One important factor in reducing back pain is the performance of exercises prescribed by physicians during treatment. The present investigation was conducted to examine the correlates of an individual’s intention to adhere to such prescriptions. On the bases of M. Fishbein’s (1980) theory of reasoned action and I. Ajzen’s (1988) theory of planned behavior, attitudes, subjective norms, and 2 types of perceived behavioral control were measured in a sample of American patients. Attitudes and subjective norms failed to predict intentions to exercise in accordance with the physician’s orders, but each of the perceived behavioral control measures did moderately well as an independent predictor and quite well when combined in a multiple regression approach.

DECREASING BACK PAIN is an important health issue. Back pain is not only responsible for much human suffering (Kelsey & White, 1980) but is also an important financial problem both because of direct health costs and indirect costs such as time spent not working (Akeson & Murphy, 1977; Spengler et al., 1986; Webster & Snook, 1994). Nachemson (1992) reviewed estimates for the total annual cost of back pain that ranged from $20 billion to $50 billion in the United States.

Despite the impressive progress in orthopedics in the last several decades, it is still difficult to tell exactly what causes back pain in a particular patient. A further problem is that back pain, from whatever cause, limits the patient’s ability to move. Because the patient does not move normally, certain pathologic changes occur in the muscle sarcolemma and in the connective tissue sheaths; these changes lead to contractures (Steindler, 1955). In addition, “continuous passive tension produces permanent structural changes in the muscle in the form of interstitial fibrosis. . .” (Steindler, 1955, p. 46). Today this clinical process is called deconditioning. Because of both the contractures and the underlying disease, the patient is unable to conduct the movements needed for daily living without pain. Often the original problem (e.g., a muscle strain) heals, but the problem of deconditioning remains.

In addition to deconditioning, specific other back problems can be improved by performing exercises to strengthen muscles and increase flexibility. For example, spinal instability was often diagnosed in the 1970s (Macnab, 1977); the intervertebral disks shrink as people age, loosen certain ligaments, and painful motions often result. If spinal instability did not resolve spontaneously, it was treated surgically because no muscles were known to exist that could compensate for the loosened ligaments and thereby prevent the painful motions from occurring. In the early 1980s, however, Bogduk (Bogduk & McIntosh, 1984) discovered that muscles do exist that can compensate for the loosened ligaments.

A second example pertains to spinal stenosis, that is, insufficient room in the spinal canal for the nervous elements. The condition (when painful) had been treated surgically until Onel, Sari, and Doenmetz (1993) tried physical therapy, including an exercise program. The program eliminated pain in all of the 145 patients they tested.

Although it is easy for a doctor to prescribe an exercise program for a patient, and although there is now a plethora of data indicating that these programs are effective in reducing and eliminating back pain when the exercises are performed in accordance with the doctor’s instructions, it is difficult to ensure that a patient actually performs the exercises. Thus, an important issue for people concerned with back pain is primarily
According to the theory of reasoned action (Fishbein, 1980), the proximal determinants of behaviors are intentions to perform them (behavioral intentions). These, in turn, are determined by attitudes and subjective norms. Attitudes are evaluations of the behavior, and subjective norms are what the person believes others think he or she should do. Finally, attitudes are determined by behavioral beliefs (beliefs about the consequences of performing a behavior) and evaluations of each of those beliefs. Subjective norms are determined by normative beliefs (beliefs about what specific important others think the person should do) and how much the person is motivated to comply with the suggestions of each of those important others. Fishbein has summarized the effects of behavioral beliefs and evaluations of each of those beliefs on attitudes by the formula $A = \Sigma b_i e_i$ in which $A$ is attitude, $b$ is behavioral belief, and $e$ is evaluation. Similarly, the effect of normative beliefs and motivation to comply on subjective norms has been summarized by the formula $SN = \Sigma n_i m_i$ in which $SN$ is subjective norm, $n$ is normative belief pertaining to a specific referent, and $m$ is motivation to comply with that referent.

Ajzen (1988) argued that the theory of reasoned action is satisfactory for understanding and predicting behaviors that are perceived to be under the person’s control, but an additional variable is needed for behaviors that are not so perceived. This variable, called perceived behavioral control, refers to the extent to which the person believes he or she can perform the behavior. Thus, behavioral intentions can be predicted not only from attitudes and subjective norms but also from perceived behavioral control. Recent research reviewed by Ajzen (1991) indicates that at least some behavioral intentions are better predicted from attitudes, subjective norms, and perceived behavioral control than from attitudes and subjective norms alone. Ajzen (1988) called the addition of perceived behavioral control to Fishbein’s conceptualization the “theory of planned behavior.”

There has been a shift in how researchers have conceptualized perceived behavioral control. Recently, perceived behavioral control has come to refer to the perceived ease or difficulty in performing the behavior under consideration (Ajzen, 1991). To distinguish between the two meanings, we refer to the original conception of perceived behavioral control (does the person believe he or she is capable of performing the behavior?) as perceived ability and the second conception of perceived behavioral control (does the person believe that the behavior is easy or difficult for him/her to perform?) as perceived difficulty.

There are both advantages and disadvantages to exercising as a therapy for back pain. According to the theory of reasoned action, beliefs about those consequences (and evaluations of their positivity or negativity) should determine attitudes toward the behavior which, in turn, should determine behavioral intentions. Thus, a person who strongly believes that exercising will be extremely inconvenient should have a more negative attitude toward doing so and therefore should be unlikely to intend to do it. In contrast, a person who strongly believes that exercise will lead to a “cure” should have a more positive attitude toward performing the behavior and therefore should be more likely to intend to do it. Our first hypothesis was that positive attitudes toward exercising are correlated with intentions to do so. We also expected that behavioral beliefs and evaluations of those beliefs ($\Sigma b_i e_i$) would be correlated with attitudes.

Normative pressure has sometimes been shown to affect intentions to perform “healthy” behaviors. Trafimow (1994) reported a significant positive correlation (.94)
between subjective norms and intentions to use a condom. Applying this concept to exercise behavior implies our second hypothesis, that subjective norms are correlated with an intention to exercise. We also expected that normative beliefs and motivations to comply (Σnmi) would be correlated with subjective norms.

It is possible to argue that people believe that exercising to cure back pain is not under one’s control because of a perceived lack of capability (perceived ability) or because it is perceived to be extremely difficult (perceived difficulty). To the extent that this argument is valid, we might expect that one’s own attitude toward performing the behavior might be irrelevant. If you do not believe you can exercise (or if you believe that it is just too difficult) then you will not do it, regardless of how positive your attitude is or how much normative pressure you are under to do it. Thus, our Hypotheses 3 and 4 state that perceived ability (Hypothesis 3) and perceived difficulty (Hypothesis 4) are correlated with intentions to exercise.

PRELIMINARY STUDY

Thirteen patients who were suffering with chronic back pain (longer than 7 weeks) and who had been told by their doctors to perform exercises for rehabilitation participated in the preliminary study. They were divided into three diagnostic groups: herniated disc, myofibrosis without any other cause of pain still evident, and other orthopedic causes. Although the diagnosis was important in determining the type of exercise program that was prescribed, there were no significant differences between the groups on any of the psychological variables of concern.

Participants answered five open-ended questions. The first two were designed to find out the perceived advantages and disadvantages of doing the exercises. Question 1 stated: “Write down every advantage you can think of that might happen if you do what the doctor told you. This means doing the exercises as strongly and as often as the doctor said.” Question 2 was similar but referred to disadvantages. Question 3 was designed to find out who the important referents were in deciding whether to perform the exercises: “List everyone who might have an opinion about whether you should or should not do what your doctor told you to do.” Questions 4 and 5 were designed to elicit control beliefs—beliefs about what might make the behavior easy or difficult to do (see Ajzen, 1988): “What might make it hard for you to do what the doctor told you to do? Please list everything you can think of.” Question 5 was similar except that it asked about what might make it easy to do what the doctor said.

To obtain those beliefs that are most relevant, we used the “75%” rule suggested by Ajzen and Fishbein (1980). After counting the frequency with which each belief was mentioned, we retained the most frequently mentioned beliefs that accounted for 75% of the cumulative frequency. Thus, there remained a set of behavioral beliefs, normative beliefs, and control beliefs mentioned by a reasonable number of people. The behavioral beliefs were that performing the behavior will “give me relief from pain,” “allow me to resume my normal activity,” “cause me pain during the exercises,” and “cost me time.” The normative referents were “friends,” “spouse,” “children,” “co-workers,” “parents,” and “relatives.” The control beliefs elicited were “There are other activities or responsibilities that take time,” “It is (in)convenient to do the exercises at work,” “The results seem slow,” and “The doctor’s instructions are (not) clear.”

Given the results of this preliminary study, we prepared a much larger questionnaire for use in the main study. The variables measured included not only the behavioral beliefs, normative beliefs, and control beliefs obtained from the preliminary study, but also behavioral intentions and their hypothesized proximal causes (attitudes, subjective norms, perceived ability, and perceived difficulty). Thus, we hoped to be able to
determine what variables are associated with intentions to exercise or not to exercise in accordance with the doctor’s instructions.

METHOD

PARTICIPANTS

Twenty-three patients from the same population used in the preliminary study participated and were placed into similar diagnostic groups. As in the preliminary study, there were no discernible differences between the diagnostic groups on the psychological variables of concern, and consequently these groups were combined for the analyses. These participants were chosen because they were all being treated for chronic back pain by the same doctor (Jordan H. Trafimow). The participants were not told about our hypotheses, but they were informed that their responses would be confidential. The questionnaires were distributed by the doctor’s secretary and mailed directly to the first author’s secretary, so that the doctor was completely unaware of individual participants’ responses.

THE QUESTIONNAIRE

On the basis of recommendations by Ajzen and Fishbein (1980, Appendix A; Ajzen, 1988) and the preliminary study, we selected the variables to be measured. Behavioral intentions were measured by asking participants to indicate on a 7-point Likert-type scale the degree to which they would be likely or unlikely to “intend to do what the doctor told me. This means doing the exercises as strongly and as often as the doctor said.”

Attitudes were measured by asking participants to complete a set of four semantic differential items on 7-point scales. They were asked whether “my doing what the doctor told me (doing the exercises as strongly and as often as the doctor said) is: (harmful—beneficial, good—bad, rewarding—punishing, unpleasant—pleasant).” These items were later factor analyzed in order to elicit a single attitude dimension.

Subjective norms were elicited by asking participants to indicate on a 7-point scale the degree to which “Most others who are important to me think I should/should not do what the doctor told me. This means doing the exercises as strongly and as often as the doctor said.” Perceived ability was measured (Ajzen, 1988) by asking participants to indicate on a 7-point scale, “How much control do you have over whether you do what the doctor told you? This means control over whether you do the exercises as strongly and as often as the doctor said.” Perceived difficulty was measured by asking participants to indicate on a 7-point scale, “If I wanted to, I could easily do what the doctor told me. This means doing the exercises as strongly and as often as the doctor said.”

The behavioral beliefs in the questionnaire were taken directly from the findings obtained from the preliminary study. Thus, participants were asked to indicate, on a 7-point scale, the likelihood that “My doing what the doctor told me (doing the exercises as strongly and as often as the doctor said) will give me relief from pain.” Similarly worded items pertained to resuming normal activity, having pain during the exercises, and the time cost of performing the exercises. Evaluations were measured by asking participants to indicate on a 7-point scale how important or unimportant “my getting relief from pain is.” Evaluations pertaining to the other behavioral beliefs were obtained by similarly worded items.

Like the behavioral beliefs, the normative beliefs in the questionnaire were taken directly from the findings obtained from the preliminary study. The patients indicated on a 7-point scale the extent to which “My friends think I should do what the doctor told me. This means doing the exercises as strongly and as often as the doctor said.” Similarly worded items pertained to other referents (spouse, children, co-workers,
parents, relatives). Motivations to comply were measured by asking participants to indicate on a 7-point scale the extent to which “Generally speaking, I want to do what my parents think I should do.” To answer this question, participants rated on 7-point scales how likely or unlikely it was that “There are other activities or responsibilities that take time,” “It is inconvenient to do the exercises at work,” “The results seem slow,” and “The doctor’s instructions are not clear” (these were obtained from the preliminary study).

**PROCEDURE**

Participants were given a copy of the questionnaire with the following instructions. “To the patient: Dr. Salmon is conducting a psychological study on certain opinions of patients who have back pain. Please fill out the attached questionnaire and seal it in the preaddressed stamped envelope that is also attached. You should then mail it yourself or give it to the secretary to mail. The reason for this procedure is so your doctor will not know what your responses are.” In fact, the envelopes were addressed to a secretary who forwarded them to the authors.

Before testing any of the hypotheses, we created indexes for those variables measured with more than one item: attitude, behavioral belief—evaluation combination ($\Sigma b_i e_i$), normative belief—motivation to comply combination ($\Sigma n_i m_i$), and a control belief index.

Attitude was measured with a set of four semantic differential scales. Consistent with other research (Ajzen & Fishbein, 1980; Trafimow & Miller, 1996), we factor analyzed these scales (after appropriate reverse scoring) to determine whether they were all tapping into the same latent variable. One factor was obtained and each of the scales loaded heavily on it. These scales and their loadings are as follows: Harmful—Beneficial (.87), Good—Bad (.85), Rewarding—Punishing (.88), Unpleasant—Pleasant (.55). Consequently, these scales were averaged in order to create the attitude measure. The likelihood of each behavioral belief was multiplied by its evaluation. These products were then summed to create an index ($\Sigma b_i e_i$) that was expected to correlate with attitude scores.

The judgment of what each important other person thought the patient should do was multiplied by the participant’s motivation to comply with that referent. Those products were then summed to create an index ($\Sigma n_i m_i$) that was expected to correlate with subjective norms. Patients’ judgments on those beliefs were averaged (and the results were also similar for their sum) to create an overall index. Scores on this index were expected to be correlated with perceived ability and/or perceived difficulty.

**RESULTS**

Hypothesis 1 states that attitudes toward performing the exercises prescribed by the doctor should be correlated with intentions to perform them. In fact, the correlation was not significant ($r = .07$, $p > .1$) and failed to support the hypothesis. Furthermore, none of the single items that composed the attitude index was correlated with intentions ($p > .1$ in all cases).

Hypothesis 2 states that subjective norms should be correlated with intentions. In contradiction to this hypothesis, however, a low and nonsignificant correlation was obtained ($r = .09$, $p > .1$).

There may be at least three possible reasons why we obtained low attitude—intention and subjective norm—intention correlations. Perhaps the intention to
perform the exercises was determined by something other than attitudes or subjective norms. Perhaps intentions were not measured correctly; or attitudes and subjective norms were not measured correctly. Although we will consider all three possibilities eventually, the third possibility is our present concern.

One way of showing that a measure is valid is to consider how well it is correlated with measures of closely related variables. If the attitude measure is valid, then attitudes should be correlated with $\Sigma b_i e_i$. In fact, a significant correlation was obtained ($r = .54$, $p < .01$), implying that the attitude measure was valid. When we applied this reasoning to subjective norms, it appeared that the validity of the subjective norm measure could be tested by correlating subjective norms with $\Sigma n_i m_i$. A low but significant correlation was obtained ($r = .39$, $p < .05$), implying that the subjective norm measure was valid.

As suggested earlier, perceived behavioral control can be thought of in two ways: perceived ability and perceived difficulty. These two variables were not correlated with each other ($r = .08$, $p > .1$). More important, however, intentions were significantly predicted by both perceived ability ($r = .52$, $p < .05$) and perceived difficulty ($r = .48$, $p < .05$). Finally, when intentions were predicted from a combination of the two variables, the multiple correlation was quite impressive ($R = .68$, $p < .01$). The standardized regression weights for perceived ability and perceived difficulty were .49 and .44, respectively. These findings imply that (a) the intention measure was valid (or it would not be so well predicted) and (b) attitudes and subjective norms failed to predict intention because the intention to perform the behavior of present concern is determined by perceived ability (Hypothesis 3) and perceived difficulty (Hypothesis 4).

Although the control beliefs used in the index were obtained as recommended by Ajzen (1988), this index was not correlated with either measure ($r = .12$ and $r = .06$, $p > .1$ in both cases), and none of the single items was correlated with either measure ($p > .1$ in all cases). These failures suggest that currently it is not known what beliefs determine either perceived ability or perceived difficulty.

**DISCUSSION**

Attitudes and subjective norms failed to predict intention (although attitudes and subjective norms were predicted by $\Sigma b_i e_i$ and $\Sigma n_i m_i$, respectively). In contrast, perceived ability and perceived difficulty were each moderately correlated with intentions when used as independent predictors, and they were highly correlated with intentions when used together in a multiple regression analysis ($R = .68$). Finally, the control belief index did not predict perceived ability or perceived difficulty.

It is part of the “orthopedic lore” that one of the reasons why many people do not perform the exercises prescribed by their doctors is that they perceive a better balance of advantages to disadvantages for not getting well than for getting well. Getting well may mean having to go back to work and not getting benefits from not working. The data here suggest an indirect argument against this conclusion. First, none of the patients mentioned these points in the preliminary study, and although they may have lied, they were informed that their responses would be anonymous. Second, even if participants in the preliminary study had been “unaware” of their motivations, their “real” attitudes should have been reflected in their scores on the attitude index (Fishbein, 1980; Trafimow, 1994; Trafimow & Miller, 1996; Triandis, 1980), which should have been correlated with intentions. It can be argued that the attitude measure was invalid, but the significant correlation of attitudes with $\Sigma b_i e_i$ indicates otherwise. More generally, although we cannot reject the orthopedic lore with complete confidence, the data suggest that we should look elsewhere for an explanation.

Although perceived ability and perceived difficulty were clearly the variables that best predicted intentions, the data raise challenging questions regarding these
variables. First, why was the index of control beliefs not correlated with either perceived ability or perceived difficulty? The fact that the index of control beliefs was not correlated with any of the other measures suggests the possibility that it is an invalid index. If true, then there is a further implication that, although the methodology used in the preliminary study may have been a good way to obtain behavioral beliefs and normative beliefs, it may not have been as good for obtaining control beliefs.

A second question is suggested by the lack of correlation between perceived ability and perceived difficulty. One possibility is that they are truly measuring different constructs. Specifically, perceived ability to perform a task might be completely different from the perception of how difficult the task is to perform. More generally, it is easy to imagine situations (or people) in which perceived ability and perceived difficulty would be inversely related, unrelated, or positively related. Thus, more research is needed to distinguish these concepts from each other. One possible strategy would be to attempt a factor analytic study in which people respond to items designed to measure either of the two concepts. If the responses cluster into two factors, support for the distinction would be obtained (provided, of course, that the “correct” items loaded on each factor); if they do not, the distinction would not be supported (Trafimow & Duran, 1998).

Two other limitations in the study concern the lack of measurement of actual exercise behavior and having a small sample size (23 participants). The lack of a behavior measure is particularly troubling because of the popular cliché that people’s behavior is often inconsistent with their intentions. On the other hand, there is much evidence that intentions are correlated well with behaviors when they are measured properly (Fishbein’s 1980 description of the principle of correspondence). Impressive intention—behavior correlations have been obtained in a number of diverse areas such as cooperating in a prisoner’s dilemma game (r = .82; Ajzen, 1971), having an abortion (r = .96; Smetana & Adler, 1980), using birth control pills (r = .85; Ajzen & Fishbein, 1980), breast versus bottle feeding (r = .82; Manstead, Proffitt, & Smart, 1983), attending church during an Easter holiday (r = .90; King, 1975), performing mental practice before football games (r = .81; Trafimow & Miller, 1996), and others (see the meta-analyses by Kraus, 1995, and by Sheppard, Hartwick, & Warshaw, 1988, for systematic reviews of research on this issue). Generally, although it would certainly have been desirable to measure actual exercise behavior, there are precedents for using intentions as a substitute (Fishbein, 1980; Trafimow, 1994, 1996; Trafimow & Finlay, 1996; Trafimow & Fishbein, 1994a, 1994b).

The small number of participants is also a limitation. It is unimportant in determining whether the results were due to chance; the statistics by which p values are computed control for sample sizes. Because, in the present study, the effects of perceived difficulty and perceived ability in predicting intentions were easily significant (p < .05), we do not believe that attributing the results to chance constitutes a plausible explanation.

The second issue concerns generalizability. How large a sample size does one need to generalize to the whole population? Whatever the answer to this question, 23 participants is undoubtedly insufficient. In fact, several hundred participants, even if randomly selected from the population, probably would be insufficient. Thus, lack of generalizability is clearly a limitation of the present data and would continue to be a limitation even if many more participants were used (particularly as we tested only the participants readily available to us rather than randomly selecting from the whole country). On the other hand, small-scale studies similar to the present one are useful in suggesting hypotheses for large-scale studies. Assuming our data are eventually replicated by such a study (and the powerful effects we obtained suggest that this would be the case), several implications follow.
PRACTICAL IMPLICATIONS

Given that perceived ability and perceived difficulty were shown to be important variables, it seems reasonable to suggest that medical interventions should be designed so that these variables are taken into account. Because the index of control beliefs was not correlated with either perceived ability or perceived difficulty, we have no explanation of how this might be done, and it might be worthwhile to conduct some studies in which participants are asked first to complete perceived ability and perceived difficulty scales, and are then asked about the reasons for their answers. If a set of such reasons could be collected and shown to correlate with perceived ability and (or) perceived difficulty, future studies with independent samples could be conducted for cross-validation purposes. These findings, in turn, would directly suggest how doctors can manipulate perceived expertise and perceived difficulty, thereby leading to better medical results.

There are also some implications about ineffective interventions. The fact that attitudes, subjective norms, behavioral beliefs (Σb,e), and normative beliefs (Σn,m) were all unrelated to participants’ intentions to adhere to the doctor’s instructions suggests that interventions designed to affect these variables might be wasting resources. Given the limited number of resources available through the health care system, knowing what not to focus on may be just as important as knowing what to focus on.

Finally, because lower back pain is only one of many disorders for which therapeutic exercises are often recommended, it is possible that the conclusions reached here can be generalized to at least some of these other disorders. If so, it would become even more important to understand the distinction between perceived ability and perceived difficulty, their causes, and how they can be manipulated. Thus, it seems worthwhile for investigators to follow up the lines of research suggested by the present data.

ADDED MATERIAL

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