1994

Efficacy, Expectations and Effort: An Investigation of the Role of Cognitive Factors as Mediators of Performance in Alcoholism Treatment

David P. Parrella
Loyola University Chicago

LOYOLA UNIVERSITY OF CHICAGO

EFFICACY, EXPECTATIONS AND EFFORT: AN INVESTIGATION OF THE ROLE OF COGNITIVE FACTORS AS MEDIATORS OF PERFORMANCE IN ALCOHOLISM TREATMENT

A THESIS SUBMITTED TO

THE FACULTY OF THE GRADUATE SCHOOL

IN CANDIDACY FOR THE DEGREE OF

MASTER OF ARTS

DEPARTMENT OF PSYCHOLOGY

BY

DAVID P. PARRELLA

CHICAGO, ILLINOIS

JANUARY 1995

ACKNOWLEDGMENTS

I'd like to thank my advisor, Emil Posavac, for serving as director of the thesis committee, and for many comments and suggestions that I found invaluable in my efforts to organize this project. I'd also like to express my gratitude to William Filstead, principal investigator of the Treatment Process Study (NIAAA Grant #08455), for allowing me access to the data set used here, for agreeing to serve on my committee, and for his long-standing support, continuing encouragement, and friendship. Finally, credit goes to all the patients who participated in the Treatment Process Study, without whose willingness to share their feelings and experiences the present study would not have been possible.

TABLE OF CONTENTS

LIST OF TABLES

Table Page

CHAPTER 1

INTRODUCTION

As coined by Tolman (1932), the word "expectancy" was originally used to describe maze-learning behavior in rats. Tolman was strongly opposed to the stimulus-response paradigm that dominated learning theory in his day, and he sought to replace it with an emphasis on the adaptive, intelligent and constructed aspects of behavior. He theorized that learning could profitably be conceptualized "as if" it consisted of acquisition of information about the response-outcome contingencies prevailing in the environment — that is, as if the animal acquired expectancies about the relationship between behavior and its consequences (Bolles, 1975).

Since Tolman's time, many others have taken up and added to the view that expectancies are central to an understanding of behavior. Osgood (1950) extended Tolman's expectancy analysis to avoidance learning. Rotter (1954, 1966) applied the concept to human motivation and perceptions of locus of control. Seligman and his associates (Abramson, Seligman & Teasdale, 1978; Maier & Seligman, 1976) developed an influential theory of depression based on outcome expectancies. Fishbein and Ajzen (1975; Ajzen & Fishbein, 1980) formulated a theory of attitudes and volitional behavior that combines compliance-weighted social norms with value-weighted expectancies. In

short, expectancy constructs have been widely used in theories concerning cognitive mediation of behavior (Stacy, Widaman & Marlatt, 1990).

Self-Efficacy as a Mediator of Behavior

One of the most recent usages of the expectancy construct can be found in Bandura's (1977, 1982, 1986a, 1986b) concept of self-efficacy expectancy, a core element of what has come to be known as Social Cognitive Theory (Bandura, 1986b). Self-efficacy is postulated to be a central cognitive mediator of behavior, influencing behavioral choice, amount of effort expended in performance, and persistence in the face of difficulties (Bandura, 1986b; Feltz, 1982; Sexton, Tuckman & Crehan, 1992). In introducing self-efficacy, Bandura (1977) expressed the belief that it could provide an integrative framework to account for behavioral changes resulting from psychological treatments. Since then, self-efficacy has been successfully applied in several domains, including sports performance (Feltz, 1982), vocational choice (Betz & Hackett, 1981), academic performance (Bandura & Schunk, 1981), social skills training (Lee, 1984a), treatment of phobias (Williams & Watson, 1985), weight control (Bernier & Avard, 1986), and the treatment of addictive behaviors (Condiotte & Lichtenstein, 1981; DiClemente, 1986).

According to Bandura, self-efficacy is defined as the belief that one can successfully execute the behavior(s) required to produce a specified level of performance or a given behavioral outcome. The self-efficacy analysis is concerned with how people judge their capabilities and how such judgments influence their motivation and behavior. Bandura notes that people act on the basis of what they believe they can do, not just on

the basis of the expected consequences of their actions. Thus, they will avoid tasks they believe exceed their capabilities, while they will engage wholeheartedly in valued activities that they believe they can handle well. For this reason, self-efficacy is seen as a proximal determinant of how people think, act, and react emotionally, especially in novel, trying, or uncertain circumstances. As such, it will contribute to the quality of psychosocial functioning in many ways.

Efficacy is intimately bound up with the need to devise and test alternate forms of behavior, as in learning new skills or persevering in the face of difficulties. Perceived inefficacy is not just a matter of not knowing what to do in a particular situation, or uncertainty in estimating future actions. Rather, those with low self-efficacy actively engage in ruminative thoughts about their performance, attribute failure to lack of ability, and show higher levels of negative mood. Nor is efficacy seen as a fixed action sequence or set of behaviors that either are or are not represented in the behavioral repertoire, just as command of a language is not simply a matter of familiarity with its vocabulary. Instead, efficacy constitutes a "generative capacity" wherein cognitive, social and behavioral skills are organized into the performance of integrated courses of action. Although people will judge their behavioral capability in terms of the skills and strategies they currently possess, efficacy operates partially independently of existing skills, since task difficulty is a function of both skills and the level of effort required to generate and evaluate behavior.

Outcome Expectancies vs. Efficacy Expectancies

Bandura (1977) clearly distinguishes between efficacy expectancy — belief that one can perform a specified behavior — and outcome expectancy — belief that performing a behavior will lead to a given outcome. Although outcome expectations can affect behavior independently of self-efficacy, efficacy is considered primary because in those situations where outcomes depend upon behavior, expectations about outcomes will be conditioned by the self-efficacy assessment — that is, beliefs about the consequences of behavior (outcome) will depend on beliefs concerning how well one can execute and sustain the requisite behavior (efficacy). As a result, if self-efficacy is low, outcome expectancy will also be low. Others, however, have argued that outcome expectations are primary, or that self-efficacy can be reduced to or derived from them. Teasdale (1978) believes that it may be impossible to distinguish the two concepts empirically, while Kazdin (1978) suggests that outcome expectancies alone can be used to predict behavior without the need for the use of efficacy as an intervening variable.

Although a large body of research now exists demonstrating the value of the self-efficacy construct, a much more limited quantity of research has focused on differentiating self-efficacy and outcome expectations and examining their relative predictive power (Maddux, Norton & Stoltenberg, 1986). Most of the literature that has addressed this question is inconclusive, either because it is methodologically flawed or because the investigators have employed laboratory analog tasks to obtain performance measures. Some investigators in this area, including Bandura himself, have criticized the use of such

procedures as not sufficiently engaging or realistic to subjects, and therefore as not providing adequate operationalization of key constructs.

The Present Study

The aim of the present study is to investigate self-efficacy in conjunction with outcome expectancies as predictors of behavior. To address the artificial nature of laboratory analog studies of this question, data collected in a naturalistic treatment setting will be examined. The sample is drawn from an archival data set containing both self-efficacy and outcome expectancy measures collected early in treatment from a group of inpatient alcoholics who participated in a large-scale treatment process study (TPS; Parrella, Filstead & Ross, 1993). In addition to initial expectancies, the TPS also assessed subsequent patient behavior, in terms of: (a) the number of patients who dropped out of treatment; (b) degree of compliance with the study protocol; and (c) daily self-reports of effort and participation during treatment. The goal in this study is to determine whether or not the two types of expectancies can be separated in predicting patient behavior, and to assess the amount of shared and unique variance attributable to each.

CHAPTER 2

DISENTANGLING EFFICACY AND OUTCOME EXPECTANCIES

Bandura's (1977) original article on self-efficacy postulated that behavior is cognitively mediated. This means that behavior which seems to flow from external contingencies in fact rests at least in part on the internal representation of these contingencies — behavior is controlled not by its consequences alone but also by beliefs about consequences. Cognitive mediation involves both goal-setting and self-evaluation, wherein self-rewarding reactions are contingent on performance attainments. Bandura described behavior as a function of performance expectations, skills, and incentives, and he noted that most prior studies concerning cognitive mediation had come from the expectancy-value framework, which focuses primarily on outcome expectancy or incentive value. Thus, such investigations often don't address the question of self-efficacy.

In response to Bandura, Kazdin (1978) stressed the importance of disentangling competence, incentive value and cognitive appraisal, which he believed Bandura's exposition left indeterminate. Kazdin asked how competence or incentives could be assessed independently if incentives depend on how they are perceived or interpreted, noting that resolution of this question is especially important in treatment applications. When should therapy focus on self-efficacy, when on skill, and when on incentives? Although he expressed the belief that self-efficacy could probably be assessed

independently, Kazdin suggested that both self-efficacy and skill might reflect or be mediated by some other construct, and that this had not yet been ruled out.

Kazdin also argued that the procedures used to assess efficacy contain an almost inherent ambiguity about what the measure reflects, speculating that either outcome expectancies or the concept of competence alone might be enough to explain Bandura's self-efficacy findings. Further, he suggested that appraisal of coping skills may vary as a function of outcome expectations, and he cautioned that whether or not self-efficacy is relevant to treatment may depend upon the specific behavior in question — both efficacy and outcome expectancies may be important, depending on the problem being considered.

Successful Performance Implies Outcome

Teasdale (1978) argued that while it may be useful to distinguish between efficacy and outcome expectancies, Bandura had blurred this distinction. Teasdale suggested that the definition of efficacy as "the ability to perform successfully" confounds ability to respond (performance) with the outcome of that response (successful performance). Further, he felt that Bandura did not adequately consider the possibility that some forms of treatment may work solely by modifying outcome expectancies. He contended that conclusions drawn from research in this area depend heavily on the interpretation given to expectancy measures, and he argued that it could be very hard to assess efficacy and outcome expectancies independently. This, he believed, would involve asking questions like "Could you perform this behavior regardless of the consequences?" and "How likely is this outcome, regardless of whether or not you could perform the behavior?" He was not

at all convinced that people could draw this kind of distinction, leaving the question of self-efficacy indeterminate.

Eastman and Marzillier (1984), following the same line of reasoning as Teasdale (1978), argued that Bandura's definition of efficacy includes outcome elements and is not conceptually distinct from them. Although Bandura says that efficacy concerns the execution of an act, not the outcomes flowing from it, Eastman and Marzillier felt that a focus on "successful performance" still includes what most people would regard as outcome elements, and they concluded that it is impossible to exclude outcome from the definition of efficacy.

They also questioned the idea that people can ignore outcomes in judging ability to cope with aversive events. They contended that efficacy estimates are strongly influenced by outcomes, and that the degree of anxiety people experience derives in part from the degree of aversiveness of anticipated consequences. They concluded that it is outcome expectations that predict behavior, and that Bandura's emphasis on efficacy oversimplifies the variables involved and directs attention away from the role of outcome expectancies as key determinants of behavior.

Eastman and Marzillier also pointed out that claims for self-efficacy extend beyond the discrete tasks with limited outcomes on which Bandura based his theory, experiments which they felt constitute limited situations with constrained outcomes. They asserted that although Bandura says that in treatment one learns generalizable skills for dealing successfully with stressful situations, self-efficacy assessment is not typically conducted at

this generalized level, but rather is locked onto discrete tasks. Thus, they felt that there was a discrepancy between the "striking and bold claims" made for self-efficacy and the "limited and specific" relationships demonstrated.

Ability vs. Willingness

Like Kazdin (1978), Kirsch (1982) averred that the interpretation of efficacy ratings depends on the nature of the task rated. He made a distinction between efficacy as "can do" versus efficacy as "willing to try." To illustrate his point, Kirsch conducted an experiment in which he compared self-efficacy ratings for two tasks: a "skill" task, in which subjects were asked to rate efficacy with regard to tossing a ball of crumpled paper into a wastebasket at varying distances, and a "fear" task, in which subjects rated efficacy on the same snake-handling tasks used by Bandura. Kirsch predicted that ratings of self-efficacy for the skill task would be attributed by subjects to ability ("can do"), whereas ratings on the fear task would be a function of anxiety and aversive consequences ("willing to try"). His results showed that when asked to explain their self-efficacy ratings on the skill task, subjects cited lack of ability, while on the fear task, 60% of the attributions made by subjects involved negative consequences.

Exploring the question further, Kirsch attempted to get people to change their ratings by varying the incentives offered for successful completion of the tasks. He found that while all subjects changed their efficacy ratings on the fear task when offered higher incentives, only half of the subjects changed their efficacy ratings on the skill task when it carried higher incentives. Kirsch concluded that efficacy ratings have different meanings

depending on whether a task involves skill or fear. With skilled tasks, he said, efficacy measures "can do," whereas efficacy judgments in fear-related tasks measure "willingness to try," which is primarily a function of outcome expectancies.

Kirsch (1985, 1986) maintained that outcome expectancies have been defined by Bandura in two different ways: (1) as perceived environmental contingencies, independent of self-efficacy; and (2) as beliefs about the consequences of one's own behavior, which are closely related to self-efficacy. Reviewing the findings from his own study, Kirsch argued that this distinction applies only to tasks involving skill. Since changes in incentives alter self-efficacy judgments for fear-related tasks, "efficacy" ratings in the fear situation measure willingness rather than ability. Kirsch concluded that even the best self-efficacy measures are influenced by outcome expectations when tasks involve willingness to perform behavior.

Outcomes Depend on Performance Ability

In his subsequent writings, Bandura (1982, 1984, 1986a, 1986b) clarified his position, addressing many of the points raised by his critics. He reiterated his view of efficacy as a generative capacity, not merely the ability to perform elementary component acts, stressing the difference between possessing component subskills and being able to utilize them effectively for various purposes under varying conditions. He maintained that the types of outcomes people anticipate depend on their judgments of self-efficacy: high self-efficacy leads to expectations of positive outcomes, while low self-efficacy leads to expectations of negative outcomes, making outcome expectations contingent on

performance judgments. It is for this reason, he argued, that expected outcomes may not add much to the prediction of behavior.

Furthermore, he insisted that assessments of outcomes are not disembodied from acts, since outcomes depend on performance ability. It is impossible, he said, to anticipate outcomes without first thinking of what one is doing and how well one is doing it. It is because people see themselves as inefficacious that they envisage aversive outcomes. Of course people are concerned with outcomes, said Bandura, but it is precisely because outcomes are contingent upon performance that people rely on efficacy judgments to decide what to do and how long to persist. Where, he asked, do outcome expectancies come from if detached from performance judgments? The inept driver pictures a crash, but it is the logically prior thought "I can't control the car" or "I can't stop fast enough" that provides the basis for the anticipated outcome. Thus, it is perceived inefficacy to cope with a threat, not simple fear, that leads people to anticipate negative outcomes.

Bandura also insisted that Kirsch misread the snake-handling task as not requiring skill. It does require skill, he said, as any herpetologist would attest. Kirsch categorized snake-handling as a "fear" task, but it is in fact the belief that inept coping will lead to adverse consequences that creates fear in this situation and leads people to shun the task. In other words, fear of aversive consequences is based on a perceived lack of fit between task demands and estimated coping abilities, whereas "willingness to try" emanates from the belief that a given task is within the scope of perceived coping ability. Thus, it is

perceived inefficacy that leads to anxiety, and fear and avoidance are interpreted as coeffects of a perceived inability to cope.

Specifying Criteria

Bandura also reiterated the need to focus on higher-order specification of behavior, noting that efficacy in driving a car is not concerned with elemental behaviors such as turning the wheel and operating the pedals, but rather with the higher-order ability to navigate roads and cope with traffic. In the same way, the prototypical snake-handling task is not a measure of the ability to exercise a grasping response that allows holding the snake, but instead concerns the ability to control a writhing snake that might turn and bite or slither away. Thus, efficacy is involved with how best to scale efforts and is not a discrete act, but the ability to exercise control.

As far as efficacy and outcome expectations being conceptually distinct, Bandura said that the difference between an act and its outcomes is simple and clear. Confusion arises because people continue to insist on isolating elements that define the act, calling them outcomes of the act. Successfully jumping six feet is not distinct from jumping six feet without knocking off the bar, since knocking off the bar means that you didn't successfully jump six feet — leaving the bar intact is part of what Bandura called the "specifying criteria" of the act. Coping with a harmless snake and coping with a poisonous snake are two different tasks, since the specifying criteria differ, with the latter requiring more control, given that the snake is more dangerous.

Factors Affecting Self-Efficacy Assessment

Bandura noted that efficacy judgments are influenced by many factors, including direct mastery experiences, social comparison, and varied forms of persuasion such as bogus feedback or the artificially-constructed hypothetical incentives used by Kirsch (1982) in testing the stability of self-efficacy estimates. Since persuasion is one means by which self-efficacy can be altered, Kirsch's demonstration that monetary inducements lead people to persuade themselves that they might be able to mount extraordinary coping efforts merely corroborates self-efficacy theory. There are lots of things people persuade themselves they could do for prized benefits, said Bandura, and efficacy beliefs based on illusory contingencies can be so powerful that people will persevere doggedly despite repeated failures. Self-efficacy judgments cannot be separated from task demands and the specifying criteria that define performance. Holding a snake and holding a snake for $1 million, he asserted, are two different tasks.

Bandura alleged that perceived self-efficacy predicts performance much better than expected outcomes, but he stressed that this predictive linkage is destroyed if outcome is only loosely linked to performance, or if outcome is based on a minimum level (or threshold) of performance. He also distinguished between self-efficacy in learning new behaviors and self-efficacy as applied to an existing performance. High self-efficacy in learning may lead to less effort if the individual believes that the learning task is easy. On the other hand, low self-efficacy almost always produces higher judgment of difficulties, higher stress, and less coping behavior. However, he cautioned that self-efficacy may not

necessarily be linearly related to performance, since, for example, there may be a threshold of self-efficacy that is necessary before a performance attempt is made, after which higher levels of self-efficacy will only lead to the same attempt.

Bandura also emphasized the difference between postulating self-efficacy as a common mechanism underlying behavior and asserting that self-efficacy is the only significant variable, noting that he never made the latter assertion. Instead, he maintained that self-efficacy judgments are concerned with the relative contributions of both ability and non-ability factors to successful performance. As such, self-efficacy estimates will change as a function of task difficulty, skill, preparation, effort, physical and psychological state, how much help is required, the temporal pattern of successes and failures, and the adequacy of monitoring and recall of performance.

Bandura also explicitly argued against an omnibus conception of self-efficacy disjoined from the nature of the performance task. Self-efficacy is not a trait-like entity reflecting a fixed faculty, he said, but is instead an inferential process embodying uncertain and unpredictable elements. Furthermore, since performance is assessed over time — with some performances falling above and some below the judged level of self-efficacy — cognitive biases can distort self-efficacy estimates. Thus, it is unreasonable to expect an omnibus measure to predict well for different activities under diverse circumstances.

CHAPTER 3

EMPIRICAL INVESTIGATIONS

Comparatively few empirical studies exist that specifically address the question of interest here — namely, the relative predictive power of self-efficacy and outcome expectations. However the work that has appeared covers a number of different areas.

Laboratory Analog Studies

Two attempts to manipulate expectancies experimentally can be found in a pair of studies conducted by Maddux and his associates (Maddux, Norton & Stoltenberg, 1986; Maddux, Sherer & Rogers, 1982). These investigators focused on the effects of self-efficacy and outcome expectancies on behavioral intentions, which have consistently been shown to be highly correlated with actual behavior (Ajzen & Fishbein, 1980). In the first study, Maddux et al. (1982) exposed 95 undergraduates to persuasive communications in the form of brochures describing the "broken record" technique used in assertiveness training. The broken record technique consists of repeating an assertive response without variation or qualification in the face of opposition. The brochures contained various combinations of information about the difficulty of performing the technique (efficacy expectancy) and its effectiveness (outcome expectancy). These manipulations were combined in a 3 (high/low/no efficacy information) x 3 (high/low/no outcome information) factorial design, where the dependent measure was intention to use the technique.

Data were analyzed using multivariate analysis of variance, which showed a main effect on behavioral intentions for outcome expectancy, and a non-significant trend for self-efficacy. In tests designed to check the effectiveness of their manipulations, Maddux et al. (1982) also found an interaction effect for post-test self-efficacy ratings suggesting that the effects of the outcome expectancy manipulation were more pronounced when paired with the low self-efficacy condition than when paired with high self-efficacy. On the basis of these results, they concluded that: (a) self-efficacy and outcome expectancies could be manipulated independently by means of verbal persuasion; (b) expectancies caused changes in behavioral intentions; and (c) those who were led to believe there was a weak connection between behavior and outcome (low outcome expectancy) were more easily persuaded by information about self-efficacy than those led to believe the technique was very effective (high outcome expectancy).

In a second study with 88 undergraduates, Maddux et al. (1986) used a very similar approach. The focus here was also behavioral intention, and the manipulation was once again a series of brochures about the broken record technique. However the no-information levels of the independent variables included in the previous study were not employed in this one, and a new manipulation — outcome value — was introduced, making the study a 2 x 2 x 2 factorial. The high outcome value brochures argued that use of the technique would result in benefits such as increased success in interpersonal encounters, while the low outcome value brochures took the position that using the

broken record technique would lead to negative consequences such as interpersonal friction.

Analysis of variance on behavioral intentions showed main effects for both outcome expectancy and outcome value, but not for self-efficacy. A self-efficacy x outcome value interaction was found, however, which showed that the outcome value manipulation had a significant effect on behavioral intentions in the high, but not the low, self-efficacy condition. All three independent variables were found to be correlated with the behavioral intention measure at about the same moderate level, but self-efficacy and outcome expectancy were not correlated with each other significantly, which Maddux et al. (1986) interpreted as evidence that the two constructs were not redundant. Regression analysis revealed that each of the three independent variables accounted for a significant and independent portion of variance in behavioral intentions, with outcome expectancy contributing a slightly larger amount of unshared variance (8%) than either of the other two variables (5% each). Given significant and roughly equivalent contributions to the prediction of intentions by all three measures, Maddux et al. (1986) concluded that while providing support for the importance of self-efficacy as a mediator of behavioral intentions, their results suggested that outcome expectancies may be equally important under some conditions.

Among the criticisms that can be leveled at the two studies conducted by Maddux and his colleagues, the first involves the use of a laboratory analog task, which may or may not have been very meaningful for subjects. Second, although manipulation checks showed

that the efficacy manipulation was effective, mean differences between groups were not large, and it could be argued that the focus of the manipulation — the broken record technique — is so simple and straightforward that few people could effectively be fooled into thinking that it was very difficult to learn or employ. Third, all manipulations in both studies were implemented by means of persuasive communications in written brochures — a form of efficacy induction described by Bandura (1977) as the weakest of all four of the forms discussed, subject to such factors as the source's persuasiveness, authority, and believability. Finally, these investigators used behavioral intention as their dependent measure, rather than actual performance, leaving the relationship between behavior and expectancies unclear.

Sexton, Tuckman and Crehan (1992) conducted an analog study in which they examined the performance of 112 college students who were offered extra credit for writing up to 25 test items each week for a period of 10 weeks. Fill-in-the-blank items were awarded one point each and multiple-choice items two points each. The dependent measure of performance was calculated as the total number of points earned each week. The independent variables were self-efficacy, outcome likelihood and outcome value, assessed each week during the study period. Data analyses included a path analysis of performance measures for the first, second and tenth weeks of the study.

Results from the path analysis showed that self-efficacy was the best predictor of performance in the first trial, with outcome value also involved to a lesser extent. On the second trial, self-efficacy and previous performance were the only significant predictors.

On the tenth trial, prior performance was the best predictor of item-writing, with outcome value explaining a small additional amount of variance. The investigators concluded that self-efficacy was the most important predictor of performance in early trials, but that it continued to have an indirect influence across all trials through its relationship with prior performance. Given the predictive power of prior performance, however, they interpreted these results as calling into question the primacy of self-efficacy across the temporal dimension.

As in the studies conducted by Maddux and his colleagues, the results reported by Sexton et al. (1992) are conditioned by the "artificial" nature of the experiment. An important question facing these investigators is whether or not the experimental task was meaningful enough to subjects to engage them sufficiently. Why, for example, would an "A" student necessarily bother much with an extra-credit task? And if better students were selectively less engaged — or, conversely, if the better students were more likely to perform well at the experimental task — what then are the implications for the authors' conclusions? Further, Sexton et al. state that it was not their primary intention to test self-efficacy theory, and they note potential problems with the way in which both efficacy and outcome expectancies were assessed in this study. In short, although this experiment did find support for Bandura's contention that self-efficacy mediates outcome expectancies, the conclusions of the study are weakened by the nature of the evidence presented.

In contrast, Williams and Kinney (1991) conducted a well-designed analog study in which they investigated several strategies for coping with acute induced pain in a sample

of 64 male and female undergraduates. The dependent variable of interest was cold-pressor pain tolerance, defined as the number of seconds subjects kept their non-dominant hand immersed in cold water. Williams and Kinney predicted that self-efficacy would be a more accurate predictor of pain tolerance than would the outcome expectancy measure, anticipated pain. After a pre-test administration of the self-report measures, subjects sampled the experimental task by immersing their hands in cold water. They then learned one of three strategies for coping with pain, after which they repeated the cold-pressor task while using their assigned coping strategy.

The results of this experiment showed an effect for all three coping strategies but not for the control group, and suggested that an active performance strategy was more effective than either a verbal-imaginal or a relaxation strategy. With regard to pain tolerance, self-efficacy was found to be more accurate than anticipated pain as a predictor of tolerance at both occasions — during pre-test familiarization with the task, as well as during the post-test when the coping strategy was employed. Using partial correlation analyses, the investigators showed that self-efficacy predicted pain tolerance when anticipated pain was controlled, but that the relation between anticipated pain and pain tolerance disappeared when self-efficacy was controlled. On the basis of these results, they concluded that self-efficacy cannot be reduced to outcome expectations, but that, on the contrary, outcome expectancy (anticipated pain) owes its capacity to predict pain tolerance to its correlation with self-efficacy.

Although this was a laboratory analog study, the Williams and Kinney (1991) experiment was more realistic than the studies described previously, since it did not involve a manipulative induction of efficacy or outcome expectancies. Further, the investigators measured both efficacy and outcome expectancies correctly, and they examined behavior (cold-pressor pain tolerance) directly rather than using a proxy such as behavioral intentions or ratings of performance assigned by the investigator. They also examined a question of practical as well as theoretical interest — pain tolerance — and conducted appropriate statistical analyses to assess the relative contribution of variables (*cf.*, Cohen & Cohen, 1975). Thus, this experiment provides perhaps the best test to date of the question of interest here — the relative predictive power of efficacy and outcome expectancies.

Another well-designed analog study was conducted by Rankin, Bruning, Timme and Katkanant (1993), who investigated spelling performance and writing ability in 258 undergraduates. The independent variables in this study were spelling and writing self-efficacy and spelling and writing outcome expectancies. The dependent variables were scores on a 50-item spelling test, and overall grades on an 18-minute essay. To assess the contributions of the independent variables, the investigators examined zero-order correlations, and submitted the variables to a path analysis. The results showed significant correlations between spelling and self-efficacy, between spelling and outcome expectations, and between writing and self-efficacy, but not between writing and outcome expectancies, with the spelling-self-efficacy correlation being much higher than the

spelling-outcome expectancy correlation. The final path model yielded only three significant effects: a direct effect of self-efficacy on spelling, an indirect effect of self-efficacy on writing mediated by spelling, and a direct effect of spelling on writing. Based on these results, Rankin and her colleagues concluded that self-efficacy was strongly related to spelling, while outcome expectancy was not, confirming the hypotheses derived from Bandura (1982, 1986b).

Outcome Value vs. Outcome Likelihood

In an experiment using a simulated assertiveness task, Lee (1984a) examined the responses of 40 female undergraduates instructed to reply in a verbally assertive manner to seven social situations presented as audiotaped role-plays. Prior to presentation of the role-plays, Lee administered a seven-item questionnaire designed to measure subjects' perceived capability of responding assertively (efficacy), and the likely result — positive or negative — of producing an assertive response (outcome value). She then used regression to partition variance on her performance measures, which consisted of the experimenter's rating of the assertiveness, appropriateness and latency of the subjects' taped responses. Although none of the independent variables could account for variance in the latency measure, for both assertiveness and appropriateness Lee found that her efficacy measure accounted for the greatest proportion of variance, and that outcome value added little (appropriateness) or nothing (assertiveness). She concluded that no combination of her variables was better than efficacy alone as a predictor of performance.

However, apart from the use of a laboratory analog task — which, again, may not have had much meaning or relevance for her subjects — and the somewhat subjective manner in which performance was assessed, the principal problem with this study rests on the operational definition of the independent variables. In particular, although self-efficacy was defined and measured as recommended (*cf.*, Bandura, 1986b), Lee used value, rather than likelihood, as her only outcome expectancy construct. While outcome value has been examined as an additional component of the self-efficacy model (*cf.* Maddux et al., 1986; Maddux & Rogers, 1983; Teasdale, 1978), Lee's omission of the more commonly-used likelihood definition of outcome expectancy is puzzling and makes it difficult to draw conclusions from her results.

The same problem is encountered in a second study she conducted (Lee, 1984b), in which 33 non-phobic male undergraduates were exposed to a snake-handling task. Here, Lee assessed efficacy and outcome value using 18 graduated behaviors ranging from "look at snake from a distance" to "tolerate snake in lap." She then allowed her subjects to perform "as many attempts as necessary" for each of the behaviors, stopping at the first refusal to perform. As in the previous study, she used multiple regression to partition performance variance, measured as the number of items successfully undertaken, this time including a multiplicative combination of efficacy and outcome value as an independent variable in addition to the other measures. She again found that efficacy was the best predictor of behavior, noting that none of the other measures, including the multiplicative combination, accounted for much variance beyond that predicted by efficacy ratings alone.

However, as above, the use of value rather than likelihood as the only definition of outcome expectancy leaves unanswered the main question of interest in the present study.

In one of the few studies in which both outcome value and outcome likelihood were examined, Sexton and Tuckman (1991) conducted a path-analytic investigation designed to assess a self-efficacy-based model of mathematics performance. Testing 42 college women, the investigators compared measures of math self-efficacy, outcome expectations and anxiety as predictors of performance on math problems across multiple trials, including in their model both general and situational self-efficacy, and both likelihood and importance (value) measures of outcome expectancies. The dependent measures examined were: (a) choice, the level of difficulty of the math problems subjects chose to solve; (b) effort, the amount of time spent on the task; and (c) achievement, the number of correct answers attained.

Their results showed that although self-efficacy measures emerged as significant predictors, outcome value and likelihood were neither distinct nor related to performance in the expected manner. In addition, the path analysis provided evidence of a changing relationship between efficacy beliefs and performance measures across time. Effort, which was not explained by any of the variables in the early trials, was predicted by self-efficacy in later trials. On the other hand, although choice was predicted by general self-efficacy beliefs in the early stages of the task, as trials progressed, a behavioral pattern developed which appeared to be more salient than self-efficacy in predicting choice in subsequent trials. Sexton and Tuckman interpreted their findings as evidence that efficacy, outcome

value and outcome likelihood were different concepts playing different roles in performance. They concluded that self-efficacy beliefs were "clearly the most influential variable," serving to "propel" subjects through difficult tasks.

Several points can be made in favor of this study, although the most pertinent to this discussion is that in addition to investigating a practical problem with real-world implications, Sexton and Tuckman employed several different measures of efficacy and outcome expectancies, including both value and likelihood definitions of outcome expectancies. They also explored the research question using path analysis, which is designed to take into account and explicate dependencies within the data. Further, they examined more than one dependent variable, and they explored the changing relationships among their measures over time. These procedures revealed heretofore unexpected insights about the differential predictive power of the independent variables for different aspects of performance, and demonstrated the dynamic relationships among variables across time. The small sample size and the use of female subjects exclusively could be questioned, as they affect the generalizability of results. However statistically significant results in a sample of this size make the findings that much more impressive, and the investigators argued convincingly that math performance among women is a matter of special interest.

Interactions Between Efficacy and Outcome Expectancies

In one of only two investigations in which the interaction between efficacy and outcome expectancies was explicitly examined, Sanna (1992) conducted a study involving

144 undergraduates in which he attempted to use self-efficacy theory to integrate research on social facilitation (Zajonc, 1965) and social loafing (Latané, Williams & Harkins, 1979). Using a signal detection task, Sanna manipulated self-efficacy by giving subjects false performance feedback. He also manipulated outcome value, leading subject pairs to believe that the contributions of individual subjects to group performance either could (high outcome value) or could not (low outcome value) be identified.

Sanna's results showed that those in the high self-efficacy groups performed better when they were led to believe that individual contributions to group performance could be distinguished (high outcome value) than when they believed their individual contributions could not be identified (low outcome value), consistent with the results of social facilitation research. On the other hand, low self-efficacy subjects in the low outcome value condition performed better than those in whom high outcome value expectancies had been induced, consistent with the hypothesis derived from social loafing research. The relative contributions to performance of self-efficacy, outcome value, and a multiplicative combination of the two were assessed in path analyses, which showed that all three factors affected performance, at about the same level. Sanna concluded that the two types of expectancy mediate performance both individually and jointly.

Although not specifically designed to test the question of interest here, this study does add to the evidence that self-efficacy and outcome expectancies can be manipulated in a non-confounded manner, and it sheds light on the importance of the setting (public versus private) in which performance is assessed. Most important in this context, Sanna's

results provide clear evidence of an interaction between outcome expectancies and self-efficacy, demonstrating that self-efficacy mediates the effect of outcome expectations. However, since outcome expectancies were defined somewhat idiosyncratically and did not include a measure of outcome likelihood — which might, in any case, have had little meaning in regard to the laboratory task used to assess performance — the results are difficult to compare with other studies of this question.

Measurement Problems

In a comparison of the predictions made by self-efficacy theory with those derived from learned helplessness theory, Davis and Yates (1982) examined depressive affect and anagram solution time. Learned helplessness theory predicts that a low outcome expectancy (non-contingency between response and outcome) is by itself sufficient to produce depressive affect (Abramson, Seligman & Teasdale, 1978), whereas Bandura's (1977) self-efficacy theory says that depression should only occur when low self-efficacy is paired with high outcome expectations. To test these differential predictions, Davis and Yates attempted to manipulate both self-efficacy and outcome expectancies in 108 male and female undergraduates. Self-efficacy was manipulated by presenting subjects with anagrams labeled as either easy (high self-efficacy) or hard (low self-efficacy), while outcome expectancy was manipulated before each of the 10 trials by exposing subjects to graphs showing that few (low outcome expectancy) or most (high outcome expectancy) students solved the anagrams correctly. Both expectancy factors also included a no-information condition, and gender was included as a factor, so the experiment was a 3 x 3

x 2 factorial design. The dependent variables assessed were performance, measured as mean time to complete the anagrams, and depressive affect at post-test.

The results of this study showed that Pearson correlations between self-efficacy and performance rose in absolute magnitude across trials to a moderately high level. Outcome expectancies were also correlated with performance, only at a much lower level, and often non-significantly. Davis and Yates concluded that their results supported self-efficacy theory, but only for male subjects. In their attempt to explain why their results were confined to males, they posed two telling alternatives: that the expectancy manipulation may have failed for the female subjects, or that the female subjects may not have considered the experimental task to be important.

These possibilities go right to the heart of the problem with laboratory analog tasks such as the one used by Davis and Yates. Artificiality causes problems with the self-efficacy manipulation in this study because merely labeling anagrams as "easy" or "hard" may not have succeeded in altering self-efficacy, especially for subjects who had previous experience solving anagrams. However, a more important critique of this study focuses on the graphs shown to subjects to induce outcome expectancies. An outcome expectancy would be the perceived probability that a given consequence would follow from anagram-solving behavior, but the graphs subjects were shown depicted the ability of other people to perform the behavior. As noted by Maddux and his colleagues (Maddux, Norton & Stoltenberg, 1986), this is surely much more closely related to self-efficacy than to outcome information. This questionable operationalization of a key construct renders the

findings from the study inconclusive with respect to the relative predictive power of the two types of expectancy.

The contrasting problem — difficulty in the operations used to measure self-efficacy — is illustrated in a study conducted by Manning and Wright (1983) of 52 women during childbirth. The question of interest centered on the ability of the women to control pain during labor without medication. Self-efficacy was defined as "the anticipated ability to control pain without medication." Outcome expectancy was operationalized as belief that pain control techniques would make this possible. The dependent variable, persistence in pain control, was whether or not medication was in fact used during labor, and the percentage of time in labor without medication.

The results showed that use of medication was negatively correlated with both self-efficacy and outcome expectancies, and that time to medication use was positively correlated with these variables. Based on multiple regression analyses, the investigators concluded that outcome expectancy did not add to self-efficacy as a predictor of persistence in pain control, supporting their original hypothesis. However, they also noted that there was a very high correlation between the self-efficacy and outcome expectancy measures ($r = .75$), and they concluded that the two constructs were "largely redundant," confirming the suspicions of Teasdale (1978) and Kazdin (1978) about the difficulty of separating them empirically.

According to Bandura (1977, 1982, 1986b), however, self-efficacy is the perceived ability to perform behavior, and is clearly distinguishable from the outcomes of that

behavior. The self-efficacy measure used by Manning and Wright focused on an outcome of behavior — the anticipated ability to control pain — rather than upon the execution of behavior — the ability to perform pain control techniques. In other words, both of the independent variables were in fact tapping outcome expectancies. This confounding may account for the high correlation observed between the two measures, and it calls into question the conclusions of the authors regarding the possibility of differentiating the two expectancy constructs.

A similar artifact may have affected the results of another study of mathematics ability. Here, Lent, Lopez and Bieschke (1993) used self-efficacy and outcome expectations to examine choice of, and performance in, college math courses for 166 undergraduates. The independent variables were math self-efficacy, positive outcome expectations, math interests, and previous math performance, as assessed by ACT scores. Dependent variables included interest in math, intention to take math courses in the future, actual choice of math courses in the subsequent semester, and performance in math courses, measured in terms of grades obtained.

Lent et al. used a hierarchical regression strategy, controlling for sex, to partition variance in their dependent measures. The results showed that the self-efficacy and outcome expectancy measures were significantly positively correlated (r = .54). For math interest, all independent variables yielded significant increments in variance, with self-efficacy contributing the most, followed by outcome expectations. Variations of the model showed that the effect on interests of past achievement in math (*i.e.*, the ACT score) was

mediated by self-efficacy. The same result was found for intention to take math courses, but when math interest (the dependent variable in the previous model) was added to the equation to predict intention, the contribution of self-efficacy was no longer significant, suggesting that self-efficacy influences intentions indirectly through interest.

For math performance (grades), on the other hand, only self-efficacy and ACT scores were significant predictors. The effect of ACT scores on grades was not accounted for by self-efficacy mediation, and adding math interests to the prediction equation did not eliminate either of the effects, suggesting that past performance and self-efficacy have both direct and indirect influences on grades. The analysis of choice of math courses also showed an effect of self-efficacy, but since coefficients and incremental variance proportions for the choice variable were not presented in the article, it was not possible to ascertain further details about this relationship.

On the basis of these results, Lent et al. concluded that self-efficacy mediates the effect of prior performance on math interests and ability, while interest mediates the effect of self-efficacy on math intentions. They also concluded that for grades, past performance has both a direct effect and an indirect effect mediated by self-efficacy, while self-efficacy has both a direct effect and an indirect effect mediated by interest. With regard to the question of the relative contributions of self-efficacy and outcome expectancies, the authors concluded that outcome expectations did not add to or moderate the influence of self-efficacy on grades, but did add unique variance to the prediction of interests and intentions. They also speculated that math self-efficacy arises in part from successful

performance experiences, and that subsequent math attainment requires both ability and self-efficacy. Further, they felt their results warranted the conclusion that perceived self-efficacy may account for gender differences in math performance.

This was a well-conducted study with practical import in which several dependent variables were assessed. It aids understanding of the role intentions play in behavior, shedding further light on the findings of Maddux et al. (1982, 1986). However, the authors did not address the fact that self-efficacy and outcome expectancy measures were highly intercorrelated in the discussion of their results, although this finding suggests that the two expectancy constructs may not have been operationalized in a way that allowed subjects to distinguish between them well. This casts some doubt on the authors' conclusions regarding the relative predictive power of efficacy and outcome expectations.

Summary of Key Methodological Issues

A number of issues have been visited in the relatively circumscribed body of literature reviewed here. Key issues fall into four general categories: (a) use of laboratory tasks to obtain performance measures; (b) value and likelihood as definitions of outcome expectations; (c) interactions between self-efficacy and outcome expectations in tests of the model; and (d) defining and measuring efficacy and outcome expectancies so that they are separate and conceptually distinct.

Laboratory analog tasks. Bandura warns that disparities can be expected between self-efficacy estimates and behavior when performance is measured in "simulated situations that are easier to deal with" (Bandura, 1986b, p. 397). This caution applies well

to many of the studies reviewed here, some of which were more artificial and highly-constructed than others. Only two of the twelve studies — Manning and Wright (1983) and Lent et al. (1993) — were naturalistic investigations of performance. The ten remaining investigations involved laboratory tasks which may or may not have had much meaning for subjects. If a performance task is so devoid of real-world incentives as to render it meaningless, or if post hoc analyses fail to provide evidence that an experimental manipulation was successful, these factors affect the conclusions drawn from such studies. As a result, it is highly likely that many of these studies did not provide an appropriate test of the differential predictive power of efficacy and outcome expectancies.

Outcome value and likelihood. Of the twelve studies reviewed here, half reported use of an outcome value measure. In three of these six studies (Lee, 1984a, 1984b; Sanna, 1992), value was the only outcome expectancy included, so the contribution of outcome likelihood could not be assessed. In a fourth study (Maddux et al., 1986), outcome value was induced by means of an experimental manipulation, but the investigators reported problems with the manipulation check and for this reason specifically demurred in interpreting the effects of this variable. In the two remaining studies that included outcome value (Sexton & Tuckman, 1991; Sexton et al., 1992), only positive outcome value was assessed. Thus, although outcome value (incentive) was postulated by Bandura as an influence on behavior (Bandura, 1977, p. 194), this assertion has not been adequately examined in the empirical studies conducted to date.

Interactions between efficacy and outcome expectancies. Although the essence of Bandura's (1977, 1982, 1986b) argument concerning the respective roles of efficacy and outcome expectations is that outcome expectancies depend on self-efficacy, most of the studies reviewed here have not examined interaction effects at all. Only two of the twelve studies explicitly tested the interaction between self-efficacy and outcome expectancies using a regression-decomposition or path-analytic strategy, one study finding that it did not add to the prediction of performance (Lee, 1984b), the other concluding that it did (Sanna, 1992). Three other studies did test some aspect of the interaction term, either by examining a specific prediction for individual cells of the efficacy-by-outcome expectancy matrix (Davis & Yates, 1982), or in passing, as part of a manipulation check, using an ANOVA model in which expectancy scores were dichotomized in creating experimental groups (Maddux et al., 1986; Maddux et al., 1982). However none of these three investigations carried the interaction term into the subsequent phase of the study where relative predictive power was assessed using correlation-based analyses. Yet all three studies showed that an interaction was present in some form. This suggests that further exploration of this issue is required in order to provide an adequate test of Bandura's hypothesis that perceived self-efficacy mediates outcome expectancies.

Measuring expectancies. This is the central question driving the present study. The debate began with Bandura's (1977) assertion that efficacy and outcome expectancies are conceptually distinct, while his critics argued that they are not (Eastman & Marzillier, 1984; Kazdin, 1978; Kirsch, 1986; Teasdale, 1978). This debate carried over to the

studies reported here, most of which were specifically conducted in order to obtain empirical evidence regarding this question. However, several difficulties in operationalizing one or both of the expectancy constructs have been noted in this review. The outcome expectancy manipulation used by Davis and Yates (1982) employed self-efficacy information, not outcome expectancies. On the other hand, the question used by Manning and Wright (1983) to measure self-efficacy expectancies in fact concerned expected outcomes. Sexton et al. (1992) expressed reservations about their own study concerning the operations used to measure both efficacy and outcome expectations, while Lent et al. (1993), like Manning and Wright (1983), reported a moderately high correlation between their efficacy and outcome expectancy measures, suggesting that they may not have been conceptually distinct. Of the eight studies remaining, three (Lee, 1984a, 1984b; Sanna, 1992) did not include a measure of outcome likelihood, while two more (Maddux et al., 1982; Maddux et al., 1986) involved a somewhat unconvincing manipulation designed to induce expectancies experimentally. In sum, studies designed to examine the relative predictive power of efficacy and outcome expectancies that have been conducted to date are subject to several conceptual and methodological concerns. As a result, they do not provide an adequate basis for wide-ranging conclusions regarding efficacy and outcome expectancies.

Context of the Present Study

To broaden the empirical context of this question, and perhaps shed further light on its theoretical underpinnings, the present study was designed to subject this controversy

to an empirical test in the arena of alcoholism treatment. Both self-efficacy and outcome expectancies have been widely employed as explanatory constructs in the study of addictive behaviors (Brown, Christiansen & Goldman, 1987; Cooper, Russell & George, 1988; Curry, Marlatt & Gordon, 1987; DiClemente, 1986; Mann, Chassin & Sher, 1987; Marlatt, 1985; Rollnick & Heather, 1982; Stacy, Widaman & Marlatt, 1990; Wilson, 1987). With regard to alcohol use, three levels of application can be distinguished: (a) the etiology of alcohol-related problems; (b) attempts to change drinking behavior; and (c) abstinence-oriented treatment for alcoholism.

In the first analysis, Bandura's (1977) ideas are used to explain the initial acquisition of positive outcome expectations for alcohol use. Low self-esteem, powerlessness, and a history of receiving frequent rewards contingent upon engaging in imitative behavior, combined with a need for positive self-image and impression management, are thought to facilitate imitative learning of addictive behaviors from peers and significant others (Evans & Raines, 1990). Subsequently, due to the accumulation of positive outcome expectancies for alcohol use, the coping mechanism selected in response to stress is most likely to be drinking. Use of alcohol as a coping response is reinforced by its immediately gratifying effects, which further strengthens positive outcome expectancies for alcohol consumption. Over time, use of alcohol as a coping response becomes a habit, an automatic response to stressful situations (Marlatt, 1985).

At the second level of analysis, changes in drinking behavior are accomplished by bringing what has become a habit performed with minimal awareness into the realm of

conscious activity where alternative coping responses can be employed. If the individual can initiate an alternate coping response when faced with a high-risk situation, this increases self-efficacy, weakens positive outcome expectations for drinking, and decreases the probability of alcohol use. However, if no alternative coping response is initiated, or if the coping response is inadequate or unsuccessful, self-efficacy decreases and the salience of positive outcome expectancies for alcohol increases. This is likely to result in a retreat into drinking to cope (Marlatt, 1985).

In the third analysis, abstinence-oriented alcoholism treatment can be seen as an exercise in modifying alcohol-related expectancies. Here, the goal of treatment is to inculcate both positive and negative outcome expectations regarding alcohol use — life-long abstinence from alcohol is stressed as the only "cure," and attention is focused on the belief that a return to drinking at any level will lead to full-blown relapse. At the same time, both positive and negative efficacy expectations are also instilled — the individual must accept the fact that he or she is powerless and unable to cope in the face of alcohol, yet he or she must additionally be convinced that mastery over drinking impulses can be attained (Rollnick & Heather, 1982). In treatment programs based on the Minnesota Model, these changes in expectations are accomplished by breaking down "denial," by providing a new normative reference group consisting of other recovering individuals, and by precipitating a "conversion experience" to a new belief system in which abstinence is considered paramount (Cook, 1988a, b). However, the current view in this field is that the utility of this confrontational approach is mediated by patient characteristics such as

motivation and compliance with treatment recommendations (IOM, 1990). In fact, patient motivation is widely believed by those from varying theoretical perspectives to be a key factor in recovery, constituting one of the few consistent predictors of alcoholism treatment outcome (Fawcett et al., 1987; Finney, Moos & Chan, 1981; Fuller et al., 1986; Westermeyer & Neider, 1984). Nevertheless, dispositional markers of motivation have shown few similarities across studies (Miller, 1985).

The present investigation addresses this third level of analysis. The aim was to determine if expectancy constructs could be used to predict motivation and participation in abstinence-oriented alcoholism treatment. Using effort as the operational definition of motivation, the dispute over the role of efficacy and outcome expectancies as predictors of behavior was employed as a general framework to examine treatment performance. Based on the foregoing review, it was hypothesized that:

1. Those who dropped out of treatment prematurely would show lower levels of positive expectations, higher negative expectations, and lower levels of self-efficacy.

2. Similarly, those who did not comply with the study protocol would show lower levels of positive expectations, higher negative expectations, and lower self-efficacy.

3. Since those who had experienced a prior treatment episode relapsed after treatment, previously treated patients should show lower negative and lower positive treatment expectations, and lower levels of treatment-related self-efficacy.

4. There would be no differences in efficacy or outcome expectations by sex.

5. A more specific measure of treatment-related self-efficacy would predict effort during the first week of treatment better than would a more general measure of self-efficacy.

6. A combined measure of positive and negative outcome expectancies would predict effort better than either positive or negative outcome expectancies alone.

7. Both self-efficacy and outcome expectations would contribute to the prediction of effort, with the two types of expectancy providing independent, as well as shared, contributions to effort variance.

8. Efficacy would be the more important predictor, accounting for a larger percentage of effort variance and mediating the effect of outcome expectations on effort.

9. There would be a significant interaction between efficacy and outcome expectations, with a multiplicative combination of the two accounting for a significant portion of effort variance over and above that accounted for by either alone.

10. Ratings of program difficulty would also contribute to the prediction of effort.

CHAPTER 4

METHOD

Subjects

Subjects were 283 men and women who had been admitted as inpatients to a large midwestern substance abuse hospital for treatment of their alcohol abuse (and, in some cases, for the abuse of other drugs as well as alcohol). Study subjects were all volunteers who participated in a larger study of treatment process issues (see Procedures, below). All volunteers for the larger study were included in the present sample, providing they met the following conditions: (a) they reported use of alcohol in the month prior to treatment; (b) there was no evidence of co-existing eating disorders; and (c) they completed both the Self-Efficacy Questionnaire and the Treatment Expectations Questionnaire during baseline testing (see Measures, below). The first two conditions were employed to reduce the heterogeneity of the sample and ensure significant alcohol involvement on the part of study subjects. The third condition was required because the main focus of the present study was a comparison of efficacy and treatment-related outcome expectations.

The 283 subjects who met these conditions (204 men, 72%, and 79 women, 28%) ranged in age from 20 to 78, with a mean ($\pm$ *SD*) age of 39.8 $\pm$ 12.4 years; twenty-five percent (25%) were under 30, and 30% were over 45 years of age. Most of these individuals (89%) were white, 39% were married, and 25% said they were living alone at

the time of admission. Eighty-four percent (84%) of subjects were high school graduates or higher, and 58% were employed full time. This was the first treatment episode for 54% of these individuals, but 25% reported a positive family history of alcohol and/or other drug abuse treatment.

Procedures

All data used in the present study were obtained from an archival data set derived from a two-year study of alcoholism treatment, the Treatment Process Study (TPS; Parrella, Filstead & Ross, 1993), which was funded by the National Institute on Alcohol Abuse and Alcoholism (NIAAA; Grant #AA08455). The principal investigator for the TPS granted the present author access to selected portions of the TPS data set for the sole purpose of conducting the research described here.

Overview of the TPS. The TPS was designed to operationalize the components and processes of treatment in a standard, abstinence-oriented, inpatient treatment program patterned after the Minnesota Model (Cook, 1988a, b). The overall aim of the TPS was to construct a detailed "map" of treatment processes in terms of the activities and services that constitute treatment on a day-to-day basis. The main goals of the study were to examine whether or not all patients got the same types and amounts of services, and to explore patients' perceptions, motivation, effort, and mood changes during treatment. The TPS included measures of pre-treatment expectations, differential service utilization during treatment, affect, effort and perceived program difficulty, and the impact of individual service components. These data were collected from patients in face-to-face

interviews and self-report questionnaires filled out at baseline and discharge, and by means of a self-monitoring workbook (the Treatment Experience Workbook, TEW; see Measures, below) that patients filled out each night during treatment at the end of the day before they went to bed.

Treatment program characteristics and operation. The treatment facility at which the TPS was conducted was a licensed, 104-bed substance abuse hospital admitting about 1800 patients a year. During the study, approximately forty percent (40%) of admissions were referred out to other programs or services after a 3-5 day detoxification period. Most of those who remained for treatment stayed from 2-4 weeks and received care in an abstinence-oriented, educational program predicated on the disease model of addiction and the 12-step self-help philosophy of Alcoholics Anonymous. Treatment services offered at this site included lectures, films, medication, medical care, psychiatric management, focus groups, recreational activities, self-help literature, individual counseling, group and family therapy, employer conferences, and self-help group meetings.

TPS procedures. Within 24 hours of admission, all new patients were solicited for participation in the TPS. A short video was shown on the detoxification and assessment units which described the purposes and procedures of the study. The principal investigator for the TPS attended these sessions, and after the video, specific tasks required of study participants were laid out and questions raised by patients were answered. Those who agreed to participate were asked to read and sign a consent form, and to provide

additional information that would enable subsequent follow-up after discharge. Then, over the course of the next two days, study subjects were interviewed and asked to complete several baseline questionnaires in addition to the standard battery of tests obtained for clinical use.

During the first testing session, study participants were given the first of a series of workbooks (TEW) containing forms for daily self-monitoring. They were instructed in the use of the workbook in face-to-face interviews and asked to go through a "dry run" in which they reconstructed the previous day's activities and experiences. Subjects returned to the research center on the second day to complete the remaining TPS instruments and review the first day of *in situ* use of the workbook. Although invited to return to the research center at any time, especially if they had questions, subjects were scheduled to return once each week to get a new workbook, review the one they turned in, and clarify questions about program activities or completion of workbook sheets. Just before discharge, subjects came to the research center again to turn in the final workbook and complete retest versions of baseline instruments. TPS data collection began in January of 1992 and lasted for 18 months, terminating in July of 1993.

Additional procedures for the present study. To obtain data for the present study from the TPS archive, administrative records were used to determine which subjects met the three conditions outlined above (*viz.*, alcohol use, no concurrent eating disorders, and presence of the baseline Self-Efficacy and Treatment Expectations Questionnaires). In order to protect the confidentiality of TPS participants, once subject protocols meeting

these conditions were identified, subject responses for the measures used in this study were linked together and extracted from the database.

Measures

Demographic and clinical variables. Demographic and clinical information was taken from the TPS administrative record and from the Alcohol and Substance Abuse Questionnaire (ASAQ; Parrella, Filstead & Ross, 1990), a 16-section paper-and-pencil self-report instrument. The ASAQ provides a comprehensive overview of basic demographics, the historical development of alcohol and substance use patterns, prior treatment history and family history of treatment, quantity and frequency measures for alcohol and other drugs, and psychosocial, physiological, and behavioral measures of consequences due to alcohol and other drug use. For this study, only sex, prior treatment history, and discharge status were abstracted. Sex was coded as female (0) or male (1). Prior treatment was coded as no prior treatment (0) or at least one previous treatment episode (1). Discharge status was coded as normal discharge (0) or dropped out of treatment before formal discharge (1).

Self-efficacy. The Self-Efficacy Questionnaire, adapted for the TPS from a scale developed by Sherer et al. (1982), is a 23-item self-report instrument designed to assess global self-efficacy, or the perceived capability to accomplish tasks. Sherer et al. (1982) describe two scales that can be derived from the items: a specific measure of social self-efficacy, and a global measure of general self-efficacy. As adapted for the TPS, each

question was rated on a 10-point Likert-type scale, where the end-points of the scale were labeled "strongly disagree" and "strongly agree."

In the present study, only the general self-efficacy score (SE) was used. The 17 items that comprise this scale are listed in Table 1. The SE score was recomputed for this study from raw item responses as a mean of valid scale items, ranging from 0 (low self-efficacy) to 9 (high self-efficacy). In order to maintain compatibility with other scales used here, SE scores were divided by 1.8, so the resulting measure ranges from 0 to 5, with higher scores indicating greater self-efficacy.

Table 1

Self-Efficacy Scale Items

When I make plans, I am certain I can make them work.
If I can't do a job the first time, I keep trying until I can.
*I avoid facing difficulties.
*I do not seem capable of dealing with most problems that come up in life.
*When I set important goals for myself, I rarely achieve them.
*I give up on things before completing them.
*One of my problems is that I cannot get down to work when I should.
Failure just makes me try harder.
*If something looks too complicated, I will not even bother to try it.
*I feel insecure about my ability to do things.
When I decide to do something, I go right to work on it.
*When trying to learn something new, I soon give up if I am not initially successful.
*When unexpected problems occur, I don't handle them well.
When I have something unpleasant to do, I stick to it until I finish it.
I am a self-reliant person.
*I avoid trying to learn new things when they look too difficult for me.
*I give up easily.

*Reversed in scoring.

To provide a second, more specific measure of treatment-related self-efficacy (TXSE), an item from the Treatment Expectations Questionnaire (TEQ; see Outcome Expectancy, below) was also used: "I expect that I'll never be able to do everything the staff wants me to do." Subjects were instructed to respond to this question in terms of likelihood — "How much do you expect this to happen?" — on a six-point Likert-type scale ranging from 0 ("not at all") to 5 ("very much"). In the present study, this item was reverse-scored, so higher TXSE scores indicate greater treatment-related self-efficacy.

Outcome expectancy. Outcome expectancies were assessed by means of the Treatment Expectations Questionnaire (TEQ), which was designed specifically for the TPS. The TEQ elicits information about the expectations patients bring with them as they enter treatment. The phrase "treatment expectation" is explained as "What you realistically expect from treatment — that is, what you think will probably happen, not what you wish would happen." Subjects were asked to rate each item in terms of the likelihood that the event or result would happen, responding on a six-point scale ranging from 0 ("not at all") to 5 ("very much"). Although primarily designed to assess outcome expectations and link up with the Treatment Results Questionnaire administered at discharge, the TEQ contains instructions that are purposely ambiguous so as to encompass both outcome ("What will be the result?") and efficacy ("Do you expect that you will experience this result?").

The TEQ contains 87 items that can be broken down into a number of different scales representing outcome expectation domains such as "Futility," "Decision-Making,"

and "Learning About Addiction." For the purposes of the present study, two subsets of TEQ items were employed: "Barriers" (BA), which taps negative process-oriented expectancy; and "Benefits" (BE), representing positive results-oriented outcome expectancies related to learning about addiction. The items that comprise each scale are listed in Table 2.

Table 2

Outcome Expectancy Scales

Barriers:
This treatment will be a painful experience.
The staff will expect me to think things I don't believe.
I'll be uncomfortable.
The staff will expect me to do things I don't want to do.
Being in treatment will upset me.
Life will never be the same after treatment.
Treatment will make me tense or anxious.
Treatment will turn me into a different person.
Treatment will complicate my life.
I'll find out things about myself that I don't like.
Treatment will change my priorities.
Going through treatment will change my lifestyle.
Benefits:
Learn to control my addiction.
Understand why I have these problems, Why me?
Learn what I can do to avoid a relapse.
Learn how to resist temptations.
Learn about 12-step programs such as AA.
Learn how to live without alcohol and drugs.
Learn what I can do instead of drinking or using drugs.

Scores on these scales were computed as means of valid items, ranging from 0 (low expectancy) to 5 (high expectancy). Thus, a "5" on the Barriers scale indicates that the subject had high negative expectations, while a "5" on the Benefits scale indicates that the subject had high positive outcome expectancies.

A third measure of outcome expectations, Decisional Balance (DB), was computed by subtracting the Barriers score from the Benefits score. This index ranges from +5 to -5, representing the differential weight given to positive and negative outcome expectancies. Positive DB scores represent a preponderance of benefits over barriers, while negative scores indicate that expected barriers outweigh expected benefits. Decisional balance has been found to be a critical construct in the Transtheoretical or "stages of change" model proposed by Prochaska (Prochaska & DiClemente, 1983), which has been used extensively in the study of addictive behaviors (*cf.*, Brownell et al., 1986; DiClemente & Prochaska, 1982; Prochaska, 1994; Velicer et al., 1990; Velicer et al., 1993).

Grouping variables and dependent measures. Four grouping variables were used in the present study: (a) discharge status; (b) sex; (c) prior treatment status; and (d) TPS participation. Discharge status was coded as normal discharge (0) or dropped out of treatment (1), indicating whether or not the patient dropped out of treatment before completing the full program and being formally discharged. Sex, as noted above, was coded as female (0) or male (1), and prior treatment was coded as no prior treatment (0) or at least one previous treatment episode (1).

TPS participation was coded in two ways: (a) as a grouping variable (WB), indicating whether or not the patient completed any workbook sheets — no (0) or yes (1); and (b) as a continuous dependent measure (PCTWB), indicating the degree of compliance with the TEW protocol. Since study participants were asked to complete a TEW sheet for each day in treatment, PCTWB was calculated as percentage of the length of stay containing TEW sheets, after adjusting for the period before the subject was enrolled in the study. PCTWB ranges from 0 (did not provide any workbook data) to 100% (completed a sheet every day).

The main dependent measure of interest in this study consists of the effort scale scores derived from workbook sheets. The items that comprise the effort scale are listed in Table 3. Since abstinence-oriented treatment programs such as the one studied are thought to have their effects by engaging patients in a self-directed change process under the guidance of counselors and peer role models, effort was conceptualized here as a multidimensional variable consisting of participating in the daily activities of the treatment program, paying attention to educational materials such as lectures and films, and contributing during insight-oriented group activities. Scores for the effort scale were calculated for each day of treatment for which a valid TEW sheet was present. The effort score was computed as a mean of valid scale items, ranging from 0 (low) to 5 (high).

Table 3

Effort Scale Items

How much effort did you put into treatment today overall?
How much did you participate in today's treatment activities?
How hard did you work today?
Were you motivated?
Were you interested and paying attention?
Did you contribute when you were in groups?

One other workbook item, the daily rating of program difficulty, was also included as part of the set of grouping measures in order to select subsets of workbook sheets for specialized analyses, which will be described below. The difficulty item asks "How difficult were the things you had to do today?" Like the other workbook items, it was rated on a 6-point scale ranging from 0 ("not at all") to 5 ("very").

Table 4 presents a descriptive list of study variables. It should be noted that as a condition of participation, TPS subjects were informed that they were free to withdraw from the study or to decline to answer specific questions at any time, without in any way affecting the course of their treatment. As a result, some TPS subjects did not provide complete information on all data collection instruments. Thus, in order to insure the integrity of the analyses conducted here, only subjects who provided valid responses to at least 3/4 of the items on each of two baseline questionnaires — the TEQ and the SE — were selected for the present study.

Table 4

Variable Descriptions

Variable	Description
Discharge	Dropped out of treatment before formal discharge, no (0) vs. yes (1)
Prior TX	Experienced at least one previous treatment episode, no (0) vs. yes (1)
Sex	Gender of subject, female (0) vs. male (1)
WB	Completed at least four non-weekend workbook sheets, no (0) vs. yes (1)
PCTWB	Percentage of length of stay covered by workbook sheets
SE	General self-efficacy score
TXSE	Treatment-related self-efficacy item response
BA	Barriers score (negative outcome expectancies)
BE	Benefits score (positive outcome expectancies)
DB	Decisional balance (positive minus negative outcome expectancies)
Effort	Mean effort and participation during the first week of treatment
Difficulty	Mean rating of program difficulty during the first week of treatment

Data Analyses

Preliminary analyses. Prior to formal analyses, all data were assessed in terms of distributional properties. Scale scores were then computed and reliability was examined for each of the scales in terms of coefficient alpha (Nunnally, 1978). To insure representative measurement for the scales derived from workbook sheets, only those subjects providing at least four non-weekend TEW sheets were classified as having workbook data. Although 192 of the 283 subjects (68%) provided at least one workbook sheet during their stay in treatment, only 177 (63%) met the criterion of at least four non-weekend sheets. This subgroup of 177 subjects was the focus for all analyses involving effort scores.

Although an effort score could, in theory, have been calculated for each day of inpatient treatment, program activities were for the most part concentrated on weekdays, so attention was restricted to TEW sheets completed Monday through Friday. Furthermore, since individual patients within this sample remained in treatment for varying lengths of time, it was believed that a summary effort score computed as a mean of daily effort scores across length of stay would unfairly weight the scores of some subjects over others. Thus, it was decided that the best approach would be to take the mean effort score for all valid non-weekend sheets completed within the first week of treatment. Besides equating subjects in terms of the span over which effort was calculated, this procedure was considered advantageous in that it represents an assessment of effort early in treatment, before other factors could intervene to diminish relationships between effort and the expectancy measures collected at baseline.

Analysis of WB, discharge status, sex, and prior treatment. In order to examine study hypotheses 1 through 4 concerning differences in baseline expectancies by subject characteristics, two sets of analyses were conducted. In the first set, to examine dependencies among the grouping variables, all four categorical measures (WB, sex, prior treatment, and discharge status) were crosstabulated in pairs. The six unique contingency tables that resulted were examined using the chi-square statistic to test for significance. In the second set of analyses, three comparisons were of interest. First, to compare those who dropped out of treatment with those who stayed for the full program, all baseline expectancy measures (TXSE, SE, BA, BE, and DB) were assessed. Since the baseline

measures were significantly correlated, this analysis was conducted as a multivariate analysis of variance (MANOVA) with discharge status as the independent or grouping variable. Second, to compare those who provided at least four TEW sheets against those who did not, a similar MANOVA was conducted, with WB as the independent variable. Third, differences in baseline expectancies were compared for sex and prior treatment groups using a 2 (sex) x 2 (prior treatment) MANOVA design.

Regression analysis for PCTWB and effort. To assess hypotheses 5 through 9 regarding the relative contributions of efficacy and outcome expectations in predicting the two dependent (or criterion) variables workbook compliance (PCTWB) and effort, separate regression series were performed on each dependent variable. Within each series, a combination of stepwise and hierarchical multiple regression strategies was used to partition variance in the criterion scores. According to Cohen and Cohen (1975), the hierarchical regression model is appropriate when the order of entry of variables into the regression equation can be dictated in advance by the purpose and logic of the research, as when theory exists, or when temporal precedence can be used to guide the construction of the equation: variables are entered in logical (or causal or temporal) sequence. A stepwise approach, on the other hand, selects and enters at each step the one independent variable that provides the largest increment in explained variance (*i.e.*, the largest squared semipartial correlation, or sr^2). This strategy is appropriate when there is no a priori hypothesis about the order of independent variables.

In this study, three sets of independent variables were of interest. The first set contained sex — dummy-coded as female (0) or male (1) — and prior treatment status — dummy coded as no prior treatment (0) or prior treatment (1). The second set contained the two efficacy measures SE and TXSE, plus an interaction term constructed from the multiplicative combination. The third set consisted of the three outcome expectancy measures BA, BE, and DB. No logical priority was assumed within sets, so the stepwise approach was employed: within each set, the variable providing the largest sr^2 was entered first, followed by examination of other variables within that set to determine if further significant sr^2 could be obtained. This procedure was employed in order to maximize the amount of criterion variance predicted by each set.

In considering comparisons among sets, on the other hand, Bandura's (1986b) contention that self-efficacy is logically prior to outcome expectations provides an explicit ordering principle. The set consisting of subject characteristics was always entered first, since subject characteristics logically precede expectancies. This was followed by the set of efficacy measures, which, in turn, were always examined prior to the set comprising outcome expectancy measures. Thus, when considering all three sets of independent variables taken together, the hierarchical regression strategy was applied, and variable sets were always added to the final regression equation in the specified order.

Two other issues drove the regression analyses. The first issue was inclusion of interaction terms in the prediction equations, and the second involved varying the order of entry for efficacy and outcome expectancy sets in order to assess the independent

increments in criterion variance explained by each. With regard to interaction terms, as related by Cohen and Cohen (1975), the multiplicative combination of variables carries the interaction effect but is not the interaction per se. The multiplicative combination can only be interpreted as an interaction after constituent variables (or main effects) have been partialled from the combination. This can be accomplished by entering the constituent variables prior to entering the multiplicative combination. Only when the multiplicative combination accounts for additional sr^2 over and above what can be accounted for by the constituent variables alone is the interaction term said to be significant. Thus, the strategy of examining interactions using multiplicative combinations of variables can be seen as constituting a special case of the hierarchical regression strategy, one in which main effects have logical precedence over interaction effects.

Accordingly, this rule was applied within the second (efficacy) variable set when examining the interaction of SE and TXSE, as well as for the final equation, in examining the efficacy set versus the outcome expectancy set. In order to examine the interaction between SE and TXSE, the multiplicative combination (SE x TXSE) was entered after both SE and TXSE, and the resulting sr^2 for the SE x TXSE interaction was then assessed for significance. Similarly, in order to examine the interaction between efficacy and outcome expectancies, the multiplicative combination of efficacy and outcome expectancy was entered as a fourth step after the efficacy set and the outcome expectancy set were entered in steps two and three, respectively. Only then was the sr^2 for this fourth step

assessed for significance, to determine whether or not the interaction between efficacy and outcome expectancies added to the prediction of criterion variance.

The second issue, varying the order of entry for efficacy and outcome expectancy sets to assess the independent increments in criterion variance explained by each, follows from weaknesses inherent in regression analysis. Variance partitioning (examining the manner in which sr^2 changes as different variables are added to or subtracted from the prediction equation) is the general strategy employed in regression analysis in part because it is considered an elegant way of thinking about the relationships among independent and criterion variables (Cohen & Cohen, 1975). But it is also used because there is no other way to determine the importance or relative contributions of independent variables with any degree of objectivity. The slopes of the independent variables are not directly comparable unless the independent variables are in the same units. While standardized slopes (beta weights) can be used to assess relative importance, this is only true for variables present in the prediction equation, making beta weights highly dependent on the variables used and the order in which variables are added or deleted. Thus, none of the regression weights indicate relative importance in any absolute sense.

The solution to this problem is to focus on decomposing criterion variance by examining how sr^2 changes as variables are added, deleted, and reordered. In the two-variable (or two-set) case, X_1 is entered first, followed by X_2, and the sr^2 (the incremental proportion of criterion variance explained by X_2 over and above that explained by X_1) is examined. Then the order is reversed: X_2 is entered prior to X_1 and the sr^2 for X_1 is

examined. This comparison provides four values: the amount of criterion variance explained by X_1 alone, the amount explained by X_2 alone, the amount explained by X_2 independent of the contribution of X_1, and the amount explained by X_1 independent of X_2.

In this study, although there is an implicit sequence specified by Bandura's (1977) theory that efficacy mediates the effect of outcome expectancies, the alternate hypothesis — that outcome expectancies mediate efficacy — was of interest, as well. Furthermore, since it was predicted that the two types of expectancy would provide independent, as well as shared, contributions to the prediction of effort, it was necessary to examine and compare sr^2 for different orders of entry in order to assess the independent contributions.

Analysis of "high difficulty" days. Three types of regression analyses were conducted to examine hypothesis 10, concerning the contribution of difficulty ratings to the prediction of effort. First, perceived difficulty was entered into the regression equation prior to efficacy and outcome expectancy sets, to determine if effort was predicted by difficulty ratings alone, or if inclusion of the difficulty variable would change the basic model derived as explained above. Second, using the basic model developed in the previous section, difficulty ratings were added to the prediction equation after the two expectancy sets to determine if perceived difficulty accounted for additional variance in effort after expectancies were controlled. In the third analysis, the effort score for the first week of treatment was recomputed selecting only high difficulty days — defined here as days on which the difficulty item was rated 3 or higher. The analyses described in the previous section were then repeated to assess the relative contributions of the two types of

expectancies to predicting effort on days when program-related tasks were perceived as at least "somewhat" difficult.

CHAPTER 5

RESULTS

Table 5 contains a matix of zero-order correlations for expectancy and workbook performance measures. Correlations below the diagonal are for the full sample of 283 subjects, while those above the diagonal are for the 177 subjects who provided at least four non-weekend TEW sheets. The diagonal itself contains internal consistency reliabilities (coefficients alpha).

Table 5

Correlations Among Measures

Measure	PCTWB	SE	TXSE	BA	BE	DB	Effort	Difficulty
PCTWB	—	.05	-.06	.03	-.05	-.06	.03	-.05
SE	.10	*.89*	.15*	-.27***	.10	.29***	.29***	-.13
TXSE	.01	.16**	—	-.27***	.12	.30***	.12	-.07
BA	.00	-.27***	-.26***	*.73*	.14	-.67***	-.03	.22**
BE	.06	.14*	.15*	.13*	*.74*	.64***	.34***	.00
DB	.05	.31***	.31***	-.65***	.67***	—	.28***	-.17*
Effort	—	—	—	—	—	—	*.89*	.13

Note. Correlations below the diagonal are for all 283 study subjects. Correlations above the diagonal are for 177 subjects involved in the analysis of effort. On the diagonal, α reliability (for scales only). Dashes indicate "not applicable."
* $p < .05$. ** $p < .01$. *** $p < .001$.

As Table 5 shows, correlations for the full sample were quite similar to those for the subset of study participants who completed at least 4 non-weekend TEW sheets. None of the study measures were significantly correlated with extent of study participation (PCTWB). The two self-efficacy measures were only slightly, although significantly, correlated, as were the self-efficacy measures and the BE scale. Both BA and the DB measure showed somewhat higher correlations with self-efficacy scores, BA being negatively correlated with the self-efficacy measures. DB was quite highly correlated with both BA and BE, which was expected, since it was calculated as the difference between them. Only SE, BE and DB showed significant, albeit quite modest, correlations with effort scores, and only BA and DB were significantly correlated with mean difficulty ratings. Coefficients alpha show acceptable reliabilities for the measures.

Dependencies Among Subject Characteristics

The first set of analyses, examination of crosstabulated contingency tables using the chi-square statistic, was not addressed to a particular study hypothesis but rather was designed to assess dependencies among the major grouping variables used in this study. All six analyses in this set yielded non-significant chi-square values. In comparing WB by prior treatment status, the hypothesis could not be rejected that workbook participation was the same for both prior treatment and no prior treatment groups, $\chi^2(1) = 1.71, p > .19$. In other words, approximately 63% of subjects provided at least four non-weekend TEW sheets, regardless of prior treatment history. Similar conclusions apply to the tables comparing WB by sex, $\chi^2(1) = .19, p > .66$, and WB by discharge status, $\chi^2(1) = .29, p >$

.59. In neither case could the hypothesis be rejected that workbook participation was the same between groups. That is, about two-thirds of both men and women provided some workbook data, and about two-thirds of all subjects provided workbook data regardless of whether or not they subsequently dropped out of treatment. In the same manner, no significant differences were found when comparing prior treatment groups by sex, $\chi^2(1) = .77, p > .38$, or prior treatment by discharge status $\chi^2(1) = .73, p > .39$. On average, 45% of subjects had experienced prior treatment regardless of gender, and 6% dropped out of treatment regardless of prior treatment history. The final contingency table, sex by discharge status, was also not significant, indicating that equal percentages of male and female subjects dropped out of treatment, $\chi^2(1) = .77, p > .37$. Since the hypothesis that the four grouping variables — sex, WB, prior treatment, and discharge status — were independent could not be rejected, each grouping variable was treated as a separate factor in the next set of analyses.

Differences in Expectancies by Subject Characteristics

The second set of analyses was designed to address hypotheses 1 through 4, which concern differences in baseline self-efficacy and outcome expectations among key subject groups. The first MANOVA in this set addresses hypothesis 1, comparing baseline expectancies for those who dropped out of treatment against those who stayed for the full program. This analysis was not significant, $F(1, 278) = .60, p > .66$, so the hypothesis that treatment dropouts had the same baseline expectations as those who stayed for the full

program could not be rejected. The second analysis, a MANOVA comparing baseline expectancies by WB groups, addresses hypothesis 2. It was conducted to determine whether or not there were either self-efficacy or outcome expectations differences between those who subsequently provided some workbook data and those who did not. This analysis was also not significant, $F(1, 278) = 1.09, p > .36$, indicating that in terms of both efficacy and outcome expectancies, the hypothesis that the two groups were equivalent at baseline could not be rejected. The third analysis in this set, a two-way MANOVA on baseline expectancies for sex and prior treatment groups, addresses hypotheses 3 and 4. This analysis showed one significant multivariate main effect, for sex, $F(1, 276) = 2.66, p < .04$. However, the prior treatment main effect and the sex x prior treatment interaction were not significant, $F(1, 276) = 2.07, p > .08$ and $F(1, 276) = .23, p > .92$, respectively. Examination of the univariate results for sex showed significant differences for two scales: SE, $F(1, 279) = 3.98, p < .03$, and BA, $F(1, 279) = 4.28, p < .02$. Males reported slightly higher levels of self-efficacy ($M = 3.14$ vs. 2.89) and slightly lower levels of negative outcome expectations ($M = 2.42$ vs. 2.76) at baseline. Thus, no support was found for any of the first four hypotheses.

Effects of Expectancies on Workbook Compliance

In the third analysis set, degree of workbook compliance (PCTWB) was employed as the operational definition of effort to examine hypotheses 5 through 10. Results from the regression series conducted on PCTWB are presented in Table 6. In testing the first set of predictor variables, only sex provided a significant increment in explaining how

diligent subjects were in filling out the workbook. Sex accounted for 2.6% of the variance in PCTWB, $F(1, 175) = 4.67$, $p < .04$. Examination of group means showed that men provided a slightly greater percentage of completed sheets than women did during their length of stay in treatment ($M = 64\%$ vs 57%).

Table 6

Results of the Regression Analyses on PCTWB

Step	sr^2	F of Change
Set 1		
Sex	.026	4.67*
Prior Treatment	.005	.85
Set 2		
SE	.003	.49
TXSE	.004	.61
Set 3		
BA	.001	.15
BE	.003	.45
DB	.004	.65
Difficulty		
Entered First	.000	.36
Entered After Sex	.000	.07

Note. Result for the final model containing sex only, $F(1, 175) = 4.67$, $p < .04$, cumulative $R^2 = .026$.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Contrary to hypotheses 5 and 7, neither general nor specific measures of self-efficacy contributed significantly to the prediction of PCTWB variance. Since neither of

the self-efficacy variables contained in set two produced significant variance increments, the interaction term (SE x TXSE) was not examined. Similarly, contrary to hypotheses 6 and 7, none of the outcome expectancy variables in set three explained a significant portion of PCTWB variance. Since neither self-efficacy nor outcome expectancy main effects entered the prediction equation, hypotheses 8 and 9 were also not supported, and the interaction between efficacy and outcome was not examined. In the last variable set, the predictive power of program difficulty ratings was examined. Contrary to hypothesis 10, difficulty ratings produced no significant increment in explaining PCTWB variance, either alone or in combination with sex. The final model for PCTWB, then, contained only sex, which, as noted above, accounted for 2.6% of criterion variance.

Effects of Expectancies on Effort

In the fourth analysis set hypotheses 5 through 10 were examined again, this time using mean TEW effort scores for the first week of treatment as the operational definition of effort. The dependent measure in this analysis set will be referred to simply as "effort" from here on, and all further references to effort should be taken as referring to mean effort scores from the TEW for the first week of treatment. The regression series for effort is displayed in Table 7. Unlike PCTWB, the analyses on effort yielded significant effects for both efficacy and outcome expectancies, so both order-of-entry and interaction effects were examined. In the first variable set, neither sex nor prior treatment history yielded significant increments in explaining effort variance. In the second set, contrary to hypothesis 5, although TXSE did not provide a significant increment in variance, SE did,

accounting for 8.1%, $F(1, 175) = 15.50$, $p < .001$. Since TXSE did not add unique variance when entered alone, the SE x TXSE interaction was not examined.

Table 7

Results of the Regression Analyses on Effort

Step	sr^2	F of Change
Set 1		
Sex	.001	.25
Prior Treatment	.002	.26
Set 2		
SE	.081	15.50***
TXSE	.013	2.38
Set 3		
BA	.001	.21
BE	.112	22.11***
DB	.077	14.57***
BE + DB	.007	1.36
DB + BE	.042	8.33**
Set 2 + Set 3		
SE + BE	.095	20.00***
BE + SE	.064	13.50***
SE x BE Interaction		
(SE + BE) + (SE x BE)	.001	.27
Difficulty		
Entered First	.018	3.25
Entered After SE + BE	.028	6.19*

Note. Result for the model with SE, BE and difficulty, $F(3, 174) = 14.82$, $p < .001$, cumulative $R^2 = .205$.
* $p < .05$. ** $p < .01$. *** $p < .001$.

In the third variable set, although the BA score did not achieve significance, both BE and DB did, $F(1, 175) = 22.11, p < .001$ and $F(1, 175) = 14.57, p < .001$, respectively. Contrary to hypothesis 6, the BE score accounted for a larger increment in variance (sr^2 = 11.2% vs. 7.7%), but since both were significant, order of entry was examined. When BE was entered before DB, DB did not add a significant increment, whereas when DB was entered before BE, BE accounted for an additional 4.2% of the variance in effort, $F(2,174) = 8.33, p < .01$.

In the next step, SE and BE were each entered into the equation first and the incremental proportions in effort variance were examined. Both orders of entry added significant increments, indicating unique as well as shared variance in predicting effort. This finding provides support for hypothesis 7. When SE was entered first (accounting for 8.1%), the BE score added 9.5% to predicting effort, $F(2, 174) = 20.0, p < .001$. When BE was entered first (supplying 11.2%), SE added 6.4%, $F(2, 174) = 13.5, p < .001$. Altogether, adding both SE and BE to the prediction equation accounted for 17.6% of effort variance, $F(2, 174) = 18.59, p < .001$. Taken together, the results of these order-of-entry permutations are contrary to hypothesis 8.

Given that SE and BE made both shared and unique contributions to predicting effort scores, the multiplicative combination representing the interaction effect was examined in the next step, to assess hypothesis 9. Both SE and BE were entered together, followed by the product term. The product provided less than 1% incremental explained effort variance, and this was not statistically significant, contrary to hypothesis 9.

To test the effect of perceived program difficulty on effort, mean difficulty ratings for the first week of treatment were entered first into the effort prediction equation (see Table 7). This yielded 1.8% explained variance, which was not significant. When mean difficulty was added last to the equation containing SE and BE, however, this resulted in an additional 2.8% explained variance in effort, which was significant, $F(3, 173) = 6.19$, $p < .02$. This result provides support for hypothesis 10. The final model, combining SE, BE and difficulty, explained 20.5% of the variance in effort, $F(3, 173) = 14.82$, $p < .001$. This final model provides support for hypotheses 7 and 10, but does not support hypotheses 5, 6, 8 or 9.

The Effect of Perceived Difficulty on Effort

In the fifth and final set of analyses, hypotheses 5 through 9 were examined once more, this time using only those days identified by subjects as at least "somewhat" difficult. Table 8 presents the regression series used to predict effort on difficult days. Overall, 110 of the 177 subjects involved in the effort analyses (62%) reported at least one difficult day during their first week in treatment. As before, sex and prior treatment history were examined in the first step, and neither of these variables yielded significant increments in explained variance. In the second set, contrary to hypothesis 5, only SE added to the prediction equation, accounting for 7% of effort variance, $F(1, 108) = 8.17$, $p < .01$. Since TXSE did not provide a significant increment on its own, the interaction between SE and TXSE was not examined.

Table 8

Results of Regression on Effort for Difficult Days

Step	sr^2	F of Change
Set 1		
Sex	.025	2.72
Prior Treatment	.006	.69
Set 2		
SE	.070	8.17**
TXSE	.016	1.75
Set 3		
BA	.004	.47
BE	.162	20.82***
DB	.112	13.56***
BE + DB	.008	1.03
DB + BE	.058	7.49**
Set 2 + Set 3		
SE + BE	.136	18.31***
BE + SE	.045	6.00*
SE x BE Interaction		
(SE + BE) + (SE x BE)	.000	.03

Note. Result for the final model containing SE and BE, $F(2, 107) = 13.89$, $p < .001$, cumulative $R^2 = .206$.
* $p < .05$. ** $p < .01$. *** $p < .001$.

In the third variable set, the BA score did not achieve significance, but both BE and DB did. The BE score accounted for 16.2%, $F(1, 108) = 20.82$, $p < .001$, a somewhat larger amount of effort variance than the 11.2% supplied by DB, $F(1, 108) = 13.56$, $p < .001$. Since both BE and DB scores were significant predictors, order of entry was

examined. As before, contrary to hypothesis 6, when BE was entered before DB, DB did not add a significant increment, whereas when DB was entered before BE, BE accounted for an additional 5.8% of effort variance, $F(2,107) = 7.49$, $p < .01$.

In the next step, order of entry for SE and BE was examined. Both expectancies added significant variance increments, evidence of unique as well as shared contributions, in support of hypothesis 7. When SE was entered first (accounting for 7.0%), the BE score added 13.6% to the prediction of effort, $F(2, 107) = 18.3$, $p < .001$. When BE was entered first (providing 16.2%), SE added 4.5%, which was significant, $F(2, 107) = 6.0$, $p < .03$. This result is contrary to hypothesis 8. Since SE and BE made both shared and unique contributions to effort variance, the multiplicative combination representing the interaction was examined, but contrary to hypothesis 9, it provided less than .1% incremental variance and was not statistically significant. The final model containing SE and BE accounted for 20.6% of the variance in effort on difficult days, $F(2, 107) = 13.89$, $p < .001$. This model provides support for hypothesis 7, but does not support hypotheses 5, 6, 8 or 9.

CHAPTER 6

DISCUSSION

Regarding the main question addressed by this study, both self-efficacy and outcome expectations made significant contributions to the prediction of effort, as stated in hypothesis 7. The two types of expectancy provided both shared and independent increments in explaining between-subjects variance in effort during the first week of treatment. Although regression analyses did not show that negative outcome expectations were related to effort, positive expectations accounted for 11% of effort score variance. General self-efficacy, too, was related to effort, although at a somewhat lower level, accounting for just over 8% of the variance in effort. Together with ratings of program difficulty, the two types of expectancy accounted for slightly more than 20% of the variance in the effort scores reported by patients during their first week in treatment.

However, most of the other predictions made in this study were not confirmed. No differences were found in any of the expectancy measures related to either discharge status (hypothesis 1) or prior treatment history (hypothesis 3). The lack of expectancy differences for those with prior treatment is somewhat puzzling, but it may be that since all TPS subjects were admitted as inpatients on a voluntary basis, the range of some of the measures was restricted, attenuating differences that might otherwise have been found

between the groups. As voluntary admissions, all patients clearly expected some benefit from undergoing inpatient treatment.

With regard to discharge status, it should be noted that there were only 16 individuals in this sample who could be classified as having terminated treatment before formal discharge. A more qualitative analysis of the individual cases might prove revealing. A matching strategy, in which subjects who were normally discharged are paired with dropouts on key characteristics, might also prove useful here, since matching is designed to minimize between-groups variance (but see Cook & Campbell, 1979, regarding cautions associated with matching). However, given the lack of significant findings in the tests that were performed, no substantive interpretations regarding treatment dropouts can be offered here.

On the other hand, contrary to hypothesis 4, differences were found in both efficacy and negative outcome expectancies by sex, with women reporting slightly higher expectations of barriers to treatment and slightly lower levels of general self-efficacy. Women also proved somewhat less diligent than the men in completing workbook sheets. However, none of these differences were very large, and for this reason they are not given substantive interpretation here. Further, since nine statistical tests were performed in this study (exclusive of regression analyses), the critical region for each comparison drops to .006 when the per-comparison alpha level is adjusted to maintain an experiment-wise alpha of .05 (*cf.* Keppel, 1973). At that level, none of the sex differences achieved statistical significance.

Contrary to hypothesis 5, it was not found that the specific measure of treatment-related efficacy (TXSE) predicted effort better than the more general efficacy score (SE). In fact, it could not be demonstrated that TXSE accounted for any of the variance in effort, while SE did — although contrary to hypothesis 2, neither measure proved significant in predicting workbook compliance. The issue of self-efficacy measurement will be addressed further below.

In examining workbook compliance, none of the measures used here proved to be significant predictors of the percentage of days on which workbook sheets were completed (save sex, which, as noted above, is best left uninterpreted). Since TPS participation was voluntary, it may be that those less inclined to comply with the workbook protocol were weeded out early on. It was made clear to patients during the recruitment phase of the TPS that they could refuse to answer any or all questions at any time without affecting the course of their treatment, so it may also be the case that those who did participate tended to regard study tasks such as workbook self-monitoring as less important than treatment-related activities such as group therapy or attendance at lectures. This view may inadvertently have been reinforced by the pains taken during the TPS to disassociate the research activity from the treatment activity and assure subjects that their forms and questionnaires would not become part of the medical record or be seen by treatment staff. This might have led to some devaluation of TPS activities, resulting in a more casual or informal level of study participation — a speculation supported by the fact that only 68% of the present sample completed even one TEW sheet. Given these facts,

workbook completion *per se* was probably not a good operational definition of patient motivation.

It was also not found that the decisional balance measure was better than the use of separate positive and negative expectancies as predictors of effort, contrary to hypothesis 6. Although DB performed better than the BA scale, the positive outcome expectations measure, BE, was the best predictor of effort in this study. DB did emerge as a significant predictor of effort both in general and on difficult days, but the order-of-entry analyses showed that almost all of the effort-score variance accounted for by the DB scale could be attributed to the BE score, one of its two constituents. However, since DB was included as an indicator of patient motivation as seen from the "stages of change" perspective (*cf.*, Prochaska, 1994), the fact that all patients were already in treatment may be an important factor, as admission to treatment was a clear step toward change that they had already taken. As a result, the DB measure may have been truncated in this sample. The lack of predictive power for BA, the other constituent of DB, lends some weight to this interpretation, as do other measures of motivation collected in the TPS.

Nor was support found for hypothesis 8, that self-efficacy would prove to be a better predictor of performance than would outcome expectations. Instead, the order-of-entry analyses conducted to compare the BE and SE scales showed that positive outcome expectancies made an independent contribution that was larger than that made by the general self-efficacy measure. Even when Bandura's hypothesis that efficacy mediates outcome expectancies was used to justify admitting SE into the analysis prior to BE, the

additional independent portion of variance accounted for by BE was larger than the entire contribution of SE, albeit only marginally. This result was even more clear-cut in the analysis of difficult days, where the independent portion of effort variance added by BE was almost twice as large as the contribution made by SE alone. Nor was support found for hypothesis 9, the prediction that the interaction between efficacy and outcome expectations would account for a significant portion of effort variance. With both SE and BE in the equation, the interaction term was not significant, in either the general analysis or in the analysis of difficult days.

One of the few study hypotheses that was supported was hypothesis 10, that perceived program difficulty would make a significant contribution to effort. Although not significantly correlated with effort by itself, when entered into the prediction equation after both SE and BE, difficulty ratings added a small but significant contribution to the prediction of effort variance. This is a phenomenon known as cooperative suppression (Cohen & Cohen, 1975), in which independent variables are mutually enhancing relative to the criterion. In this case, since the zero-order correlation between perceived difficulty and SE was negative, when each variable was partialled from the other in the equation used to predict effort, the portion of the variance in difficulty ratings due to SE but irrelevant to effort was removed. Taking out the part of perceived difficulty caused solely by low self-efficacy, a closer fit was obtained between difficulty ratings and effort. One way to interpret this finding is that efficacy influences effort indirectly through its effect on

perceptions of difficulty. This does provide support for Bandura's contention that self-efficacy mediates performance.

Turning to measurement issues, as noted above, it was not found that TXSE was better at predicting effort than was the more general SE score. This is probably due to at least two different factors. First, SE was a scale composed of several items, while TXSE was a single item, so the psychometric properties of the two measures favor SE over TXSE (Nunnally, 1978). Second, although TXSE was more explicitly related to the context of the treatment under study, it is not clear that this item was better in getting at ability to accomplish treatment-related tasks. In fact, both measures can be criticized as operational definitions of treatment-related self-efficacy. Bandura (1977, 1986b) recommends measuring efficacy in terms of level, strength and generality, in a microanalysis where efficacy estimates are elicited using a graduated series of increasingly difficult and highly-specific behavioral criteria. Given the use of archival data as the basis for the present study, this careful microanalysis could not be accomplished. Instead a general or "omnibus" efficacy measure was employed, a procedure against which Bandura has explicitly warned. However, given that the SE scale measured efficacy at only the most general level, its independent contribution to the prediction of effort seems that much more impressive.

The outcome expectancy measures used in this study, too, could be subject to criticism, on the grounds that each of the questions was phrased in the first person. This, in effect, constitutes a confounding of efficacy with outcome information (*cf.*, Sexton et

al., 1992). Although the correlation between SE and BE in this study was not large (r = .14, $p < .05$, for the full sample), it does account for the small amount of variance these measures shared in predicting effort. Ideally, to tap perceived outcome expectancies uncontaminated by the efficacy component, outcome beliefs should at least be phrased in the third person, as general beliefs about task-related consequences. For example, the item "I expect to learn about 12-step programs," which was used as part of the BE scale, should probably have been phrased as: "People who go through treatment will learn about 12-step programs." This may seem to be a subtle or unimportant distinction, but it may in fact be a crucial difference, especially in examining the relative predictive power of the two types of expectancies.

However the difficulties various investigators, including the present author, have had in trying to address this question lend weight to the contention that it can be difficult to separate the two expectancy constructs conceptually. If, as Bandura suggests, expected outcomes depend on perceived self-efficacy, then no mere rephrasing of outcome beliefs in the third person will be sufficient to strip efficacy from outcome expectancies. Nor will close attention to specifying criteria suffice to remove the outcome components from efficacy beliefs, since efficacy estimates are highly dependent upon, and have meaning only with respect to, the explicit criteria that specify successful performance. If expected outcomes are conditioned by self-efficacy, and efficacy beliefs are defined in terms of specifying criteria — which constitute potential outcomes of the performance attempt — then neither type of expectancy can exist without the other. Instead, the contention made

here is that in their natural state, outcome expectancies and perceived self-efficacy exist in a paired or "confounded" form, although they can be differentiated by asking a series of simple questions, such as "Can it be done?" versus "Can you do it?" versus "Are you willing to try?"

In the present study, it was found that self-efficacy beliefs and outcome expectancies each made significant independent contributions to effort. This accords with our previous experience in disentangling objective sources and internal responses in the measurement of stressful life events (Reich, Parrella & Filstead, 1988). Unfortunately, the investigation reported here can be criticized on many of the same grounds as the studies reviewed earlier, and for this reason it does not provide the critical test required to determine relative importance. An adequate examination of this question would entail more precise specification of behavioral criteria and better measurement of both efficacy and outcome expectancies. However, the fact that in common parlance these two different aspects of expectancy often exist as if locked in embrace should not mislead us into assuming they are the same. Bandura's unique insight is that given specific performance criteria, the two components can be separated.

REFERENCES

Abramson, L. Y., Seligman, M. E., & Teasdale, J. D. (1978). Learned helplessness in humans: Critique and reformulation. *Journal of Abnormal Psychology, 87*, 49-74.

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior.* Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*, 191-215.

Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist, 37*, 122-147.

Bandura, A. (1986a). Recycling misconceptions of perceived self-efficacy. *Journal of Social and Clinical Psychology, 4*, 359-373.

Bandura, A. (1986b). *Social foundations of thought and action: A social cognitive theory.* Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A., & Schunk, D. H. (1981). Cultivating competence, self-efficacy, and intrinsic interest through proximal self-motivation. *Journal of Personality and Social Psychology, 41*, 586-598.

Bernier, M., & Avard, J. (1986). Self-efficacy, outcome, and attrition in a weight-reduction program. *Cognitive Therapy and Research, 10*, 319-338.

Betz, N. E., & Hackett, L. (1981). The relationship of career-related self-efficacy expectations to perceived career options in college men and women. *Journal of Counseling Psychology, 28*, 399-410.

Bolles, R. C. (1975). *Learning theory.* NY: Holt, Rinehart and Winston.

Brown, S. A., Christiansen, B. A., & Goldman, M. S. (1987). The alcohol expectancy questionnaire: An instrument for the assessment of adolescent and adult alcohol expectancies. *Journal of Studies on Alcohol, 48*, 483-491.

Brownell, K. D., Marlatt, G. A., Lichtenstein, E., & Wilson, G. T. (1986). Understanding and preventing relapse. *American Psychologist, 41*, 765-782.

Cohen, J., & Cohen, P. (1975). *Applied multiple regression/correlation analysis for the behavioral sciences*. NY: John Wiley & Sons.

Condiotte, M. M., & Lichtenstein, E. (1981). Self-efficacy and relapse in smoking cessation programs. *Journal of Consulting and Clinical Psychology, 49*, 648-658.

Cook, C. (1988a). The Minnesota Model in the management of drug and alcohol dependency: Miracle, method or myth? Part I. The philosophy and the programme. *British Journal of Addiction, 83*, 625-634.

Cook, C. (1988b). The Minnesota Model in the management of drug and alcohol dependency: Miracle, method or myth? Part II. Evidence and conclusions. *British Journal of Addiction, 83*, 735-748.

Cook, T. D., & Campbell, D. T. (1979). *Quasi-experimentation: Design and analysis issues for field settings*. Boston: Houghton Mifflin.

Cooper, M. L., Russell, M., & George, W. H. (1988). Coping, expectancies, and alcohol abuse: A test of social learning formulations. *Journal of Abnormal Psychology, 97*, 218-230.

Curry, S., Marlatt, G. A., & Gordon, J. R. (1987). Abstinence violation effect: Validation of an attributional construct with smoking cessation. *Journal of Consulting and Clinical Psychology, 55*, 145-149.

Davis, F. W., & Yates, B. T. (1982). Self-efficacy expectancies versus outcome expectancies as determinants of performance deficits and depressive affect. *Cognitive Therapy and Research, 6*, 23-35.

DiClemente, C. C. (1986). Self-efficacy and the addictive behaviors. *Journal of Social and Clinical Psychology, 4*, 302-315.

DiClemente, C. C., & Prochaska, J. O. (1982). Self-change and therapy change of smoking behavior: A comparison of processes of change of cessation and maintenance. *Addictive Behaviors, 7*, 133-142.

Evans, R. I., & Raines, B. E. (1990). Applying a social psychological model across health promotion interventions: Cigarettes to smokeless tobacco. In J. Edwards et al. (Eds.), *Social influence processes and prevention*. NY: Plenum Press.

Fawcett, J., Clark, D. C., & Aagesen, C. A. (1987). A double-blind, placebo-controlled trial of lithium carbonate therapy for alcoholism. *Archives of General Psychiatry, 44*, 248-256.

Feltz, D. L. (1982). Path analysis of the causal elements in Bandura's theory of self-efficacy and an anxiety-based model of avoidance behavior. *Journal of Personality and Social Psychology, 42*, 764-781.

Finney, J. W., Moos, R. H., & Chan, D. A. (1981). Length of stay and program component effects in the treatment of alcoholism: A comparison of two techniques for process analysis. *Journal of Consulting and Clinical Psychology, 49*, 120-131.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research.* Reading, MA: Addison-Wesley.

Fuller, R. K., Branchey, L., & Brightwell, D. R. (1986). Disulfiram treatment of alcoholism: A Veterans Administration cooperative study. *Journal of the American Medical Association, 256*, 1449-1455.

Institute of Medicine (1990). *Broadening the base of treatment for alcohol problems.* Washington, DC: National Academy Press.

Kazdin, A. E. (1978). Conceptual and assessment issues raised by self-efficacy theory. *Advances in Behaviour Research and Therapy, 1*, 177-187.

Keppel, G. (1973). *Design and analysis: A researcher's handbook.* Englewood Cliffs, NJ: Prentice-Hall.

Latané, B., Williams, K. D., & Harkins, S. G. (1979). Many hands make light the work: The causes and consequences of social loafing. *Journal of Personality and Social Psychology, 37*, 822-832.

Lee, C. (1984a). Accuracy of efficacy and outcome expectations in predicting performance in a simulated assertiveness task. *Cognitive Therapy and Research, 8*, 37-48.

Lee, C. (1984b). Efficacy expectations and outcome expectations as predictors of performance in a snake-handling task. *Cognitive Therapy and Research, 8*, 509-516.

Maddux, J. E., Norton, L., & Stoltenberg, C. D. (1986). Self-efficacy expectancy, outcome expectancy, and outcome value: Relative influences on behavioral intentions. *Journal of Personality and Social Psychology, 51*, 783-789.

Maddux, J. E., & Rogers, R. W. (1983). Protection motivation and self-efficacy: A revised theory of fear appeals and attitude change. *Journal of Experimental Social Psychology, 19*, 469-479.

Maier, S. F., & Seligman, M. E. (1976). Learned helplessness: Theory and evidence. *Journal of Experimental Psychology, 105*, 3-46.

Mann, L. M., Chassin, L., & Sher, K. J. (1987). Alcohol expectancies and the risk for alcoholism. *Journal of Consulting and Clinical Psychology, 55*, 411-417.

Marlatt, G. A. (1985). Cognitive factors in the relapse process. In G. A. Marlatt & J. R. Gordon (Eds.), *Relapse prevention: Maintenance strategies in the treatment of addictive behaviors*. NY: Guilford Press.

Miller, W. R. (1985). Motivation for treatment: A review with special emphasis on alcoholism. *Psychological Bulletin, 98*, 84-107.

Nunnally, J. C. (1978). *Psychometric theory*. NY: McGraw-Hill.

Osgood, C. E. (1950). Can Tolman's theory of learning handle avoidance training? *Psychological Review, 57*, 133-137.

Parrella, D. P., Filstead, W. J., & Ross, A. A. (1990). *Self-report reliability for inpatient alcoholics and drug abusers*. Park Ridge, IL: Lutheran General Behavioral Health.

Parrella, D. P., Filstead, W. J., & Ross, A. A. (1993). *Alcoholism treatment: Expectations, motivation and effort. NIAAA Grant #AA08455 Final Report*. Park Ridge, IL: Lutheran General Behavioral Health.

Prochaska, J. O. (1994). Strong and weak principles for progressing from precontemplation to action on the basis of twelve problem behaviors. *Health Psychology, 13*, 47-51.

Prochaska, J. O., & DiClemente, C. C. (1983). Stages and processes of self-change in smoking: Toward an integrative model of change. *Journal of Consulting and Clinical Psychology, 51*, 390-395.

Reich, W. P., Parrella, D. P., & Filstead, W. J. (1988). Unconfounding the Hassles Scale: External sources versus internal responses to stress. *Journal of Behavioral Medicine, 11*, 239-249.

Rollnick, S., & Heather, N. (1982). The application of Bandura's self-efficacy theory to abstinence-oriented alcoholism treatment. *Addictive Behaviors, 7*, 243-250.

Rotter, J. B. (1954). *Social learning and clinical psychology.* Englewood Cliffs, NJ: Prentice-Hall.

Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs, 80*, 615-629.

Sexton, T. L., & Tuckman, B. W. (1991). Self-beliefs and behavior: The role of self-efficacy and outcome expectations over time. *Personality and Individual Differences, 12*, 725-736.

Sexton, T. L., Tuckman, B. W., & Crehan, K. (1992). An investigation of the patterns of self-efficacy, outcome expectations, outcome value, and performance across trials. *Cognitive Therapy and Research, 16*, 329-348.

Sherer, M., Maddux, J., Mercandante, B., Prentice-Dunn, S., Jacobs, B., & Rogers, R. (1982). The self-efficacy scale: Construction and validation. *Psychological Reports, 51*, 663-671.

Stacy, A. W., Widaman, K. F., & Marlatt, G. A. (1990). Expectancy models of alcohol use. *Journal of Personality and Social Psychology, 58*, 918-928.

Teasdale, J. D. (1978). Self-efficacy: Toward a unifying theory of behavioral change? *Advances in Behaviour Research and Therapy, 1*, 211-217.

Tolman, E. C. (1932). *Purposive behavior in animals and men.* NY: Century Press.

Velicer, W. F., DiClemente, C. C., Rossi, J. S., & Prochaska, J. O. (1990). Relapse situations and self-efficacy: An integrative model. *Addictive Behaviors, 15*, 271-283.

Velicer, W. F., Prochaska, J. O., Bellis, J. M., DiClemente, C. C., Rossi, J. S., Fava, J. L., & Steiger, J. H. (1993). An expert system intervention for smoking cessation. *Addictive Behaviors, 18*, 269-290.

Westermeyer, J., & Neider, J. (1984). Predicting treatment outcome after ten years among American Indian alcoholics. *Alcoholism: Clinical and Experimental Research, 8*, 179-184.

Williams, S. L., & Kinney, P. J. (1991). Performance and nonperformance strategies for coping with acute pain: The role of perceived self-efficacy, expected outcomes, and attention. *Cognitive Therapy and Research, 15*, 1-19.

Williams, S. L., & Watson, N. (1985). Perceived danger and perceived self-efficacy as cognitive determinants of acrophobic behavior. *Behavior Therapy, 16*, 136-146.

Wilson, G. T. (1987). Cognitive studies in alcoholism. *Journal of Consulting and Clinical Psychology, 55*, 325-331.

Zajonc, R. B. (1965). Social facilitation. *Science, 149*, 269-274.

VITA

David P. Parrella

Education

Bachelor of arts in experimental psychology received from the University of Connecticut, Storrs, CT, in 1979. Graduate work completed in clinical psychology at Northwestern University, Evanston, IL, from 1981-1983. Currently enrolled in the Ph.D. program in applied social psychology at Loyola University, Chicago, IL. Master of arts in applied social psychology to be conferred by Loyola in January, 1995.

Experience

Analyst. Parkside Lutheran Hospital, Park Ridge, IL, 1984-1993. Served as data base manager for NIAAA grant #AA08455. Served as data base manager for NIAAA grant #AA07409. Analyst is responsible for designing and implementing studies of alcohol and substance abusers. Duties include constructing and managing data bases for ongoing research projects, developing and monitoring data collection protocols, and writing research reports and grant proposals.

Programmer/analyst. Michael Reese Hospital, Chicago, IL, 1982-1985. Developed microcomputer system for analysis of adolescent self-image questionnaire data. Also designed and analyzed NBC television survey of adolescent sexual behavior. Duties

include documenting and managing a longitudinal adolescent self-image data base, and designing and analyzing studies for outside investigators.

Publications

Several scientific reports have been published or accepted for publication. A representative list of these publications follows.

Filstead, W., Parrella, D., Ross, A., & Schneider, K. (1994). Linking treatment process with treatment outcome: Implications for EAP services. *Journal of Employee Assistance Research*, in press.

Gastfriend, D., Filstead, W., Reif, S., Najavits, L., & Parrella, D. (1994). Validity of assessing treatment readiness in patients with substance use disorders. *American Journal of Psychiatry*, in press.

Ross, A., Filstead, W., Parrella, D., & Rossi, J. (1994). A comparison of high risk situations for alcohol and other drugs. *American Journal on Addictions, 3*, 241-253.

Filstead, W., Parrella, D., & Ross, A. (1992). Adolescent screening tests, part I: The assessment basis. *Addiction and Recovery, 12*, 31-33.

Filstead, W., Parrella, D., & Ross, A. (1992). Adolescent screening tests, part II: Assessment instruments and their findings. *Addiction and Recovery, 12*, 7-8.

Parrella, D., & Filstead, W. (1988). Definition of onset in the development of onset-based alcoholism typologies. *Journal of Studies on Alcohol, 49*, 85-92.

Filstead, W., Parrella, D., & Conlin, J. (1988). Alcohol use and dependency in youth: Examining DSM-III diagnostic criteria. *Drugs and Society, 3*, 145-170.

Filstead, W., Parrella, D., & Ebbitt, J. (1988). High risk situations for engaging in substance abuse and binge eating behaviors. *Journal of Studies on Alcohol, 49*, 136-141.

Reich, W., Parrella, D., & Filstead, W. (1988). Unconfounding the Hassles scale: External sources versus internal responses to stress. *Journal of Behavioral Medicine, 11*, 239-249.

APPROVAL SHEET

The thesis submitted by David P. Parrella has been read and approved by the following committee:

Dr. Emil J. Posavac, Director
Professor, Psychology
Loyola University of Chicago

Dr. William J. Filstead
Associate Professor, Education
Northwestern University, Evanston, Illinois

The final copies have been examined by the director of the thesis and the signature which appears below verifies the fact that any necessary changes have been incorporated and that the thesis is now given final approval by the Committee with reference to content and form.

The thesis is, therefore, accepted in partial fulfillment of the requirements for the degree of Master of Arts.

4 Aug 1994
Date

Director's Signature