

Predictors of Progress in Smoking Cessation

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Abstract This study examined the ability of two specific measures of stressors associated with smoking cessation to act as predictors of progress through the stages of smoking cessation as described by Prochaska and DiClemente (1983). Specifically, a 19-item scale measuring barriers to smoking cessation and a 14-item scale measuring smoking cessation self-efficacy were completed by 127 smokers and self-quitters at three time points over a six-month period. Subjects who made progress through the stages of smoking cessation had lower barriers scores initially and had significant changes in their self-efficacy and barriers scores over the six-month period. In contrast, non-progressors had no significant change in either their self-efficacy or barriers scores over the time period. These results suggest that the two scales may provide clinically useful data to public health nurses working with smokers.

INTRODUCTION

Tobacco use is recognized as the single most preventable cause of death in the United States, with one in six deaths each year attributed at least in part to smoking (U.S. Department of Health and Human Services, 1990). With approximately 40 million smokers in the United States today (Wynder, 1993), effective approaches and programs to support smoking cessation are essential for promoting the public health. Since the majority of smokers who quit do so without the help of a smoking-cessation group (Orleans et al., 1991), applied research in smoking cessation particu-

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larly needs to address self-quitters (Bauman, 1992). Given the time and resource constraints faced by public health nurses today, research focusing on practical approaches to targeting clients who are ready or likely to succeed at smoking cessation is essential.

Although current research in smoking cessation has identified a link between coping during cessation and successful quitting (Abrams et al., 1987; Wewers, 1988), there is a need for research that explicitly conceptualizes and examines the process of smoking cessation within a stress and coping framework (Carey, Snel, Carey, & Richards, 1989). Smoking cessation is innately stressful both because it targets existing coping mechanisms and because it creates new demands on the individual for which he or she does not have readily available responses. For example, individuals who are quitting smoking must "give up" using cigarettes to cope with distressful feelings such as nervousness or anxiety. They also must deal with new demands such as rejuvenated taste buds, which make it difficult to avoid overeating. Since exposure to stressors appears to increase the desire to smoke (Perkins & Grobe, 1992), the extent to which individuals experience stresses and strains associated with quitting smoking seems particularly likely to impact their success at quitting.

Specific stresses and strains associated with smoking cessation have the potential to be quantified and therefore are relatively easy to assess clinically. This study examined stresses and strains associated with smoking cessation as predictors of initiation and progress through the stages of smoking cessation.

The study was broadly conceptualized using Lazarus' Transactional Model of Stress and Coping (1966). Within Lazarus' model, stress is described as the product of an individual's perceptions that something is threatening and his perception that he does not have the ability to cope effectively with that threat. Applied to stresses associated with smoking cessation, this model suggests that the extent

to which any particular aspect of smoking cessation is stressful depends on the individual's perceptions and coping skills. Specifically, rejuvenated taste buds and increased appetite will be a stress associated with smoking cessation for an individual *only* if she perceives gaining weight to be threatening and does not believe she has the coping skills to manage that threat.

Staying within Lazarus' Model of Stress and Coping (1966) and borrowing an important construct from the Health Belief Model (HBM) (Maiman & Becker, 1974), specific stresses and strains associated with smoking cessation were conceptualized as two major constructs: smoking-cessation self-efficacy and perceived barriers to smoking cessation. Smoking-cessation self-efficacy is an individual's perception of his ability to refrain from smoking in selected specific situations. Smoking-cessation self-efficacy has been shown to significantly contribute to the prediction of relapse within three months of quitting (Baer, Holt, & Lichtenstein, 1986; Conditte & Lichtenstein, 1981; McIntyre, Lichtenstein, & Mermelstein, 1983; Yates & Thain, 1985). Viewing self-efficacy within a stress and coping framework, it seems logical that an individual who does not believe she *can* refrain from smoking in a specific situations would be stressed about trying to quit smoking. For example, individuals who are not confident that they can quit smoking in the presence of others who smoke (a low self-efficacy) would feel stressed about trying to quit smoking when co-workers smoke.

Perceived barriers was the second construct used in this study to reflect stresses and strains associated with smoking cessation. Within the original HBM, perceived barriers were described as attitudes reflecting negative aspects or costs of a particular health action that could act as impediments to undertaking the action (Janz & Becker, 1984). For this study, barriers were reconceptualized within Lazarus's Stress and Coping Model (1966) as an individual's perception that aspects of not smoking are threatening and that he does not have the ability to cope with those threats (Macnee & Talsma, in press). Barriers reconceptualized in this manner differ from self-efficacy in that an individual may believe that he *can* refrain from smoking when around others who are smoking (a high self-efficacy), but may believe this is very threatening and difficult to manage (high perceived barriers). Despite a high self-efficacy, such an individual would feel stressed about quitting if he will be doing so in the presence of smoking coworkers. Perceived barriers to smoking cessation reconceptualized within the Transactional Model of Stress and Coping (Lazarus, 1966) have been found to be related to perceived well-being of individuals quitting smoking (Macnee, 1991), and to predict inability to abstain from smoking in participants of a smoking-cessation group (Macnee, 1992).

This study examined perceived barriers to smoking and smoking-cessation self-efficacy as predictors of initiation

of smoking cessation and positive movement through the stages of smoking cessation for self-quitters. The stages of smoking cessation examined were those described by Prochaska and DiClemente (1983) and include: (1) precontemplation—smoking with no intention of quitting; (2) contemplation—smoking with an intent to quit within the next six months; (3) preparation for action—smoking but making specific cognitive and behavioral changes in order to stop smoking; (4) early action—abstaining from smoking for less than six months; (5) maintenance—abstaining from smoking for six months or more; and (6) relapse—returning to smoking after attempting to quit.

DESIGN

This study used a nonexperimental descriptive design over a six-month period. Smokers and individuals in the early stages of quitting smoking were recruited and asked to complete a written questionnaire at three time points: at the time of recruitment—T1; two months later—T2; and six months after recruitment—T3. Smokers were included in the sample because the purpose of the study was to examine barriers and self-efficacy as predictors of initiation of quitting smoking (movement through the stages of precontemplation and contemplation) as well as progress through later stages of quitting smoking.

In order to classify subjects regarding their stage of smoking cessation, subjects were asked on the questionnaire to report on their smoking over the past 24 hours, and if they were smoking, about their intent to quit in the next six months. Subjects were told they might be asked to provide a saliva specimen to confirm their self-report about smoking. Only subjects who reported abstaining from smoking were asked to provide a saliva sample, which was tested for cotinine (a byproduct of nicotine). Subjects were paid \$20 for participation in the study; \$10 after they completed the second questionnaire (at two months after recruitment), and another \$10 after they completed the third questionnaire (six months after recruitment).

Sample

Subjects from a Midwestern urbanized county (population 282,937) were recruited to participate in the study through newspaper ads. Ads were placed in the newspapers of the four major towns within the area (ranging in size from approximately 8,000 to 150,000 in population). Criteria for inclusion in the study for smokers were: (1) age 18 or older; (2) able to read and write English; and (3) smoked at least 20 cigarettes per week for at least a year. An additional criterion for inclusion in the study as a quitter was (4) a stated intention to quit smoking, with a concrete action taken in order to quit and a quit date established *or* having been abstinent for no more than four weeks. This criterion assured that quitters were in the preparation-for-

action or early-action stages of quitting smoking (Prochaska & DiClemente, 1983).

Active recruitment of subjects was conducted for 10½ weeks, and a total of 295 calls from potential subjects were screened during that time. Subjects who met the criteria for the study were verbally informed about the study, including their right to drop out of it at any time. Those who indicated a willingness to participate were sent two copies of a written informed consent form plus the first questionnaire. Subjects who returned the signed informed consent and the first questionnaire were considered enrolled in the study. One hundred fifty-seven subjects enrolled in the study, and of these, 127 (81%) returned both the T2 and T3 questionnaires.

The sample had a mean age of 32 ($SD=11$), with a range of 18 to 69 years. Sixty-three percent ($n=80$) were female, and 87% ($n=110$) were white. Census tract data from 1990 indicate that 83.5% of residents of the county from which the sample was recruited were white (U.S. Department of Commerce, 1992), indicating that the racial distribution of the sample was close to that for the area. Subjects reported a mean of 13.4 ($SD=3$) years of education, and 55% ($n=72$) were single or divorced. Fifty-four percent ($n=68$) of the sample reported a family income of less than \$20,000, and 19% ($n=24$) reported a family income of greater than \$40,000. Fifty percent ($n=61$) of subjects reported they were employed for more than 20 hours per week, and only 6% ($n=8$) reported being employed less than 20 hours per week. However, 8% ($n=10$) described themselves as homemakers, and 13% ($n=16$) were unemployed. Sixty-one percent ($n=78$) entered the study as smokers, and 72% of these subjects reported they planned to quit smoking in the next six months. Subjects reported smoking an average of 19 ($SD=11$) cigarettes per day.

Measures

The questionnaire included measures of smoking-cessation self-efficacy and perceived barriers to smoking cessation. Smoking-cessation self-efficacy was defined as the individual's mean rating of his confidence in his ability to refrain from smoking in 14 specific situations and was measured using the Confidence Questionnaire (CQ) Form S (Baer & Lichtenstein, 1988). The CQ is an easily administered scale that asks subjects to rate on a scale from zero to 100% the probability that they will be able to refrain from smoking in 14 specific situations (see Table 1 for examples of items). The theoretical range for scores on this scale is 0 to 100. The CQ has been shown to be internally consistent with a coefficient alpha of .92 and was reported to have predictive validity in a sample of 63 subjects in smoking-cessation programs (Baer & Lichtenstein, 1988). Coefficient alpha for the CQ in the study reported here was .82 ($N=157$).

TABLE 1. *Examples of Items from the Smoking Self-Efficacy Scale*

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1. When you are anxious
 3. When you have finished a meal or snack
 4. When you are nervous
 6. When you want to relax
 8. When you feel tense
-

Perceived barriers to smoking cessation were defined as the sum of individual's rankings on a four-point Likert-type scale of 19 items describing general circumstances or feelings that can make it harder for individuals to stop smoking, as measured by the Barriers to Cessation Scale (BCS) (Macnee & Talsma, in press) (see Table 2 for examples of items). The four-point Likert-type scale included "not a barrier," "a small barrier," "a moderate barrier," and "a big barrier," which were scored 0 to 3, respectively. Theoretically, scores on this scale could range from 0 to 57. In earlier studies Cronbach's alpha for the scale was .87 in a sample of a 165 smokers and self-defined quitters and was .81 in a sample of 25 participants in a smoking-cessation group (Macnee & Talsma, in press). Both construct and predictive validity of the measure have been supported in earlier studies (Macnee & Talsma, in press). Coefficient alpha for the BCS in the study reported here was .83 ($N=157$).

The BCS and the CQ are relatively short and easily administered scales. Both this study and an earlier cross-sectional study (Macnee, 1991) found statistically significant inverse relationships between scores on the BCS and the CQ, as well as statistically significant relationships among the BCS, the CQ, and the Daily Hassles Scale (DeLongis, Folkman, & Lazarus, 1988), which is a measure of daily stresses and strains. These results would be theoretically predicted and would support the validity of these measures with a lower socioeconomic status (SES) population (Macnee & Talsma, in press).

Validity of self-reported abstinence was tested by saliva cotinine levels. Cotinine was tested using the gaschromatographic method (Hariharan & VanNoord, 1991). Twenty (87%) of the 23 subjects from whom specimens were obtained had cotinine levels that reflected abstinence from

TABLE 2. *Examples of Items from the Barriers to Cessation Scale*

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1. Gaining weight
 2. No encouragement or help from friends
 3. Having strong feelings such as anger, or feeling upset when you are by yourself
 4. Having withdrawal symptoms
-

smoking for at least a week. There was a four-day to two-week gap between the subjects' report of abstaining from smoking and the collection of the saliva specimens. Subjects mailed their questionnaires to the investigator, and although reported smoking status was checked immediately upon receipt of a questionnaire, it often took several days to reach a subject by phone and arrange for collection of the saliva specimen. The expense of collecting specimens from all subjects at the time when they completed the questionnaire was prohibitive.

Given the time between self-report and collection of the saliva specimen, it is not surprising that three subjects had relapsed in the interim. Two of the three subjects whose cotinine level reflected smoking reported that they had "slipped" since reporting they were not smoking. Despite the time gap between report and specimen collection, 87% of the subjects from whom specimens were obtained *did* have cotinine levels that reflected abstinence for at least a week, supporting the validity of subjects' self-report of abstinence.

RESULTS

There were no significant differences between the 127 subjects who stayed in the study through all three time points and the 30 subjects who dropped out of the study for any of the demographic or smoking-history variables or initial CQ and BCS scores. In order to examine self-efficacy and barriers as predictors of initiation and progress in smoking cessation, subjects were classified into the six stages of smoking cessation described by Prochaska and DiClemente (1983) at each of the three time points of the study. Specifically, subjects were classified as being in the stage of "precontemplation" if they categorized themselves as smokers and indicated they had no plans to try to quit smoking in the next six months. Subjects who categorized themselves as smokers who *did* plan to quit in the next six months were classified as "contemplators." Subjects who reported still smoking cigarettes but who had taken specific actions to quit and set a quit date were classified as being in the stage of "preparation for change." Subjects who reported not smoking were classified as in the stage of "early action" at T1. At T2 and T3 subjects could also be classified as a "relapsers" (started to smoke again since previous time point) or as "maintainers" if they continued to abstain from smoking for a total of four months.

Table 3 shows the number of subjects in each of the six stages of smoking cessation at the three time points of the study (six subjects had incomplete data for categorization so were excluded from the following analysis). Almost 62% of the subjects at T1 were either precontemplators or contemplators, and there were only two subjects who were

classified as being in the stage of early action. By T3, 14 subjects were classified as early action, and eight as maintainers. One subject was classified as a relapser, and 80 subjects were either precontemplators or contemplators. Eleven percent of subjects were abstaining from smoking at T2, and 18% of subjects were abstaining from cigarettes at the end of the study.

Progress through the stages of smoking cessation was examined by computing the number of stages a subject had moved in either a positive or negative direction over the time period. Examination of movement through the stages from T1 to T3 revealed that 24% ($n=29$) regressed or moved in a negative direction through the stages of smoking cessation, 55% stayed at the same stage ($n=66$), and 21% ($n=26$) progressed or made positive movement through the stages of smoking cessation over the six-month period. Because the focus of this study was on progress through the stages of smoking cessation, subjects who either regressed or made no movement were categorized together as non-progressors in the analysis that follows.

Table 4 shows the barriers and self-efficacy scores of subjects grouped as progressors ($n=26$) and non-progressors ($n=95$). Independent *t*-tests comparing these groups revealed significant differences in their initial (T1) barriers scores ($t(119)=2.3, p<.05$), with progressors having lower initial barriers as compared with non-progressors. Barriers at T2 were not significantly different because non-progressors' barriers scores dropped slightly, but by T3 progressors' barriers scores had dropped seven points and there was a significant difference in barriers scores between progressors and non-progressors ($t(119)=5.3, p<.001$).

Self-efficacy scores of progressors and non-progressors at T1 were not significantly different. However, at both T2 and T3 there were significant differences, $t(119)=-2.6, p<.05$, and $t(119)=-3.5, p<.01$, respectively. As expected, self-efficacy scores were higher for progressors compared with non-progressors.

Paired *t*-tests indicated that self-efficacy scores increased significantly between T1 and T2 for progressors ($t(26)=-3.6, p<.01$) but did not change significantly between T2 and T3. Barriers scores did not change significantly from T1 to T2 for progressors but did drop significantly ($t(25)=3.7, p<.001$) between T2 and T3. Subjects who made positive progress through the stages of smoking cessation had significant improvements in their self-efficacy over the first two-month period and then maintained these levels and had significant drops in their perceived barriers during the next four-month period. Further, those who progressed had significantly lower initial barriers than those who did not progress. In comparison, those who made no progress or regressed had no significant changes in either their self-efficacy scores or their barriers scores between any of the time points.

TABLE 3. Number of Subjects in Each of the Six Stages of Smoking Cessation at the Three Time Points

Smoking Stage	Time One		Time Two		Time Three	
	n	%	n	%	n	%
Precontemplation	20	16	21	17	29	24
Contemplation	57	45	67	54	51	42
Preparation for action	46	37	23	23	19	15
Early action	2	2	13	11	14	11
Maintenance	0	0	0	0	8	7
Relapse	0	0	0	0	1	1

Note: Numbers do not always total 127 because some subjects had missing data, which precluded their being classified into a smoking stage.

TABLE 4. Mean Barriers Scores and Self-Efficacy Scores for Progressors (n = 26) and Non-progressors (n = 95)

Scale	Time One		Time Two		Time Three	
	M	SD	M	SD	M	SD
Barriers						
Progressor	19.9	9*	19.7	9	12.5	9***
Non-progressor	24.7	9	23.6	10	23.6	10
Self-Efficacy						
Progressor	54	2	63	2*	69	2**
Non-progressor	46	2	51	2	48	3

* $p < .05$.

** $p < .01$.

*** $p < .001$.

DISCUSSION AND IMPLICATIONS

The subjects in this sample reported a relatively low family income and employment status, suggesting that the sample, while clearly not random, is representative of the evolving population of entrenched smokers who generally have a lower SES (Orleans et al., 1989). Since this is the population of greatest concern to public health nurses, the results of this study have the potential to be particularly useful. Further, the "quit rate" of 18% found in this study is very similar to the rate generally reported for self-quitting (Carey et al., 1989), which further supports the representativeness of this sample.

This study's findings suggest that nursing assessment of smoking clients' perceived barriers to smoking cessation and self-efficacy may provide useful data both for targeting clients with the potential to make positive progress through the stages of smoking cessation and for planning interventions to facilitate that movement. Clients with lower perceived barriers initially made progress through the stages of smoking cessation. The mean initial barriers score of subjects who progressed through the stages of smoking cessation was 20 ($SD = 9$). This suggests that clients with barriers scores of 20 or lower

may be particularly ready for efforts to move them toward smoking cessation.

Further, a consistent pattern arose in this study in terms of changes over time in self-efficacy and barriers of progressors, with progressors significantly improving their self-efficacy first, and then decreasing their perceived barriers. These results suggest that clients may need to work first on their self-efficacy or beliefs in their *ability* to carry out the behaviors needed to quit smoking (such as drinking a cup of coffee without a cigarette). Once they have found they *can* carry out the behaviors needed (therefore decreasing their stress associated with this aspect of quitting), the next step might be to work on their perceptions of the stress associated with the actual behavior and their perceived ability to cope with carrying out these behaviors on an ongoing basis. These results may provide some important insights into potential interventions to promote smoking cessation in self-quitters. Further research is needed to test such interventions.

The sample for this study was considered to be self-quitters because no formal smoking-cessation intervention program was offered as part of the study. Subjects were told that the study focused on self-quitting when they were recruited. However, it has not been the practice in studies

of self-quitters to specifically direct them not to participate in any formal program, nor was self-report of participation in a program requested. Therefore it is possible that some subjects did avail themselves of a formal smoking-cessation program during the six months of the study. Future studies should specifically address this limitation in the sampling design. Whether the subjects in this study were *exclusively* self-quitters or not, the general finding of a pattern to barriers and self-efficacy scores supports the usefulness of examining stressors associated with smoking cessation as predictors of movement through the stages of smoking cessation.

Because barriers to smoking cessation were conceptualized within the Transactional Model of Stress and Coping (Lazarus, 1966), this study responds to the need identified in the literature for studies that are explicitly based upon that model. The results support the appropriateness of developing interventions for self-quitters that focus on their specific stresses and strains associated with smoking cessation. The results also suggest that use of both the BCS and the CQ may provide clinically useful data to nurses who work with smokers in inpatient and outpatient settings. Interventions based on these two scales, which can be easily implemented clinically, need to be developed and tested so that public health nurses can more accurately target smokers with a high likelihood of successfully quitting and can identify interventions that may help highly addicted smokers move closer to successful quitting.

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