

The Self-Efficacy of Pharmacy Students in Performing Clinical Tasks

Paul S. Cady
Lon N. Larson

ABSTRACT. The self-efficacy theory proposes that an individual's beliefs about his or her capabilities function as a determinant of future behavior. Individuals who possess a strong sense of self-efficacy for a task, i.e., perceive they can successfully perform the task, are more willing to engage in the task. We developed an instrument to evaluate the self-efficacy of pharmacy students in performing clinical functions. Students in the third professional year of a pharmacy curriculum exhibited higher levels of self-efficacy than first- or second-year students. First-year students exhibited the lowest scores. (Female students exhibited lower self-efficacy scores than male students did.) Measuring self-efficacy may provide pharmacy educators with a valuable assessment tool. Methods for improving efficacy expectations of pharmacy students are discussed. [Article copies available from The Haworth Document Delivery Service: 1-800-342-9678.]

INTRODUCTION

One explanation of behavior comes from the self-efficacy theory, which states that the initiation, perseverance, and accomplishment of specific behaviors and changes in behavior are causally mediated by self-precepts

Paul S. Cady, Ph.D., R.Ph., is Assistant Professor of Pharmacy Practice and Administrative Sciences, College of Pharmacy, Idaho State University, Pocatello, ID 83209. Lon N. Larson, Ph.D., R.Ph., is Associate Professor of Pharmacy Administration, College of Pharmacy and Health Sciences, at Drake University, Des Moines, Iowa 50311.

of efficacy (1). In other words, an individual's beliefs about his or her capabilities function as a determinant of future behavior and emotional reaction to stimuli (2). A high level of self-efficacy indicates that an individual perceives that he or she has the ability to cope with a particular situation or task. A low sense of self-efficacy indicates that an individual perceives that the task exceeds his or her ability. Bandura stated that people fear and may seek to avoid situations they believe exceed their coping skills, whereas they readily become involved in activities and behave differently when they judge themselves capable of handling situations (1).

Judgments of self-efficacy also determine how much effort will be expended and how long individuals will persist in the face of obstacles and undesirable outcomes. Individuals who harbor doubts about their abilities are more likely to give up, but individuals with a strong sense of efficacy will exert more effort and draw on their coping abilities. This, in itself, may allow individuals to perform the behavior (3-5).

Measures of self-efficacy have been found to predict many behaviors: pain tolerance (6), condom use (7), smoking cessation (8-9), teaching effectiveness (10), physicians' effort in promoting behavioral change (11-12), and promoting preventive and phobic reaction to feared stimuli (13-14). Perceived exercise abilities have served as a better predictor of performance than capability as indicated by a treadmill test for subjects recovering from myocardial infarction (15). Self-efficacy appears to be a predictor of many health-related outcomes (16). In summary, although skill level is important, studies have found that perceived self-efficacy serves to predict a significant amount of the variance in performance (17-18). Research has found that self-efficacy is also related to gender. More specifically, females have been found to have lower efficacy expectations than males and were less likely to attribute success to ability. This was especially true of masculine-type tasks (19-20) and career choice (21-22). Females judged themselves as highly efficacious in occupations traditionally held by women but not efficacious in dealing with traditional male occupations (21,23). This occurred even though actual skill levels of males and females were the same.

If pharmacists perceive they do not have the capabilities to deal with specific situations, according to this theory, they will avoid the situation and will exert little effort before giving up. However, if pharmacists perceive they can successfully perform a task, they will engage in the activity and use more coping skills.

METHODS

Using the self-efficacy theory as a framework, a pilot study was conducted to evaluate the self-efficacy of pharmacy students. We hypothesized that students in their third and final professional year would exhibit the highest level of self-efficacy compared with the first- and second-year students. We also expected that men students would exhibit higher levels of self-efficacy than would women students.

An instrument to measure self-efficacy of pharmacy students for performing different clinically oriented tasks consisted of three scenarios: (i) a hospital pharmacy (a patient with possible urinary tract infection), (ii) a community pharmacy (a patient with possible ringworm), and (iii) a general situation (a young child with a cold). The instrument and scenarios were checked for content validity through responses from clinical faculty and practicing pharmacists, and appropriate changes were then made.

Pharmacy students were then asked to rate their confidence in performing seven tasks for each scenario. The seven tasks for each scenario were similar: (i) differentiating between two possible diseases, (ii) obtaining information to make a recommendation, (iii) recommending an appropriate product, (iv) assessing appropriateness of a specific product, (v) recommending proper dosage, (vi) providing information on side effects, and (vii) providing information on drug-drug interactions. Subjects rated their confidence on a 0-100% confidence scale that was divided in 10% intervals. All students in a regularly scheduled class completed the instrument (Appendix) during one class period. The students were instructed to read each scenario and answer all questions as if they were the pharmacist in the scenario. The scenarios were randomly ordered for each participant.

RESULTS

Out of a total of 156 instrument distributed to students at a college of pharmacy, 147 were completed; the remaining nine were only partially completed and so were not used in the analysis. The students who participated were in the first ($n = 45$), second ($n = 56$), and third ($n = 46$) professional years of the Bachelor of Science pharmacy curriculum. More women participated than men (97 vs. 50). This ratio of women to men (2:1) is approximately the same for enrollment in the college of pharmacy.

Two self-efficacy dimensions were measured: magnitude and strength. Magnitude refers to the total number of behaviors the individual would attempt when tasks are ordered according to level of difficulty. The

strength of the efficacy expectations is the durability of the expectations. Weak expectations are easily extinguished by disconfirming experiences, while strong expectations tend to withstand failure. A third dimension of self-efficacy is generality, which refers to the generalizability of the coping skills. Gaining efficacy in one area of work may provide individuals with the skills to successfully deal with other areas. Generality was not measured in this study.

The magnitude score was calculated by summing the number of items for each scenario that participants indicated they expected to perform with a confidence value above 10% (33). Each scenario had potential scores ranging from zero to seven. Strength of self-efficacy was determined by summing the confidence score for each item and dividing the sum by the total number of items. Reliabilities for the strength scores were calculated using Cronbach's Alpha. Results of the calculation were 0.93 for the community, 0.91 for the general, and 0.92 for the hospital scenarios. Because of the dichotomous nature of the items used to measure magnitude, the Kuder-Richardson 20 was used to measure internal consistency. The reliabilities were 0.94, 0.93, and 0.94 for the magnitude measures in the community, general, and hospital scenarios, respectively.

The means for the men and women students in each class and standard deviations for the measure of magnitude are in Table 1. The means and standard deviations for the measures of strength are in Table 2.

A three-way analysis of variance (class, gender, and practice setting), with repeated measures on practice setting, was used to analyze the data for magnitude and strength scores (Tables 3 and 4, respectively).

TABLE 1. The means (standard deviation) for magnitude scores for men and women students in each class and overall class scores.

Class (n)	Scenario		
	General	Community	Hospital
First Year (45)	3.1 (2.9)	3.1 (2.9)	1.8 (2.7)
Men (15)	4.1 (3.0)	4.3 (2.6)	2.5 (3.0)
Women (30)	2.6 (2.7)	2.5 (2.9)	1.5 (2.5)
Second Year (56)	5.7 (2.1)	5.2 (2.4)	3.8 (2.6)
Men (16)	6.6 (0.9)	6.1 (1.5)	4.4 (2.8)
Women (40)	5.4 (2.3)	4.0 (2.5)	3.5 (2.5)
Third Year (46)	6.8 (0.5)	6.9 (0.4)	6.9 (0.3)
Men (19)	6.9 (0.2)	6.9 (0.2)	6.9 (0.3)
Women (27)	6.8 (0.6)	6.8 (0.4)	6.8 (0.5)

TABLE 2. The means (standard deviations) for strength scores for men and women students for each class and overall class scores.

Class (n)	Scenario		
	General	Community	Hospital
First Year (45)	21 (22)	22 (24)	13 (19)
Men (15)	27 (20)	29 (23)	19 (24)
Women (30)	18 (23)	18 (23)	09 (15)
Second Year (56)	51 (25)	45 (28)	30 (24)
Men (16)	63 (21)	53 (25)	39 (28)
Women (40)	46 (24)	41 (29)	26 (22)
Third Year (46)	76 (14)	74 (17)	8 (14)
Men (19)	78 (12)	77 (10)	80 (11)
Women (27)	75 (16)	72 (20)	77 (15)

TABLE 3. Analysis of variance on the measures of magnitude between classes and gender across three practice scenarios.

Source	df	MS	F	P
Between Subjects	147			
Class	2	514.8	21.2	< 0.01
Gender	1	70.3	7.0	< 0.01
Class x Gender	2	14.9	1.5	0.23
Error Between	142	10.0		
Within Subjects	296			
Scenario	2	47.2	27.4	< 0.01
Scenario x Class	4	15.1	8.2	< 0.01
Scenario x Gender	2	1.1	0.6	0.54
Scenario x Gender x Class	4	0.1	0.1	0.98
Error Within	284	1.7		

The results of the strength and magnitude measures were similar. There was a significant difference among classes and a significant difference between genders. Further analysis revealed that each class was significantly different from all other classes ($p < 0.05$). Third-year students scored the highest and the first-year students the lowest. There was also a significant difference between the genders for both measures of self-efficacy,

TABLE 4. Analysis of variance on the measures of strength between classes and gender across three practice scenarios.

Source	df	MS	F	P
Between Subjects	147			
Class	2	1018.1	94.2	< 0.01
Gender	1	77.6	7.2	< 0.01
Class x Gender	2	8.0	0.7	0.48
Error Between	142			
Within Subjects	296			
Scenario	2	30.1	21.0	< 0.01
Scenario x Class	4	19.8	13.7	< 0.01
Scenario x Gender	2	.01	.01	0.92
Scenario x Gender x Class	4	0.5	0.3	0.86
Error Within	284			

with women exhibiting lower levels of self-efficacy (strength and magnitude) than men. In addition, on both measures, a significant interaction between class and scenario was detected.

DISCUSSION

The results indicate that students develop a higher sense of self-efficacy as they progress through the pharmacy curriculum. The development of these efficacy expectations might be attributed to lectures (verbal persuasion), viewing others perform the same or similar tasks (modeling), and actual performance of the task. It appears that the third-year students have high efficacy expectations in being able to perform the three tasks. The analysis revealed a significant interaction between class and scenario. Figures 1 and 2 reveal that the first- and second-year students scored lower on the hospital scenario than they did on the other scenarios. This fact might be due to differences in perceived (or actual) difficulty in performing the task. The tasks were selected to represent different skills of tasks. The degree of complexity might not have been the same. Another explanation might be the exposure the students have had with the tasks. The third-year students, having just finished a course covering applied thera-

FIGURE 1. Interaction between year (first, second, or third) and scenario (community, hospital, or general) for strength of self-efficacy scores.

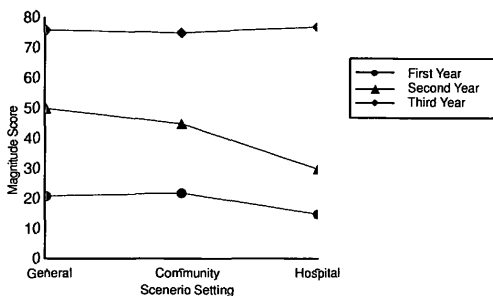
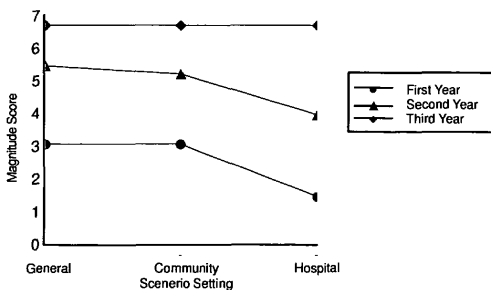


FIGURE 2. Interaction between year (first, second, or third) and scenario (community, hospital, or general) for magnitude of self-efficacy scores.



able to accomplish them. They persuade themselves that if others can do it, they should be able to do it also (28). Models similar to the individual being trained (29-30) who demonstrate difficulty in accomplishing a task but persist until they complete it are superior to the adept (expert) model (29,31). Pharmacy faculty should be encouraged to model desired behaviors. Having similar others, pharmacy residents, or other pharmacy students may be more effective than the faculty in building efficacy expectations.

Verbal Persuasion. Verbal persuasion is perhaps the method most commonly used in an attempt to alter behavior. Often such an attempt can increase an individual's self-efficacy, but this efficacy expectation can be quickly extinguished by disconfirming experiences (32-33). Telling students how to perform a service may give them the sense that they can perform the task, but if their first experience is less than optimal, efficacy expectation might decrease.

Emotional Arousal. A situation perceived as stressful generally elicits emotional arousal. The degree of arousal depends upon the circumstances. Emotional arousal can serve as a source of information about perceived self-efficacy. Some individuals find arousal motivates them, while others find the arousal inhibitory (2). Extremely high arousal might inhibit performance. Anxiety arousal is diminished by modeling and is even more thoroughly eliminated by experienced mastery achieved by participant modeling (26). The curriculum should assist the student in building efficacy expectations in the early years. This would minimize instances where the student experiences extremely high arousal that may lead to poor performance.

Our study indicates that as pharmacy students progress through their curriculum, they develop a greater sense of self-efficacy in performing clinical functions. This study did not evaluate the effects of clinical experiences on self-efficacy judgments. It would be expected that clinical rotations would provide the student with performance accomplishments that are the most powerful source of efficacy information (24). Repeated successes raise efficacy expectations while repeated failures lower them. Efficacy appraisals are most sensitive to failures in the early stages of training. Once a strong sense of efficacy has been gained through success, the effect of an occasional failure will be minimal. Further research in this area will help assess the relationship between efficacy judgments and performance.

REFERENCES

1. Bandura A. Self-efficacy: toward a unifying theory of behavioral change. *Psychol Rev.* 1977; 84(2):191-215.
2. Bandura A. Social foundations of thought and action: a social cognitive theory. Englewood Cliffs, NJ: Prentice-Hall; 1986:390-453.

3. Bandura A, Schunk DH. Cultivating competence, self-efficacy, and intrinsic interest through proximal self-motivation. *J Pers Soc Psychol.* 1981; 41(3):586-98.
4. Bandura A, Cervone D. Self-evaluative and self-efficacy mechanisms governing the motivational effects of goal systems. *J Pers Soc Psychol.* 1983; 45(5):1017-28.
5. Schunk DH. Modeling and attributional effects on children's achievement: a self-efficacy analysis. *J Educ Psych.* 1981; 73(1):93-105.
6. Reese LB. Coping with pain: the role of perceived self-efficacy. Doctoral dissertation, Stanford University, Stanford CA; 1983.
7. Wulfert E, Wan CK. Condom use: a self-efficacy model. *Health Psychol.* 1993; 12(5):346-53.
8. Condiotte MM, Lichtenstein E. Self-efficacy and relapse in smoking cessation programs. *J Consult Clin Psychol.* 1981; 49(5):648-58.
9. DiClemente CC. Self-efficacy and smoking cessation maintenance: a preliminary report. *Cognit Ther Res.* 1981; 5(2):175-87.
10. Gibson S, Dembo, MH. Teacher efficacy: a construct validation. *J Educ Psych.* 1984; 76(4):569-82.
11. Mann KV, Putman RW. Physicians' perceptions of their role in cardiovascular risk reduction. *Prev Med.* 1989; 18(1):45-58.
12. Attarian L, Fleming M, Barron P et al. A comparison of health promotion practices of general practitioners and residency trained family physicians. *J Commun Health.* 1987; 12(1):31-9.
13. Bandura A, Adams NE. Analysis of self-efficacy theory of behavioral change. *Cognit Ther Res.* 1977; 1(4):287-310.
14. Cervone D. Randomization tests to determine significance levels for microanalytic congruences between self-efficacy and behavior. *Cognit Ther Res.* 1985; 9(4):357-65.
15. Ewart CK, Taylor CB, Reese LB et al. Effects of early postmyocardial infarction exercise testing on self-perception and subsequent physical activity. *Am J Cardiol.* 1983; 51(7):1076-80.
16. Holden G. The relationship of self-efficacy appraisals to subsequent health related outcomes: a meta-analysis. *Soc Work Health Care.* 1991; 16(1):53-93.
17. Locke EA, Frederick E, Lee C, et al. Effect of self-efficacy, goals, and task strategies on task performance. *J Appl Psychol.* 1984; 69(2):241-51.
18. Schunk DH. Self-efficacy perspective on achievement behavior. *Educ Psychol.* 1984; 19(1):48-58.
19. Maccoby EE, Jacklin CN. The psychology of sex differences. Stanford CA: Stanford University Press; 1974:135-61.
20. Parsons JE, Ruble DN. The development of achievement-related expectancies. *Child Dev.* 1977; 48(3):1075-79.
21. Betz NE, Hackett G. The relationship of career-related self-efficacy expectations to perceived career options in college women and men. *J Counsel Psychol.* 1981; 28(5):339-410.

peutics, might have had sufficient positive practice to feel confident in all tasks. The first- and second-year students might not have had experience with the tasks other than verbal persuasion.

Another finding that deserves discussion is that the women exhibited lower levels of self-efficacy than did the men. Previous research in other areas has found similar differences, even when actual capability is not different (29,31). Our study did not relate perceived efficacy with actual performance, so caution is urged in interpreting this difference. Further study is necessary before any conclusions can be drawn between pharmacy student efficacy scores for particular tasks and willingness to engage in that task. Although statistically significant, the difference between men and women students may not be practically significant. Also, efficacy scores do not indicate ability to perform a task correctly, only the perception that one is capable of performing the task.

Taking measures of self-efficacy do not serve to improve the educational process. They will serve to identify desired behaviors where self-efficacy is low. Once identified, pharmacy educators may take steps to improve student sense of self-efficacy in performing these behaviors. Bandura proposed four sources for developing efficacy information (1): (i) performance accomplishments, (ii) vicarious experience, (iii) verbal persuasion, and (iv) emotional arousal.

Performance Accomplishments. Performance accomplishments serve as the most powerful source of efficacy information (24). Repeated successes raise efficacy expectations while repeated failures lower them. Efficacy appraisals are most sensitive to failures in the early stages of training. Once a strong sense of efficacy has been gained through success, the effect of an occasional failure is minimized.

An adjunct to actual performance of a task is participant modeling. Performing the task in a structured environment can ensure success and may allow individuals to engage in activities they would otherwise avoid (25). Participant modeling has been found to be superior to vicarious experience (26-27), but it is not as powerful as actual performance. Well-structured clinical rotations serve as a source of performance accomplishments. For example, the use of participant modeling may be employed initially to ensure that the student is competent to perform the task. Performing the task in a structured environment serves to minimize failure and errors. Once the preceptor is confident that the student is capable of performing the task, the student may be allowed to perform in a less structured environment.

Vicarious Experience. Seeing others perform activities without adverse consequences can generate expectations in observers that they too will be

22. Wolleat PL, Pedro JD, Becker AD, et al. Sex differences in high school students' causal attributions of performance in mathematics. *J Res Math Educ.* 1980; 11(5):356-66.
23. Hackett G. Role of mathematics self-efficacy in the choice of math-related majors in college women and men: a path analysis. *J Counsel Psychol.* 1985; 32(1): 47-56.
24. Bandura A, Adams NE, Beyer J. Cognitive processes mediating behavioral change. *J Pers Soc Psychol.* 1977; 35(3):125-39.
25. Bandura A. Effecting change through participant modeling. In: Krumboltz JD, Thoresen CE, eds. *Counseling methods.* New York: Holt, Rinehart and Winston; 1976:248-64.
26. Blanchard EB. Relative contributions of modeling, informational influences, and physical contact in extinction of phobic behavior. *J Abnorm Psychol.* 1970; 76(1):55-61.
27. Roper G, Rachman S, Marks I. Passive and participant modelling in exposure treatment of obsessive-compulsive neurotics. *Behav Res Ther.* 1975; 13(4):271-9.
28. Bandura A, Barab PG. Processes governing disinhibitory effects through symbolic modeling. *J Abnorm Psychol.* 1973; 82(1):1-9.
29. Meichenbaum DH. Examination of model characteristics in reducing avoidance behavior. *J Pers Soc Psychol.* 1971; 17(3):298-307.
30. Schunk DH, Hanson, AR. Peer models: influence on children's self-efficacy and achievement. *J Educ Psych.* 1985; 77(3):313-22.
31. Zimmerman BJ, Ringle J. Effects of model persistence and statements of confidence on children's self-efficacy and problem solving. *J Educ Psych.* 1981; 73(4):485-93.
32. Lick J, Bootzin R. Expectancy factors in the treatment of fear: methodological and theoretical issues. *Psychol Bull.* 1975; 82(6):917-31.
33. Moore N. Behaviour therapy in bronchial asthma: a controlled study. *J Psychosom Res.* 1965; 9(3):257-76.

APPENDIX

Case #1: A woman comes to the pharmacy. She states that her two-year-old daughter has a stuffy nose. The woman asks if you can help her choose a good product for her child.

1. How confident are you that you could ask the pertinent questions to obtain the necessary information for recommending an appropriate product?
2. In assessing the child's condition, how confident are you that you could differentiate between sinusitis and allergy or a more serious upper respiratory infection?
3. With adequate information, how confident are you that you could recommend an appropriate product for this child? During the conversation, the mother says that a neighbor thinks Sudafed® (pseudoephedrine) is an excellent product. She asks for your evaluation of Sudafed®.
4. How confident are you that you could accurately assess the appropriateness of pseudoephedrine for this child?
5. Assume that Sudafed® was chosen for this patient. How confident are you that you could recommend a proper dosage and dosage frequency?
6. How confident are you that you could provide proper information about the side-effects and contraindications for pseudoephedrine?
7. How confident are you that you could provide proper information on drug-drug interactions for pseudoephedrine?

Case #2: You receive a phone call from a physician requesting information. She describes a 68-year-old female diabetic patient who has been catheterized for three days. The patient now has a probable urinary tract infection. The physician would like you to recommend an antibiotic for this patient.

1. How confident are you that you could ask the pertinent questions to obtain the necessary information for recommending an appropriate product?
2. In assessing the patient's condition, how confident are you that you could differentiate between uncomplicated UTI and acute pyelonephritis?
3. With adequate information, how confident are you that you could recommend an appropriate product for this patient?

When the lab results arrive, you note that the urine culture grew *klebsiella* sensitive to gentamicin. The physician states that she has used gentamicin (Garamycin®) before. She asks for your evaluation of gentamicin.

4. How confident are you that you could accurately assess the appropriateness of gentamicin for this patient?
5. Assume that gentamicin was chosen for this patient. How confident are you that you could recommend a proper dosage and dosage frequency?
6. How confident are you that you could provide proper information about side effects and contraindications for gentamicin?
7. How confident are you that you could provide proper information on drug-drug interactions of gentamicin?

Case #3: A man comes into your pharmacy with a young boy (nine years old). The man says his son has a rash on the inside of his leg and arm. He would like you to recommend something.

1. In assessing the child's condition, how confident are you that you could differentiate between ringworm and other skin conditions such as poison ivy?
2. How confident are you that you could ask the pertinent questions to obtain the necessary information for recommending an appropriate product?
3. With adequate information, how confident are you that you could recommend an appropriate product for this child?

During the conversation, you learn that the boy spent several weeks with relatives. One of his cousins had ringworm and they used Tinactin® (tolnaftate).

4. How confident are you that you could accurately assess the appropriateness of tolinaftate for this patient?
5. Assume that tolinaftate was chosen for this patient. How confident are you that you could recommend a proper dosage and dosage frequency?
6. How confident are you that you could provide proper information about the side effects and contraindications for tolinaftate?
7. How confident are you that you could provide proper information on drug-drug interactions of tolinaftate?

The following scale was placed beneath each item. Participants were instructed to rate how confident they were by circling the appropriate number: from 0% indicating no confidence to 100% indicating total confidence.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%