonable to assume that patients in experimental groups felt that they owed a debt of gratitude to a graduate student who visited them and took time to show videotapes in their rooms. An obvious way to pay this debt would be to confirm what they believed was the experimenter's hypothesis by reporting that their pain had been reduced. This alternative explanation can be addressed, in future research, by separating the delivery of the movies from the assessment of their effects by perhaps different experimenters.

Limitations

We have alluded to several factors that limit the number of conclusions that can be drawn from the results of this investigation. First, as we noted, there is some reason to believe that the patients in this study had trouble interpreting
our paper-and-pencil scales. Questions have also been raised about the reliability of the visual analogue scale (Carlsson, 1983). We had hoped that these brief measures would allow us to avoid the problem of subject attrition that sometimes accompanies the use of longer scales. Based on the results of this experiment, we would suggest concern about attrition should not dissuade future investigators from employing longer and more reliable instruments, such as the McGill Pain Questionnaire (Melzack, 1975).

Second, we had planned to follow Ulrich's (1984) lead and include recovery (i.e., days in the hospital) as a dependent variable. We had to abandon this plan because there was no way to ensure that the experimenter could always be on call to debrief every patient before he or she was released. It is possible that this study's experimental manipulations would have exerted stronger effects if, first, patients had been able to watch movies for more than 2 days (e.g., until the day of their release) and, second, debriefing had been delayed until patients had been released. However, it would take a much more complicated design and analysis to explore this possibility because patients would have received differing amounts of the experimental treatments (i.e., varying days of movies).

Finally, this experiment’s results are limited to adults living in an urban community who were suffering from pain that was severe enough to require surgery. It is possible that stronger and perhaps more interesting results would have been obtained if we had studied patients suffering from other (e.g., immune) disorders. It has been found that antibody levels are correlated with positive emotions (Maier, Watkins, & Fleshner, 1994; Martin & Dobbin, 1988). This finding is consistent with the results obtained by Dillon, Minchoff, and Baker (1985-1986) who found that amusing movies increased levels of Immunoglobulin A in saliva.

Implications

This experiment’s results indicate that patients benefit from the introduction of humorous material in a hospital setting. This suggests that video players might be added to the television sets found in many hospital rooms. However, from the standpoint of theory and subsequent applications, it may be more important to observe that humor is only one of many ways to induce positive affect. A number of other environmental and situational factors have been found to improve people’s mood, including music, massage, sunlight, pleasant odors, small gifts, and good food (Cousins, 1989; Isen, 1989; Ornstein & Sobel, 1989). Research is needed to determine if these variables, as well as ones directly linked to hospital stays (e.g., receiving flowers), also reduce a patient’s distress and need for medication.
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