Published in final edited form as:

J Health Psychol. 2008 April ; 13(3): 416. doi:10.1177/1359105307088144.

Autonomous Motivation as a Critical Factor in Self-Efficacy among Rural Smokers

Carla J. Berg^a, Lisa Sanderson Cox^a, Jonathan D. Mahnken^a, K. Allen Greiner^b, and Edward F. Ellerbeck^a

^aDepartment of Preventive Medicine & Public Health, University of Kansas Medical Center, 3901 Rainbow Boulevard, Mail-Stop 1008, 4004 Robinson, Kansas City, KS 66160, Fax: 913-588-2780

^bDepartment of Family Medicine, University of Kansas Medical Center, 1130 Delp Pavilion, Mail Stop 4010, 3901 Rainbow Boulevard, Kansas City, KS 66160, Fax: 913-588-2095

Abstract

Self-efficacy has been related to intent to stop smoking, abstinence success, and risk for relapse. Because limited attention has been given to self-efficacy among rural smokers, the current study examined correlates of self-efficacy among rural primary care patients smoking ≥ 10 cigarettes per day. Participants completed a telephone survey assessing demographics, smoking and medical history, social environment, self-efficacy, nicotine dependence, motivation for quitting, and depression. Among the 750 participants, higher self-efficacy was correlated with lower depression scores, longer length of previous abstinence period, higher autonomous motivation, older age, lower nicotine dependence, readiness to quit, and being male. By targeting characteristics associated with self-efficacy, health care providers may be able to better enhance self-efficacy in their efforts to help smokers quit.

Keywords

smoking; self-efficacy; rural; depression; smoking cessation

Cigarette smoking remains the leading preventable cause of premature disease and death in this country, accounting for nearly one in every five deaths, or about 438,000 premature deaths annually (American Cancer Society, 2006). Thus, tobacco use prevention and smoking cessation treatments are a major public health priority. One factor associated with smoking cessation is self-efficacy (Bandura, 1977; 1982; 1997). Smoking abstinence self-efficacy is the perception of one's ability to resist smoking. More positive self-efficacy beliefs are hypothesized to lead to greater effort and persistence in the face of obstacles, which, in turn, leads to a higher probability of successful behavior change (Bandura, 1977; 1982; 1997).

Self-efficacy has been shown to be one of the most robust predictors of outcome in smoking cessation such that people who feel more confident in their ability to abstain from smoking prior to quitting or after treatment have greater intent to quit (Willemsen, Vries, Breukelen, & Oldenburg, 1996; Schnoll et al., 2005) and are ultimately more successful (e.g., Baer, Holt, &

© [The Author(s)]

Please address all correspondence to Edward F. Ellerbeck, M.D., Department of Preventive Medicine & Public Health, University of Kansas Medical Center, 3901 Rainbow Boulevard, Mail-Stop 1008, 4004 Robinson, Kansas City, KS 66160, Phone: 913-588-2775, Fax: 913-588-2780, eellerbe@kumc.edu..

This study was presented in part at the 2006 Annual Meeting of the Society for Nicotine and Tobacco Research, Orlando, FA, February, 2006.

Lichtenstein, 1986; Coelho, 1984; DiClemente, 1981; Garcia, Schmitz, & Doerfler, 1990; Gulliver, Hughes, Solomon, & Dey, 1995; Haaga, 1990; Mothersill, McDowell, & Rosse, 1988; Stuart, Borland, & McMurry, 1994). This has been true in retrospective studies (e.g., Carey & Carey, 1993; Carey, Snel, Carey, & Richards, 1989; Ciondotti & Lichtenstein, 1981; DiClemente, 1981; DiClemente, Prochaska, & Gibertini, 1985; Gulliver, Hughes, Solomon, & Dey, 1995) and in prospective investigations (Wojcik, 1988; Yates & Thain, 1985). Furthermore, self-efficacy may predict which smokers are likely to relapse, how soon, and in which situation they will start smoking again (Condiotte & Lichtenstein, 1981; Gwaltney et al., 2001; McIntyre, Lichtenstein, & Mermelstein, 1983).

According to Bandura (1977;1982;1997), self-efficacy beliefs are created by previous mastery experiences (i.e., one's own previous performance), vicarious experiences (i.e., watching performances of others), social persuasions (i.e., judgments or encouragement from others), and somatic and emotional states (i.e., anxiety, stress, arousal, and mood states). These somatic and emotional states may be triggered by events, or in some cases, may be altered due to chronic mood disorders such as depression. Thus, it is important to consider a host of the specific factors that could affect smoking abstinence self-efficacy.

Correlates of Self-Efficacy

Among the demographic variables that have been related to higher self-efficacy for quitting are older age (Schnoll et al., 2005), higher education (DiClemente, Prochaska, & Gibertini, 1985; Droomers, Schrijvers, & Mackenbach, 2004; Willemsen et al., 1996), and being of Caucasian heritage (Schnoll et al., 2005). Furthermore, self-efficacy has been related to several smoking-related characteristics, including fewer cigarettes smoked per day (DiClemente, Prochaska, & Gibertini, 1985; Willemsen et al., 1996), less nicotine dependence (DiClemente, Prochaska, & Gibertini, 1985), older age of smoking initiation (DiClemente, Prochaska, & Gibertini, 1985), and longer duration of last abstinence period (DiClemente, Prochaska, & Gibertini, 1985). Also, stage of change (per the transtheoretical model; Prochaska & DiClemente, 1984; Prochaska, Velicer, Guadagnoli, & Rossi, 1991) and self-efficacy have been found to be highly positively correlated and seem to be measuring similar constructs (Vernon, Crane, Prochaska, Fairclough, & MacKenzie, 1999). Moreover, higher self-efficacy has been related to lower levels of depression (Haukkala, Uutela, Vartiainen, McAlister, & Knekt, 2000; John, Meyer, Rumpf, & Hapke, 2004).

Studies also have found higher self-efficacy to be related to greater social pressure to quit and social support for quitting (Sorensen, Emmons, Stoddard, Linnan, & Avrunin, 2002). Other research has found that social support does not predict self-efficacy; rather, the personal skill set of the smoker may be a more robust predictor of self-efficacy (Kavanagh, Pierce, Lo, & Shelley, 1993).

Higher self-efficacy has been linked to higher motivation to quit (Schnoll, Rothman, Newman, Lerman, Miller, Movsas et al., 2004). However, the relationship between motivation and self-efficacy has been shown to be quite complex. One study showed that people in the action stage of change that were motivated by external forces have been shown to have lower self-efficacy expectations in comparison to those motivated by internal forces (Bolman & de Vries, 1998). Furthermore, previous research (Vernon et al., 1999) has found that, among adult patients admitted to the hospital, patients who believed their hospitalization was due to smoking had greater self-efficacy to quit. Moreover, some research has found that higher motivation to quit was related to higher levels of depression, which was associated with lower self-efficacy (Haukkala, Uutela, Vartiainen, McAlister, & Knekt, 2000). Given the complexity of these findings, the relationship between motivation and self-efficacy remains unclear.

Research to date has not investigated what factors may form, or be predictive of, smoking abstinence self-efficacy among rural smoking populations. Adult men and women in rural communities face unique barriers to smoking cessation that might impact their self-efficacy, including higher rates of smoking (Eberhardt et al., 2001), less access to medical services, especially specialty services such as smoking cessation programs (NRHA, 2006; Scott, LaSala, Lyndaker, & Neil-Urban, 2003), a greater proportion of the population without health insurance (National Rural Health Association, 2006), more poverty (National Rural Health Association, 2006), and fewer community smoking restrictions (e.g., in restaurants, at work; McMillen, Breen, & Cosby, 2004). Taken together, these factors put rural smokers at a greater disadvantage for smoking cessation.

Given the high rates of smoking and the paucity of resources for addressing smoking cessation in rural communities, it is critical to identify factors that might be associated with self-efficacy for quitting. In this study, we sought to: (1) confirm the relationships of factors identified in previous studies as correlates of self-efficacy; (2) test the impact of rural social-environmental factors on self-efficacy; and (3) examine the relationship between the different types of motivation and self-efficacy in quitting.

METHODS

The current paper was completed as part of a larger study, the Kan Quit Research Study conducted by the University of Kansas Medical Center Department of Preventive Medicine. This was an intervention study designed to collaborate with primary care physicians in rural communities in order to evaluate a disease-management program for smoking cessation among rural smokers. Trained medical students on a rural preceptorship recruited smokers from 40 rural primary care clinics throughout the state of Kansas. The students screened patients for their smoking status, identified smokers for eligibility, and obtained informed consent from interested individuals. The participant information was forwarded to the Kan Quit research staff. The staff contacted the participants via telephone, verified eligibility, and conducted the baseline survey.

Participants

In order to be eligible for the study, participants must: (1) have been smoking more than 10 cigarettes per day; (2) have smoked at least 25 of the last 30 days; (3) be at least 18 years of age; (4) not be pregnant or planning to become pregnant in the next two years; (5) not be planning on moving in the next two years; (6) have a home telephone or a cellular telephone; and (7) consider one of our participating physicians to be their regular doctor. Of 1,826 smokers identified, 715 were ineligible, 303 refused to participate, 58 were not able to be contacted, and 750 were randomized.

Measures

Participants completed a telephone survey assessing demographic information (i.e., age, gender, race, total annual income, education level, employment status, marital status) and smoking history (i.e., age at smoking initiation, number of cigarettes smoked per day, number of previous quit attempts, length of longest quit attempt, previous nicotine replacement usage, previous Zyban usage). Information regarding social environment (i.e., encouragement from friends or family to quit, smoking status of partner, number of friends that smoke, other smokers in the home, children in the home) also was collected. In addition, they were asked if any health care provider had ever told them that they have diabetes, hypertension, high cholesterol, a stroke, chronic lung disease, heart disease, or cancer. The survey also included the following instruments.

Smoking Self-Efficacy Questionnaire (SEQ-12)—The SEQ-12 (Etter, Bergman, Humair, & Perneger, 2000) is a two-dimensional 12-item scale measuring confidence in ability to refrain from smoking on a 5-point Likert scale (from 1 = “not at all sure” to 5 = “absolutely sure”). SEQ-12 scores range from 12 to 60 with higher scores indicating greater self-efficacy. It assesses this confidence using two subscales: (1) the Intrinsic Self-Efficacy subscale, which assesses confidence in ability to refrain from smoking when facing internal stimuli (e.g. feeling depressed); and (2) the Extrinsic Self-Efficacy subscale, which assesses confidence in ability to refrain from smoking when facing external stimuli (e.g. being with smokers). Scores for each of the subscales range from 6 to 15.

Fagerstrom Test for Nicotine Dependence (FTND)—The FTND (Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991) is a 6-item questionnaire designed to predict biochemical measures of heaviness of smoking. Scores on the FTND range from 0 to 10, with 0-5 indicating a low addiction and 6-10 indicating a high addiction.

Readiness to Quit—Readiness to quit was assessed by asking the participants “Are you seriously considering quitting smoking within the next 30 days?” and “Are you seriously considering quitting smoking within the next 6 months?” (DiClemente, Prochaska, Fairhurst, Velicer, Velasquez, & Rossi, 1991; Fava, Velicer, & Prochaska, 1995).

Treatment Self-Regulation Questionnaire (TSRQ)—The TSRQ for smoking (Williams, Ryan, & Deci, 2004) is a 15-item instrument that assesses one’s motivation to quit smoking using three subscales—Autonomous Motivation (i.e., motivation regulated by the process of choice and willingness to engage in a behavior), Controlled Motivation (i.e., motivation regulated by the process of compliance to external pressure and one’s feelings that he or she has no choice), and Amotivation (i.e., lack of motivation). Higher scores indicate greater autonomous motivation, controlled motivation, or amotivation. The Autonomous Motivation and Controlled Motivation subscales have a range of 6 to 42, with higher scores indicating greater motivation; the Amotivation subscale has a range of 3 to 21, with a higher score indicating greater amotivation.

Patient Health Questionnaire-9 (PHQ-9)—The PHQ-9 (Kroenke & Spitzer, 2002) is a 9-item scale assessing depression severity on a 4-point Likert scale (from 0 = “not at all” to 3 = “nearly every day”). Scores range from 0 to 27, with cutpoints of 5, 10, 15, and 20 representing the thresholds of mild, moderate, moderately severe, and severe depression, respectively. PHQ-9 scores were analyzed as a continuous variable.

Statistical Analysis

Associations with smoking abstinence self-efficacy were investigated. The types of variables investigated in relation to self-efficacy were demographics, smoking and medical history, social environment, readiness to quit, sources of motivation, and depression levels. Individual subscale scores (i.e., Intrinsic Self-Efficacy, Extrinsic Self-Efficacy) also were investigated in relation to these variables. However, these individual subscale scores manifested similar relationships as the SEQ-12. Thus, only the total SEQ-12 scores are reported and were examined in multivariable analyses for parsimony.

For continuous variables, correlation coefficients were calculated with SEQ-12 scores. Scatter plots (and in some cases, bubble plots) were generated to evaluate whether the Pearson’s correlation coefficient or Spearman’s correlation coefficient was more appropriate. For the dichotomous variables, a two-sample t-test was used to compare the mean self-efficacy scores between the two groups. Histograms also were generated to visually inspect the distribution of self-efficacy scores to assess whether this test was appropriate. Sample variances for the

two groups were tested for equality. Those groups showing a statistically different ($p < 0.05$) variances were compared using the Satterthwaite correction factor for the t-test.

The outcome variable for our multivariable model was total SEQ-12 scores. All variables investigated for a bivariate association with SEQ-12 scores were considered for this model. Stepwise selection was used, with α -cutpoints for entry into and removal from the model set at 0.05, as suggested by Draper and Smith (1998). However, prior to building the model, a global test of all possible predictors was performed as suggested by Harrell (2001). Failure to reject this global test would have prevented proceeding on to the model building. The purpose of this test is to prevent an excessive number of predictors from being considered for inclusion into the model (to protect against type I errors). Residual analysis was performed on the final model and collinearity was assessed. All analyses were performed using SAS 9.1.

RESULTS

Univariate Analyses

Table 1 presents the sociodemographic and smoking history characteristics of our 750 study participants. The majority were female (58.5%), Non-Hispanic Caucasians (89.5%) with an annual household income of less than \$40,000 (60.4%). The average age was 47.2 years of age ($SD = 13.1$). This was a heavy smoking population with 76.8% smoking more than a pack per day ($M = 23.7$ cigarettes per day, $SD = 10.4$) and 45.7% having an FTND score ≥ 6 ($M = 5.2$, $SD = 2.2$), indicating significant nicotine dependence. The average age of smoking initiation was 17.9 years of age ($SD = 6.5$). Participants in this study also reported high levels of depressive symptoms, with 19.5% reporting moderate, 8.3% reporting moderately severe, and 3.5% reporting severe depressive symptoms.

In regard to psychosocial factors, the mean SEQ-12 score was 32.9 ($SD = 10.7$), which is considered in the low to moderate range self-efficacy. Participants had significantly lower Intrinsic SEQ-12 scores ($M = 15.3$, $SD = 5.8$) than Extrinsic SEQ-12 scores ($M = 17.6$, $SD = 6.03$; $t = -12.3$, $p < .001$). Average scores on the Autonomous Motivation, Controlled Motivation, and Amotivation subscales were 36.8 ($SD = 6.8$), 21.7 ($SD = 10.0$), and 7.8 ($SD = 4.3$), respectively. The mean PHQ-9 score was 7.3 ($SD = 5.7$).

Bivariate Analyses

The relationships of SEQ-12 scores to the Intrinsic and Extrinsic SEQ-12 subscale scores were strong ($r = 0.90$, $p < 0.0001$ and $r = 0.91$, $p < 0.0001$, respectively; see Table 2). The Intrinsic and Extrinsic subscales also were strongly correlated ($r = 0.64$, $p < 0.0001$).

Among the socio-demographic characteristics, age showed a positive linear association with SEQ-12 scores ($r = 0.16$, $p < 0.0001$; see Table 2). Females had a significantly lower average SEQ-12 score than males ($\delta = -2.1$, $p = 0.01$; see Table 1). Significantly greater SEQ-12 scores were found among participants with incomes over \$40K ($\delta = 1.6$, $p = 0.05$). Among the smoking history variables, a negative correlations with SEQ-12 scores were found for number of cigarettes smoked per day ($r_S = -0.07$, $p = 0.05$) and FTND ($r = -0.14$, $p < 0.0001$). Positive correlations were found with length of longest quit attempt ($r_S = 0.15$, $p < 0.0001$) but not number of quit attempts ($r_S = 0.05$, $p = 0.14$). Significant increases in average SEQ-12 scores were found among those ready to quit within the next 30 days ($\delta = 2.5$, $p < 0.01$) and among those ready to quit within the next six months ($\delta = 2.9$, $p = 0.03$). Of the comorbidity variables, statistically significant differences in average SEQ-12 scores were found among those with diabetes and those with depression. Participants with diabetes had an increase in SEQ-12 scores ($\delta = 2.8$, $p = 0.01$), whereas those with a previous diagnosis of depression had lower SEQ-12

scores ($\delta = -1.6, p = 0.05$). PHQ-9 scores also were correlated with SEQ-12 scores ($r_S = -0.19, p < 0.0001$).

Several of the social environment variables demonstrated statistical significance in regard to the SEQ-12. Having other smokers in the home ($\delta = -1.6, p = 0.05$) and having more friends that smoke ($r_S = -0.13, p < 0.001$) were associated with lower SEQ-12 scores (see Table 2). Additionally, higher SEQ-12 scores were related to more encouragement from family ($r_S = 0.10, p < 0.001$) and friends ($r_S = 0.07, p = 0.05$) to quit smoking. Autonomous Motivation scores were related to SEQ-12 scores ($r_S = 0.13, p < 0.0005$); however, Controlled Motivation and Amotivation scores were not correlated with SEQ-12 scores ($r_S = 0.05, p = 0.18$; $r_S = -0.02, p = .63$, respectively).

Multivariable Analysis

Table 3 shows that longest time able to stay off cigarettes, Autonomous Motivation scores, and age were positively associated with SEQ-12 scores ($p = 0.001, p = 0.0008$, and $p < 0.0001$, respectively) after adjusting for other significant effects. PHQ-9 scores and FTND scores were negatively associated with SEQ-12 scores ($p < 0.0001$ and $p = 0.002$, respectively). Those ready to quit in the next 30 days had higher self-efficacy than those not ready ($p = 0.02$). Females had lower self-efficacy than males ($p = 0.04$). This model explains approximately 13% of the total variation in SEQ-12 scores ($R^2 = 0.13$).

DISCUSSION

This is the first study to examine self-efficacy among rural smokers. As in previous research with other populations, we found that higher self-efficacy is related to older age (Schnoll et al., 2005), length of longest abstinence (DiClemente, Prochaska, & Gibertini, 1985), and greater nicotine dependence (DiClemente, Prochaska, & Gibertini, 1985). Although number of cigarettes per day also was related to self-efficacy (DiClemente, Prochaska, & Gibertini, 1985; Willemsen et al., 1996), nicotine dependence was a better predictor of self-efficacy than number of cigarettes smoked per day in the present study. Furthermore, consistent with present findings, previous research (Etter, Prokhorov, & Perneger, 2002) reported that women had lower confidence in their ability to quit smoking but smoked fewer cigarettes per day (Females: $M = 21.9, SD = 10.1$; Males: $M = 26.2, SD = 10.5$; $p < .0001$). Our findings also support previous research showing that those closer to initiating a quit attempt report greater self-efficacy (Prochaska & DiClemente, 1984; Prochaska et al., 1991) and that those with depressive symptoms have lower self-efficacy (Haukkala et al., 2000). Given the increased prevalence of depression among smokers (Breslau, Kilbey, & Andreski, 1993) and the more numerous barriers to mental health care in rural areas, health care providers must be aware of the relationship between depression and low self-efficacy in order to gear their smoking cessation intervention strategies toward both treating depressive symptoms and increasing self-efficacy.

The current findings indicated that increased encouragement to quit smoking from family and friends was related to higher self-efficacy. Furthermore, this study found that having other smokers in the home and having more friends that smoke was related to less self-efficacy. Taken together, these findings highlight the positive impact of social support and the negative impact of the presence of other smokers on overall self-efficacy among rural smokers. Thus, health care providers may be able to impact self-efficacy of smokers by intervening on their potential support systems (e.g., encouraging smokers trying to quit to identify support systems, recommending home smoking restrictions).

The present study is the first we are aware of to find a relationship between self-efficacy and autonomous motivation (i.e., being motivated by choice and willingness to engage in a behavior). The ability to call upon personal reasons for refraining from smoking (e.g., "I feel

I want to take responsibility for my own health,” “I have carefully thought about it and believe it is very important for many aspects of my life”) may be an important strategy to increase self-efficacy among rural smokers. The ability to call upon controlled, external, or compliance-based reasons (i.e., “others would be upset with me”, “I’d feel guilty or ashamed”) appears to be significantly less important. Likewise, peer pressure, guilt, and other negative reinforcers may not be effective motivators in this population. Thus, health care providers may increase the self-efficacy of smokers by helping patients focus on positive reinforcers, such as their personal reasons and the positive aspects of their social environment. Moreover, helping patients to reframe their thinking about the perceived negative reinforcers to cessation and to identify personal reasons related to extrinsic motivators may be effective strategies for increasing self-efficacy.

The current study showed that the modal response to the items on the SEQ-12 was “Not very sure” or “More or less sure” of one’s ability to resist smoking in various situations. This held true for both the intrinsic and extrinsic subscales. Given that readiness to quit is highly related to self-efficacy, the fact that this study included smokers at all stages of readiness to quit may explain the relatively low level of self-efficacy in this sample.

The present study has important limitations. First, we did not assess for potential interactions influencing self-efficacy. These issues should be addressed in future studies after developing specific a priori hypotheses that might reduce the potential for identifying spurious relationships. Also, this sample of smokers seen in rural clinics may not be representative of all smokers in rural communities. This sample was predominantly white and may not represent rural smokers of other racial and ethnic groups. These participants also had access to regular medical care. Nevertheless, studies on this population can inform rural health care providers who have the opportunity to promote self-efficacy during regular clinic visits or during the diagnosis of a smoking-related illness. Health care providers also may assess for predictors of self-efficacy among their patients, such as level of nicotine dependence and the presence of social support, in order to better understand the patient’s health risk profile and the effectiveness of efforts to enhance self-efficacy.

Overall, self-efficacy is an important construct because of its relationship to successful smoking cessation. Because smoking is more prevalent and smoking cessation efforts face more challenges in rural areas, it is important to understand characteristics related to self-efficacy among rural smokers. By identifying patients at risk for low self-efficacy (e.g., heavy smokers, females) and by capitalizing on characteristics associated with high self-efficacy (e.g., autonomous motivation, social support), rural health care providers may be able to better enhance self-efficacy in their efforts to help smokers quit.

Acknowledgments

This study was supported by the National Cancer Institute (Grant 1102390) and was presented in part at the 2006 Society of Research on Nicotine and Tobacco Conference, Orlando, February, 2006.

REFERENCES

- American Cancer Society. Cancer facts and figures. American Cancer Society; Atlanta: 2006.
- Baer JS, Holt CS, Lichtenstein E. Self-efficacy and smoking reexamined: Construct validity and clinical utility. *Journal of Consulting and Clinical Psychology* 1986;54:846–852. [PubMed: 3794032]
- Bandura A. Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review* 1977;84:191–215. [PubMed: 847061]
- Bandura A. Self-efficacy mechanism in human agency. *American Psychologist* 1982;37:122–147.
- Bandura, A. Self-efficacy: The exercise of control. Freeman; New York: 1997.

- Bolman C, de Vries H. Psycho-social determinants and motivational phases of smoking behavior of cardiac inpatients. *Preventive Medicine* 1998;27(5 Pt 1):738–747. [PubMed: 9808806]
- Breslau N, Kilbey M, Andreski P. Nicotine dependence and major depression: New evidence from a prospective investigation. *Archives of General Psychiatry* 1993;50:31–35. [PubMed: 8422219]
- Carey KB, Carey MP. Changes in self-efficacy resulting from unaided attempts to quit smoking. *Psychology of Addictive Behaviors* 1993;7(4):219–224.
- Carey MP, Snel DL, Carey KB, Richards CS. Self-initiated smoking cessation: A review of the empirical literature from a stress and coping perspective. *Cognitive Therapy and Research* 1989;13:323–341.
- Condiotte MM, Lichtenstein E. Self-efficacy and relapse in smoking cessation programs. *Journal of Consulting and Clinical Psychology* 1981;49:648–658. [PubMed: 7287974]
- Coelho RJ. Self-efficacy and cessation of smoking. *Psychological Reports* 1984;54:309–310. [PubMed: 6718624]
- DiClemente CC. Self-efficacy and smoking cessation maintenance: A preliminary report. *Cognitive Therapy and Research* 1981;5:175–187.
- DiClemente CC, Prochaska JO, Fairhurst SK, Velicer WF, Velasquez MM, Rossi JS. The process of smoking cessation: An analysis of precontemplation, contemplation, and preparation stages of change. *Journal of Consulting and Clinical Psychology* 1991;59:295–304. [PubMed: 2030191]
- DiClemente CC, Prochaska JO, Gibertini M. Self-efficacy and the stages of self-change of smoking. *Cognitive Therapy and Research* 1985;9:181–200.
- Draper, NR.; Smith, H. *Applied Regression Analysis*. 3rd ed.. John Wiley & Sons, Inc.; New York, NY: 1998.
- Droomers M, Schrijvers CTM, Mackenbach JP. Educational differences in starting excessive alcohol consumption: Explanations from the longitudinal GLOBE study. *Social Science and Medicine* 2004;58(10):2023–2033. [PubMed: 15020017]
- Eberhardt, MS.; Ingram, DD.; Makuc, DM.; Pamuk, ER.; Freid, VM.; Harper, SB.; Schoenborn, CA.; Xia, H. *Urban and rural health chartbook*. National Center for Health Statistics; Hyattsville, MD: 2001.
- Etter JF, Bergman MM, Humair JP, Perneger TV. Development and validation of a scale measuring self-efficacy of current and former smokers. *Addiction* 2000;95(6):901–913. [PubMed: 10946439]
- Etter JF, Prokhorov AV, Perneger TV. Gender differences in the psychological determinants of cigarette smoking. *Addiction* 2002;97(6):733–743. [PubMed: 12084143]
- Fava JL, Velicer WF, Prochaska JO. Applying the transitional model to a representative sample of smokers. *Addictive Behavior* 1995;20:189–203.
- Garcia ME, Schmitz JM, Doerfler LA. A fine-grained analysis of the role of self-efficacy in self-initiated attempts to quit smoking. *Journal of Consulting and Clinical Psychology* 1990;58(3):317–322. [PubMed: 2365894]
- Gwaltney CJ, Shiffman S, Norman GJ, Paty JA, Kassel JD, Gnys M, Hickcox M, Waters AJ, Balabanis M. Does smoking abstinence self-efficacy vary across situations? Identifying context-specificity within the Relapse Situation Efficacy Questionnaire. *Journal of Consulting and Clinical Psychology* 2001;69:516–527. [PubMed: 11495181]
- Gulliver SB, Hughes JR, Solomon LJ, Dey AN. Self-efficacy and relapse to smoking in self-quitters. *Addiction* 1995;90:767–772. [PubMed: 7633293]
- Haaga DAF. Issues in relating self-efficacy to smoking relapse: Importance of an “Achilles’ heel” situation and of prior quitting experience. *Journal of Substance Abuse* 1990;2:191–200. [PubMed: 2136109]
- Harrell, FE. *Regression Modeling Strategies: With Applications to Linear Models, Logistic Regression, and Survival Analysis*. Springer-Verlag New York Inc.; New York, NY: 2001.
- Haukka A, Uutela A, Vartiainen E, McAlister A, Knekt P. Depression and smoking cessation: The role of motivation and self-efficacy. *Addictive Behaviors* 2000;25:311–316. [PubMed: 10795958]
- Heatherton TF, Kozlowski LT, Frecker RC, Fagerstrom KO. The Fagerstrom Test for Nicotine Dependence: A revision of the Fagerstrom Tolerance Questionnaire. *British Journal of Addiction* 1991;86:1119–1127. [PubMed: 1932883]

- John U, Meyer C, Rumpf HJ, Hapke U. Self-efficacy to refrain from smoking predicted by major depression and nicotine dependence. *Addictive Behaviors* 2004;29:857–866. [PubMed: 15219330]
- Kavanagh DJ, Pierce J, Lo SK, Shelley J. Self-efficacy and social support as predictors of smoking after a quit attempt. *Psychology and Health* 1993;8(4):231–242.
- Kroenke K, Spitzer RL. The PHQ-9: A new depression diagnostic and severity measure. *Psychiatric Annals* 2002;32(9):509–613.
- McIntyre KO, Lichtenstein E, Mermelstein RJ. Self-efficacy and relapse in smoking cessation: A replication and extension. *Journal of Consulting and Clinical Psychology* 1983;51(4):632–633. [PubMed: 6619375]
- McMillen R, Breen J, Cosby AG. Rural-urban differences in the social climate surrounding environmental tobacco smoke: A report from the 2002 Social Climate Survey of Tobacco Control. *Journal of Rural Health* 2004;20(1):7–16. [PubMed: 14964923]
- Mothersill KJ, McDowell I, Roses W. Subject characteristics and long-term post-program smoking cessation. *Addictive Behaviors* 1988;13(1):29–36. [PubMed: 3364221]
- National Rural Health Association. What's different about rural health care?. 2006. Retrieved from <http://www.nrharural.org/about/sub/different.html> on May 2, 2006
- Prochaska JO, DiClemente CC. Self-change processes, self-efficacy and decisional balance across five stages of smoking cessation. *Advances in Cancer Control: Epidemiology and Research* 1984:131–140.
- Prochaska JO, Velicer WF, Guadagnoli E, Rossi JS. Patterns of change: Dynamic typology applied to smoking cessation. *Multivariate Behavioral Research* 1991;27:83–107.
- Schnoll RA, Miller SM, Wang H, Babb JS, Cornfeld MJ, Higman-Tofani SH, Henigan-Peel T, Balshem A, Slater E, Ross E, Boyd S, Engstrom PF. Change in smoking behavior at the worksite following a cancer risk feedback intervention: A pilot study. *American Journal of Health Behavior* 2005;29(3):215–227. [PubMed: 15899685]
- Scott LD, LaSala KB, Lyndaker CZ, Neil-Urban S. Smoking cessation practices of rural and urban health care providers. *Online Journal of Rural Nursing and Health Care* 2003;3(2)
- Sorensen G, Emmons K, Stoddard AM, Linnan L, Avrunin J. Do social influences contribute to occupational differences in quitting smoking and attitudes toward quitting? *American Journal of Health Promotion* 2002;16(3):135–141. [PubMed: 11802258]
- Stuart K, Borland R, McMurry N. Self-efficacy, health locus of control, and smoking cessation. *Addictive Behaviors* 1994;19:1–12. [PubMed: 8197887]
- Vernon JD, Crane LA, Prochaska AV, Fairclough D, MacKenzie TD. Smokers hospitalized in an urban, public hospital: Addiction, stages of change, and self-efficacy. *Preventive Medicine* 1999;28:488–495. [PubMed: 10329339]
- Willemsen MC, de Vries H, van Breukelen G, Oldenburg B. Determinants of intention to quit smoking among Dutch employees: The influences of the social environment. *Preventive Medicine* 1996;25(2):195–202. [PubMed: 8860285]
- Williams, GC.; Ryan, RM.; Deci, EL. Health-Care, Self-Determination Theory Packet. 2004. Retrieved June 10, 2004 from <http://www.psych.rochester.edu/SDT/measures/health.html>
- Wojcik JV. Social learning predictors of the avoidance of smoking relapse. *Addictive Behaviors* 1988;13:177–180. [PubMed: 3369326]
- Yates AJ, Thain J. Self-efficacy as a predictor of relapse following voluntary cessation of smoking. *Addictive Behaviors* 1985;10(3):291–298. [PubMed: 4083105]

Table 1

Characteristics of study participants and bivariate analyses of the relationship between patient characteristics and smoking abstinence self-efficacy

Characteristics	Average Self-Efficacy scores among patients with characteristic		
	<i>N</i> (%)	Mean	<i>p</i>
Overall	750 (100%)	--	
Gender** ^a			
Females	439 (58.5)	32.0	.01
Males	311 (41.5)	34.1	
Ethnicity			
White	666 (88.6)	31.1	.11
Not white	84 (11.4)	33.1	
Annual Income*			
≤40K	453 (61.4)	32.3	.047
>40K	285 (38.6)	33.9	
Education			
≤HS	385 (51.3)	32.4	.22
>HS	365 (48.7)	33.4	
Employment Status			
Employed	503 (67.1)	33.1	.35
Unemployed	247 (32.9)	32.4	
Marital Status			
Married or living with partner	504 (67.2)	33.0	.56
Not married or living with partner	246 (32.8)	32.6	
Partner's smoking status ^a			
Smoking partner	309 (41.2)	32.6	.49
Other	441 (58.8)	33.1	
Other smokers in the home*			
Yes	345 (46.0)	32.0	.045
No	405 (54.0)	33.6	
Children under age 6 in home			
Yes	106 (14.1)	31.7	.24
No	644 (85.9)	33.1	
Readiness to quit in the next 30 days**			
Yes	587 (78.3)	33.4	.008
No	163 (21.7)	30.9	
Readiness to quit in the next 6 months*			
Yes	681 (90.8)	33.2	.03
No	68 (9.2)	30.3	
Previously used NRT			
Yes	397 (52.9)	33.3	.22

**Average Self-Efficacy scores
among patients with characteristic**

Characteristics	N (%)	Mean	<i>p</i>
No	353 (47.1)	32.4	
Previously used Zyban			
Yes	245 (32.7)	33.2	.58
No	505 (67.3)	32.7	
Comorbid Conditions			
Diabetes*			
Yes	101 (13.5)	35.3	.01
No	649 (86.5)	32.5	
Hypertension			
Yes	258 (34.4)	33.4	.39
No	492 (65.6)	32.6	
High cholesterol			
Yes	269 (35.9)	33.5	.25
No	481 (64.1)	32.5	
Stroke			
Yes	34 (4.5)	34.1	.51
No	716 (95.5)	32.8	
Chronic lung disease			
Yes	202 (26.9)	32.6	.63
No	548 (73.1)	33.0	
Heart disease			
Yes	73 (9.7)	33.6	.52
No	677 (90.3)	32.8	
Cancer			
Yes	37 (4.9)	33.1	.91
No	713 (95.1)	32.9	

The Pooled method was used for most analyses due to equal variances between the groups.

Note: 12 cases are missing annual income data. One case is missing data regarding readiness to quit in the next 6 months.

^a indicates that the Satterthwaite method was used due to unequal variances between the groups.

Table 2

Correlations of smoking abstinence self-efficacy to demographics, smoking characteristics, social environment, motivation, and depression

Variable	Correlation to Self-Efficacy	
	<i>r</i>	<i>p</i>
Self-efficacy	--	--
Internal subscale ^a	.90	<.0001
External subscale ^a	.91	<.0001
Age ^a	.16	<.0001
Age at smoking initiation	.07	.06
CPD	-.07	.05
Nicotine dependence ^a	-.14	<.0001
Number of previous quits	.05	.14
Length of longest quit	.15	<.0001
Number of smoking friends ^a	-.13	.0005
Family encouragement ^a	.10	.008
Friend encouragement ^a	.07	.045
Autonomous motivation	.13	.0005
Controlled motivation ^a	.05	.18
Amotivation	-.02	.63
Depression	-.19	<.0001

Spearman *r* was used for most analyses.

Note: Self-efficacy assessed using the SEQ-12. Nicotine dependence assessed using the FTND. Autonomous motivation, controlled motivation, and amotivation assessed using the TSRQ. Depression assessed using the PHQ-9. The Internal and External SEQ-12 subscales correlated with a Pearson *r* of .64 (*p* < .0001).

^a indicates Pearson *r* was used.

Table 3

Factors associated with smoking abstinence self-efficacy among 750 rural smokers using multivariate logistic regression with stepwise entry

Variables	Parameter estimate	Standard error	<i>p</i>
Depression	−.30	.07	<.0001
Length of longest quit	.71	.21	.001
Autonomous motivation	.19	.06	.0008
Age	.13	.03	<.0001
Nicotine dependence	−.57	.18	.002
Readiness to quit in next 30 days	2.27	.96	.02
Female	−1.60	.77	.04

Note: Depression scores assessed using the PHQ-9. Autonomous motivation assessed using the TSRQ. Nicotine dependence assessed using the FTND.

* The model accounts for 13.0% of the variance in smoking abstinence self-efficacy ($N = 750$).