

Secondary Smoking Prevention in a University Setting: A Randomized Comparison of an Experiential, Theory-Based Intervention and a Standard Didactic Intervention for Increasing Cessation Motivation

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Objective: College may represent an untapped opportunity to reach the growing number of student smokers who are at risk of progressing toward regular smoking. The aim of this study was to test the efficacy of a theory-based experiential intervention for increasing motivation to quit smoking and reducing smoking behavior. **Design:** This study used a 3-arm, randomized design to examine the efficacy of an experiential secondary prevention intervention. The control groups included a traditional didactic smoking intervention and an experiential intervention on nutrition. **Main Outcome Measures:** The 2 primary dependent variables were change in self-reported intention to quit smoking, measured pre- and postintervention, and change in smoking behavior over the month following the intervention. **Results:** As hypothesized, the experiential smoking intervention was more effective than either control group in increasing immediate motivation to quit, but the effect was found only among female participants. At 1-month follow-up, both smoking interventions produced higher rates of smoking cessation and reduction than did the nutrition control condition. **Conclusion:** Findings support the potential efficacy of an intensive experiential intervention for female smokers.

Keywords: tobacco, college smokers, intervention, smoking, motivation to quit

The increase in adolescent smoking among middle school and high school students has reached the college population (Wechsler, Rigotti, Gledhill-Hoyt, & Lee, 1998). In fact, the young-adult years (ages 18–24) have the highest prevalence of smoking (Anthony & Echeagaray-Wagner, 2000), and nearly one third of college students report being current smokers (Rigotti, Lee, & Wechsler, 2000). While a substantial effort has been directed toward preventing tobacco use among adolescents, little attention has been paid to those who have already begun smoking. Although primary prevention efforts have been viewed as the ultimate goal of tobacco control efforts, secondary prevention (i.e., treatment of early-stage tobacco use and dependence) also deserves attention.

College-age youths represent the youngest population that the tobacco industry is legally able to target, making college students especially vulnerable to marketing strategies used to facilitate addiction (Rigotti, Moran, & Wechsler, 2005). For example, cigarettes are marketed to college students as a way to ease the stress

caused by the transition from the teen years to adulthood (Ling & Glantz, 2002).

College students have smoking behaviors that are more entrenched than those of young adolescents. Those who started smoking before college become heavier smokers as young adults (Centers for Disease Control and Prevention, 2001). Nevertheless, they smoke at a rate lower than that of older adult smokers. Among current college smokers, 32% smoke less than one cigarette per day, and only 13% smoke more than a pack per day (Rigotti et al., 2000). Fluctuations in smoking behavior over the college years suggest that their behavior may be more malleable than that of older adult smokers (Wetter et al., 2004). In addition, college students' cognitive outcome expectancies about the effects of smoking are less specific and developed (Brandon & Baker, 1991; Copeland, Brandon, & Quinn, 1995). Unlike the decline in illicit drug use and drinking that typically occurs after college (Gotham, Sher, & Wood, 1997), smoking tends to persist through adulthood (Breslau & Peterson, 1996), underscoring the need for a timely intervention. Thus, college represents a transitional period for smoking, creating a unique window of opportunity for smoking interventions.

Despite public health campaigns, smokers continue to underestimate the health consequences of long-term tobacco use (Weinstein, Marcus, & Moser, 2005). Students wrongly believe the number of homicides and cocaine-related deaths exceeds the number of tobacco-related deaths (Giapopassi & Vandiver, 1999), and they deny any symptoms related to smoking while at the same time reporting respiratory difficulties such as shortness of breath or persistent cough (Prokhorov et al., 2003). Colleges themselves minimize the consequences of smoking, as some allow smoking in residence rooms and tobacco to be purchased on meal cards

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(Gardiner, 2002). Over half of surveyed colleges reported offering smoking cessation programs but report little use of these resources (Wechsler, Kelley, Siebring, Kuo, & Rigotti, 2001). Students appear not to be motivated to seek out typical cessation programs; therefore, more creative and proactive secondary prevention efforts are needed. To date, most research on college student smoking can be characterized as either descriptive in nature, using college students as a sample of convenience, or uncontrolled feasibility studies (e.g., Obermayer, Riley, Asif, & Jean-Mary, 2004). Indeed, there has been a lack of systematic research aimed at developing interventions specifically for college student smokers.

The present study tests an experiential intervention based on theories and empirical research from the social psychology literature on attitude and behavior change. Research suggests that experiential, or active, learning is more likely to produce enduring changes in attitudes and behavior than is more traditional didactic instruction (Miller, Wozniak, Rust, Miller, & Slezak, 1996; Onion & Bartzokas, 1998; Viswesvaran & Schmidt, 1992). That is, information must be delivered in a manner more effective than the typical didactic, noninteractive methods that passively relay information (e.g., pamphlets, videos). An example of an experiential intervention for college students is the alcohol expectancy challenge paradigm used by Darkes and Goldman (1993, 1998). In this intervention, college students are given either alcohol or placebo beverages (or if they are underage, they observe others drinking the beverages) prior to an opportunity for a social interaction. They then are asked to guess which students had received alcohol versus placebo, and they subsequently discover that their guesses are no better than chance. This procedure has been found to reduce subsequent drinking among participants. The lack of a high-quality placebo cigarette and the fact that smokers' expectancies appear to reflect more accurately the effects of the drug make this paradigm unfeasible as a tobacco intervention. However, the experiential, active learning characteristics of the intervention serve as a model for the current study.

Prior research has suggested that presenting smokers with risk information may not be an effective strategy because smokers use cognitive dissonance reducing techniques (Festinger, 1957) to discount the personal relevance of the messages offered by the intervention (e.g., Halpern, 1994; Jenks, 1992; McMaster & Lee, 1991). Dissonance theory is relevant because smokers are continually exposed to health risk information, and this awareness of risk is inconsistent with continued smoking, thus resulting in psychological discomfort that they are motivated to reduce. On the basis of dissonance theory, smokers can reduce such dissonance by changing their behavior (quitting smoking), by misinterpreting or ignoring information that increases dissonance, or by adding new cognitions that are consonant with the behavior. That is, smokers may claim that they are so addicted to smoking that their behavior is "out of their hands" (Jenks, 1992) or may contend the positive effects of smoking are worth the risks. In line with dissonance theory, smokers endorsed a greater number of rationalizations for smoking than nonsmokers and ex-smokers, despite an equal level of factual knowledge (McMaster & Lee, 1991). Nearly half of the smokers in their sample endorsed the following statements: "Smokers can usually tell if they are being harmed by cigarettes" and "Smokers can totally reverse damage to their health by deciding to give up smoking." Similarly, consistent with a cognitive

dissonance interpretation, the magnitude of risk denial was positively associated with magnitude of smoking (Dawley, Fleisher, & Dawley, 1985; Halpern, 1994).

Cognitive dissonance theory has been applied to health-related interventions. Stone, Aronson, Crain, Winslow, and Fried (1994) used principles from dissonance theory to encourage the adoption of safe-sex practices among college students. Specifically, they induced hypocrisy by asking participants to write proattitudinal speeches advocating condom use while being reminded of their own failure to use condoms in the past. Participants were also videotaped, requiring them to make a public commitment toward condom use. These participants subsequently purchased significantly more condoms than those in a control condition.

In a preliminary study exploring the application of a dissonance-enhancing intervention for college smokers, Simmons, Webb, and Brandon (2004) randomly assigned 144 smokers to four conditions in a 2×2 factorial design. Participants were asked to prepare a counterattitudinal essay about (Factor 1) the risks of smoking and/or (Factor 2) the feasibility of quitting smoking. Participants in a control condition wrote essays about the history of tobacco. Participants then read the essay to a video camera and were told that their video would be used as an intervention for adolescent smokers. The primary experimental finding was a significant interaction between the two factors on intentions to quit smoking, such that either manipulation increased intentions, but their effects were not additive. The primary correlational finding was that, as hypothesized, degree of cognitive dissonance was associated with intentions to quit smoking. The findings from that study suggested that attitudes and intentions to quit smoking can be influenced by a brief experiential intervention. The current study extends this line of research by increasing the potency of the social psychological elements and including a follow-up measure of smoking behavior. The primary aim of the present study was to test the efficacy of a theory-based experiential intervention for increasing motivation to quit smoking and reducing smoking behavior.

Method

Experimental Design and Hypothesis

The three conditions included the experiential smoking intervention (exp-smoke) and two control conditions. The first control condition, standard didactic smoking intervention (standard), represented a traditional educational smoking intervention and allowed us to test if the experiential, theory-based intervention was more effective than a typical didactic intervention. The second control condition, the experiential nutrition intervention (exp-nutrition), comprised an experiential intervention on diet and nutrition, thus providing a health-related comparison condition while controlling for the experiential component itself and for the multiple assessments. The two primary dependent variables were change in self-reported intention to quit smoking, measured pre and postintervention, and change in smoking behavior over the month following the intervention. We hypothesized that the exp-smoke intervention would produce the greatest changes in cessation motivation and behavior as compared with the control groups. Secondary dependent variables examined as potential mediators included risk perceptions, smoking-related outcome expectancies, cognitive dissonance, and smoking-related knowledge. Demo-

graphic and smoking history variables were examined as possible moderators.

Participants

Students who self-identified as smokers on a screening questionnaire distributed in classrooms and through freshman orientation sessions at the University of South Florida from February 2003 to July 2003 were contacted and screened by telephone for inclusion criteria: 18–24 years of age, able to speak and read English, and smoking five or more cigarettes per week. Smoking status was assessed by one of a series of questions on the screening questionnaire, thus masking the focus of the study and preventing participants from determining why they were eligible. We found

287 smokers who met inclusion criteria and agreed to participate, and 215 (136 female, 79 male) arrived for their scheduled appointment and were then randomized to intervention condition, constituting the final sample (Figure 1). This sample size yielded power of .80 to detect group differences with small to medium effect sizes (Cohen, 1988).

Measures

Smoking Status Questionnaire. This instrument was used to ascertain current smoking status. The Smoking Status Questionnaire included the Fagerström Test for Nicotine Dependence (FTND; Heatherton, Kozlowski, Frecker, & Fagerström, 1991), the standard measure of nicotine dependence.

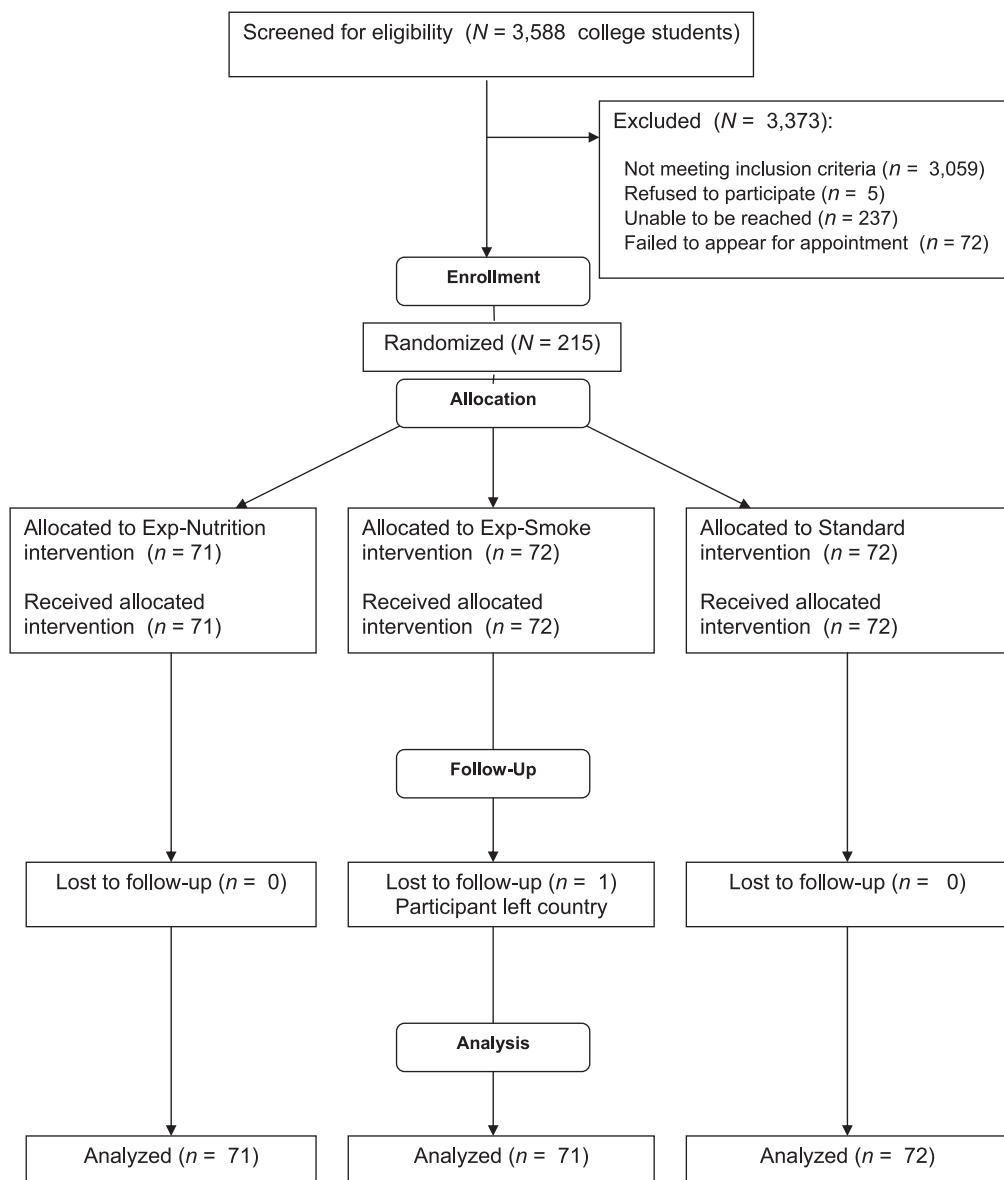


Figure 1. Participant flow diagram. Exp-nutrition = experiential nutrition intervention; exp-smoke = experiential smoking intervention; standard = standard didactic smoking intervention.

Contemplation Ladder (Biener & Abrams, 1991). As our primary dependent variable, the Contemplation Ladder is a continuous measure of motivation to quit smoking and comprises 10 rungs ranging from *no thoughts of quitting* to *taking action to quit*. Participants circle the number on the ladder that best indicates where they are in terms of thinking about quitting. Evidence for the Contemplation Ladder as a predictor of smoking cessation has been established (Biener & Abrams, 1991; Herzog, Abrams, Emmons, & Linnan, 2000). This instrument was administered at baseline, immediately after the intervention, and at 1-month follow-up.

Stages of Change Questionnaire (Prochaska & DiClemente, 1983). As a secondary measure of intention to quit, the Stages of Change Questionnaire consists of a three-item measure of quitting motivation that has predicted both attempts to quit smoking and actual cessation (DiClemente et al., 1991). It was administered after the intervention and at the 1-month follow-up.

Risk Perception Questionnaire. There is currently no single measurement tool that can be used to assess smoking risk perceptions (see Weinstein, 1998). In the current study, risk was assessed by the Risk Perception Questionnaire, asking participants about their likelihood of developing six smoking-related diseases (e.g., lung cancer, emphysema) using a 7-point Likert scale from 1 (*extremely unlikely*) to 7 (*extremely likely*). Two additional questions asked about participants' perceived overall chance of developing a smoking-related disease. A significant difference in smoking risk perception was found between intervention groups when using this question in a prior study (Simmons et al., 2004).

Smoking Consequences Questionnaire (SCQ; Brandon & Baker, 1991). The SCQ was developed for college students and measures smoking-related outcome expectancies on four factors: Positive Reinforcement/Sensory Satisfaction, Negative Reinforcement/Negative Affect Reduction, Appetite/Weight Control, and Negative Consequences. Coefficient alpha reliabilities for the four scales ranged from .91 to .96. The SCQ measured changes in outcome expectancies due to the interventions.

Dissonance Thermometer (Devine, Tauer, Barron, Elliot, & Vance, 1999; Elliot & Devine, 1994). This 14-item instrument measures affective discomfort associated with cognitive dissonance. Participants were asked to indicate how they are feeling "right now" on a 7-point Likert scale from 1 (*does not apply at all*) to 7 (*applies very much*). Prior research has found the measure to be reliable and predictive of intentions to quit smoking (Simmons et al., 2004) and has indicated that the 3-item Discomfort factor (uncomfortable, uneasy, and bothered) represents a distinct affective consequence of dissonance induction.

Test of Smoking Knowledge. To measure how well participants retained smoking information, we administered a 10-item multiple-choice Test of Smoking Knowledge that was developed for this study based on the factual information that participants were exposed to in both smoking interventions.

Behavioral measure. As an immediate behavioral measure of movement toward smoking cessation, smoking cessation pamphlets were placed at the exit of the experimental room, and the number of pamphlets taken by each group of participants following the intervention was recorded.

Summary of Assessment Procedures

At baseline, participants completed the demographic questionnaire and the Contemplation Ladder. Postintervention measures included the Risk Perception Questionnaire, Smoking Status Questionnaire, Smoking Consequences Questionnaire, Dissonance Thermometer, Contemplation Ladder, Stages of Change Questionnaire, and Test of Smoking Knowledge. Comparable nutrition-focused questionnaires were also administered to everyone, consistent with the cover story. As participants exited the study, the number of smoking cessation pamphlets picked up was recorded. One month later, participants were called, and the timeline follow-back procedure (Sobell & Sobell, 1992) was used to recreate their daily smoking behavior. The Contemplation Ladder and Stages of Change Questionnaire were given verbally.

Intervention Conditions

Participants were scheduled for appointments in groups of 3–8. Immediately prior to the start of each group, the experimenter opened a concealed envelope (prepared at the start of the study) revealing its random assignment to intervention condition. The duration of each intervention type was approximately 60–90 min. Participants were paid \$20.

Experiential smoking intervention (exp-smoke). Upon participants' arrival, we obtained informed consent by telling participants that the purpose of the study was to develop new approaches to health promotion to be used with high school students. Participants randomized to the exp-smoke condition were told the goal of the project was to create a series of health videos for high school seniors on a variety of health-related topics. Research suggests that attitude change is greatest when individuals believe that they chose to engage in the dissonance-enhancing (hypocritical) behavior (e.g., Harmon-Jones, 2000; Zanna & Cooper, 2000). By asking participants questions such as "Remember, your participation is completely *voluntary*, are you sure you would like to participate?" we emphasized free choice (Wenzlaff & LePage, 2000). Participants were told that they had the choice to discuss tobacco smoking or proper diet and nutrition; however, the experimenter led the group to choose the tobacco topic by stating the following:

We have two topics left to cover: nutrition and smoking. Since I see here that you all are smokers, and we need more smoking videos, it would be nice if you chose the smoking topic, however, the decision is entirely up to you. Which topic do you want to do?

The goal of these strategies was to foster an appearance of choice and allow participants to feel that they were making the decision.

After the tobacco topic was "chosen," participants engaged in a discussion of smoking-related topics (e.g., health risks of smoking, high costs of cigarettes). To generate discussion, we handed participants a list of 15 points that they were asked to incorporate into the discussion. They were also given the freedom to add comments that they felt would convince high school students to quit smoking.

Having participants publicly advocate beliefs that are clearly inconsistent with their own behavior (e.g., having current smokers state the hazards of smoking) induces hypocrisy that can motivate behavior change (e.g., Eitel & Friend, 1999; Leake, Friend, & Wadhwa, 1999). The delivery of the speech on video induces a public commitment and has proved to be an effective tool in

attitude change (e.g., Dickerson, Thibodeau, Aronson, & Miller, 1992). Thus, the discussion was videotaped and played back for participants to view. **Cognitive dissonance theory (Festinger, 1957) posits that as people experience psychological discomfort (which results from feeling one is being hypocritical), they will be motivated to reduce this discomfort by changing their attitudes and/or behavior (Draycott & Dabbs, 1998).**

Experiential nutrition intervention (exp-nutrition). The procedures were identical to the exp-smoke condition except that the group was guided to choose to make the nutrition-related video.

Standard didactic smoking intervention (standard). Participants were shown an antismoking video (*Butt-Out: The Proven Quit Smoking Plan*, by the American Cancer Society and American Lung Association) followed by a question-and-answer session with the experimenter.

Follow-Up and Debriefing

One month after the intervention, we reached all but 1 participant with a follow-up call to assess smoking status. Participants were paid \$15 for the call and were debriefed. They were told that because we were in the early stages of the research, their tape would not be shown to high school students.

Results

Participants averaged 20.2 years of age ($SD = 1.7$); they smoked a mean 55.4 cigarettes per week ($SD = 45.9$) for 3.4 years ($SD = 2.3$) and had a mean FTND score of 2.0 ($SD = 2.6$). Eighty-three percent of the sample was Caucasian. Participants were randomly assigned to the exp-smoke ($n = 72$), exp-nutrition ($n = 71$), and standard ($n = 72$) conditions. A series of one-way analyses of variance and chi-square analyses indicated group equivalence on all demographic and smoking history variables.

Readiness to Quit Smoking

Table 1 depicts unadjusted Contemplation Ladder scores at baseline, postintervention, and 1-month follow-up. To investigate

differences between intervention groups with respect to readiness to quit, we conducted analyses of covariance (ANCOVAs) with baseline scores as a covariate; adjusted means are reported in subsequent analyses.

As predicted, after controlling for baseline scores, a difference in postintervention Contemplation Ladder scores was found across conditions, $F(2, 211) = 15.61, p < .001$. Specifically, immediately following the intervention, participants in the exp-smoke condition reported higher intentions to quit smoking than participants in the exp-nutrition condition ($M = 6.99$ vs. $M = 5.85$), $F(1, 140) = 30.25, p < .001, \eta^2 = .178$, and standard condition ($M = 6.96$ vs. $M = 6.27$), $F(1, 141) = 8.38, p = .004, \eta^2 = .056$. Participants in the standard condition reported greater readiness to quit smoking than participants in the exp-nutrition condition ($M = 6.49$ vs. $M = 6.08$), $F(1, 140) = 6.57, p = .011, \eta^2 = .045$.

At 1 month following the intervention, there remained a significant difference between groups with respect to readiness to quit, $F(2, 210) = 15.18, p < .001$. Specifically, participants in the exp-smoke and standard conditions continued to report higher intentions to quit smoking as compared with the exp-nutrition condition ($ps < .001, \eta^2 = .187, \eta^2 = .098$, respectively). Although participants in the exp-smoke condition continued to report greater readiness to quit as compared with the standard condition ($M = 7.52$ vs. $M = 7.10$), the difference was no longer significant at 1-month follow-up ($p = .233$).

Exploratory analyses were conducted to examine whether the observed relationship between condition and readiness to quit was moderated by demographic or smoking variables. Tested moderators included age, education, grade point average, cigarettes per week, Fagerström scores, and gender. Results demonstrated that only gender met criteria for moderation. Specifically, the significant interaction term of condition and gender suggested that gender acted as a moderator of the relationship between condition and motivation to quit, $F(2, 209) = 5.90, p = .003$. As can be seen in Figure 2, only among female participants did the exp-smoke condition produced greater change in readiness to quit than the standard and exp-nutrition conditions.

Table 1
Contemplation Ladder Scores Across Time, Unadjusted Means

Sample and condition	Preintervention		Postintervention		1-month follow-up	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Full sample						
Exp-smoke	5.47	3.02	6.76 _a	2.67	7.42 _a	2.44
Standard	6.00	2.24	6.47 _b	2.20	7.19 _a	2.07
Exp-nutrition	6.06	2.86	6.10 _c	2.82	5.82 _b	2.50
Women						
Exp-smoke	5.02	2.94	6.72 _a	2.54	7.50 _a	2.31
Standard	6.10	1.98	6.56 _b	2.00	7.45 _a	1.97
Exp-nutrition	5.87	2.86	5.89 _c	2.80	5.64 _b	2.57
Men						
Exp-smoke	6.32	3.04	6.80 _a	2.94	7.28 _a	2.73
Standard	5.86	2.63	6.32 _a	2.50	6.78 _{a,b}	2.20
Exp-nutrition	6.38	2.88	6.46 _a	2.90	6.11 _b	2.39

Note. Within columns, means with different subscripts showed significant differences, controlling for preintervention scores. Exp-smoke = experiential smoking intervention; standard = standard didactic smoking intervention; exp-nutrition = experiential nutrition intervention.

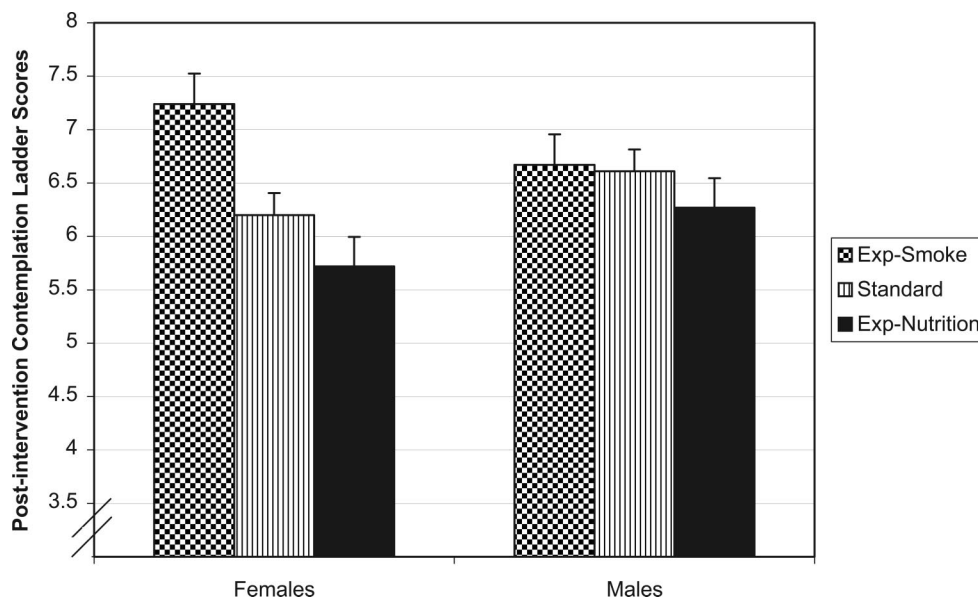


Figure 2. Mean postintervention Contemplation Ladder scores by gender, controlling for preintervention ladder scores. Exp-smoke = experiential smoking intervention; exp-nutrition = experiential nutrition intervention; standard = standard didactic smoking intervention.

Because of this moderator effect of gender, a series of ANCOVAs was conducted within gender to examine differences across condition in readiness to quit. After controlling for baseline scores, we found a significant difference in postintervention Contemplation Ladder scores for female participants, $F(2, 132) = 16.45$, $p < .001$, but not for male participants, $F(2, 75) = 1.09$, $p = .341$. Pairwise comparisons indicated that female participants in the exp-smoke condition reported higher intentions to quit smoking following the intervention than female participants in the standard condition ($M = 7.10$ vs. $M = 6.17$), $F(1, 88) = 8.60$, $p = .004$, $\eta^2 = .089$, and exp-nutrition condition ($M = 7.07$ vs. $M = 5.53$), $F(1, 89) = 34.28$, $p < .001$, $\eta^2 = .278$. Female students in the standard condition also reported higher postintervention ladder scores than female students in the exp-nutrition condition, $F(1, 86) = 4.11$, $p = .046$, $\eta^2 = .046$.

Because of the robust gender effect observed following the intervention, analyses were also conducted within gender at 1-month postintervention. Once again, a significant difference was found for female participants in Contemplation Ladder scores, $F(2, 131) = 15.43$, $p < .001$, but ladder scores did not differ for male participants across conditions, $F(2, 75) = 1.97$, $p = .146$. At 1 month following the intervention, female participants in the exp-smoke and standard conditions continued to report higher intentions to quit as compared with the exp-nutrition condition ($ps < .001$, $\eta^2 = .249$, $\eta^2 = .153$, respectively). Although female participants in the exp-smoke condition also reported higher intentions to quit as compared with the standard condition ($M = 7.70$ vs. $M = 7.24$), the difference was no longer significant 1-month postintervention ($p = .278$).

Stage of Change Movement

Stage of change was assessed as a secondary measure of cessation motivation at postintervention and 1-month follow-up. No

group differences were found at postintervention. To examine change between postintervention and follow-up, we categorized participants as having *advanced* if they progressed at least one stage between these assessment points, *regressed* if they moved back at least one stage, or *stable* if there was no stage movement. As expected, stage movement was significantly different among the three intervention groups, Kruskal-Wallis $\chi^2(2, N = 209) = 17.67$, $p < .001$. A greater proportion of participants in the exp-smoke group (37.7%) advanced in their motivation to quit than those in the exp-nutrition (10.0%, $p < .001$) or standard group (22.9%, $p = .008$). No significant difference was observed between the standard and exp-nutrition conditions ($p = .092$).

Stage of change movement was also examined by gender. For female participants, stage distributions were significantly different among the intervention groups, Kruskal-Wallis $\chi^2(2, N = 132) = 22.45$, $p < .001$; however, no significant difference was observed for male participants, $\chi^2(2, N = 77) = .461$, $p = .794$. Pairwise comparisons indicated that more female participants in the exp-smoke group (44.4%) advanced in their motivation to quit than those in the exp-nutrition (6.7%) or standard group (21.4%; $ps < .001$). Again, there were no significant differences in stage movement between the standard and exp-nutrition conditions ($p = .106$).

Behavioral Measure

As an immediate behavioral measure of impact, the number of quit-smoking pamphlets picked up following each intervention was recorded. As hypothesized, the proportion of participants who took pamphlets was significantly different across conditions, $\chi^2(2, N = 215) = 8.47$, $p = .014$. Specifically, a greater proportion of individuals from exp-smoke picked up a pamphlet on smoking cessation (46%) following the intervention than did those in the standard (29%), $\chi^2(1, N = 144) = 4.27$, $p = .039$, or exp-nutrition (24%), $\chi^2(1, N = 143) = 7.53$, $p = .006$, group. The difference

between the control conditions was not significant. Because of the nature of this measure, we were unable to test for gender effects.

Smoking Cessation and Reduction at 1-Month Follow-Up

To investigate the influence of our intervention on smoking behavior, we conducted chi-square analyses to examine differences between intervention groups in the proportion of participants who reportedly quit smoking or reduced their smoking rate 1 month following the intervention. Successful cessation was defined using the standard 7-day point prevalence abstinence criteria (i.e., no smoking on the 7 consecutive days prior to follow-up; Hughes et al., 2003). Analyses revealed that there was a significant difference among groups in the proportion of those who quit smoking, $\chi^2(2, N = 214) = 6.55, p = .038$. A greater proportion of participants in the exp-smoke intervention group (9.9%) and standard group (12.5%) quit smoking as compared with the exp-nutrition group (1.4%), $\chi^2(1, N = 142) = 4.77, p = .029$ and $\chi^2(1, N = 143) = 6.76, p < .009$, respectively. The exp-smoke and standard conditions did not differ in quit rates ($p = .616$). No gender differences were found in cessation rates across conditions.

We were also interested in examining changes in smoking behavior more broadly to include a reduction in smoking rate. At 1-month follow-up, a significant difference was observed across groups in the proportion of participants who reported that they had either quit smoking or reduced the number of cigarettes smoked, $\chi^2(2, N = 214) = 14.96, p = .001$. A greater proportion of participants in the exp-smoke condition reported quitting or cutting down as compared with the exp-nutrition condition (67.6% vs. 35.2%), $\chi^2(1, N = 142) = 14.91, p < .001$. Participants in the standard condition reported a greater reduction in smoking than those in the exp-nutrition condition as well (52.8% vs. 35.2%, $p = .034$). The difference in proportions between the exp-smoke and standard conditions approached significance (67.6% vs. 52.8%, $p = .07$). Results were also examined by gender. Among female but not male participants, a significant difference was observed among groups in the proportion of participants who reportedly reduced the number of cigarettes smoked, $\chi^2(2, N = 135) = 13.66, p = .001$. Pairwise comparisons indicated that female participants in the exp-smoke and standard conditions reported a greater reduction in smoking than the exp-nutrition condition (69.6%

vs. 31.3%, $p < .001$; 54.5% vs. 31.3%, $p = .026$, respectively). Although a greater percentage of female participants in the exp-smoke condition reported a reduction in smoking as compared with the standard condition (69.6% vs. 54.5%), the difference was not significant ($p = .142$).

Process Measures and Mediation Analyses

In addition to assessing changes in smoking motivation and behavior, we examined differences on potential mediating variables. As can be seen in Table 2, significant differences were observed across groups in smoking knowledge, negative consequence smoking expectancies, and dissonance affect. Results for smoking knowledge and the negative consequence expectancies were in the expected direction. That is, compared with participants in both the exp-nutrition and standard conditions, participants in the exp-smoke condition demonstrated greater smoking knowledge and reported stronger negative consequence expectancies following the intervention ($ps < .001$). In addition, both smoking interventions produced greater levels of dissonance-related affect as compared with the exp-nutrition condition ($ps < .01$). No difference was found in risk perception. We also tested whether gender interacted with any of these potential mediating variables, but no interactions were found.

Using the guidelines outlined by Baron and Kenny (1986), smoking-related knowledge, risk perceptions, dissonance, and smoking-related outcome expectancies were examined as potential mediators. None of the tested mediators satisfied criteria for mediation. Mediation analyses conducted separately for female participants also failed to meet requirements for mediation.

Discussion

To date, there has been a dearth of smoking cessation interventions designed to assist the alarmingly high number of college student smokers (Patterson, Lerman, Kaufman, Neuner, & Audrain-McGovern, 2004). The current study tested an experiential intervention among college smokers. Overall, the findings were encouraging, at least with regard to female smokers. On every one of the six outcome measures (posttreatment readiness to change, follow-up

Table 2
Means and Standard Deviations of Process Measures by Experimental Condition

Measure	Exp-smoke		Standard		Exp-nutrition		Overall <i>F</i> (2, 212)
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Smoking knowledge	93.06	8.98 _a	81.67	11.13 _b	51.97	14.30 _c	235.96**
Negative Consequences expectancies	6.46	1.36 _a	5.98	1.25 _b	5.58	1.33 _c	7.97**
Dissonance	2.43	1.43 _a	2.35	1.12 _a	1.79	0.79 _b	6.67**
Risk perceptions	42.94	9.36 _a	40.51	9.88 _a	39.72	10.45 _a	2.06

Note. Smoking knowledge is a 10-item scale; means reflect percentage of items answered correctly. Negative Consequences expectancies is a subscale of the Smoking Consequences Questionnaire, with possible range in scores of 0–9. Dissonance is the discomfort scale of the Dissonance Thermometer, with possible range in scores of 1–7. Risk perceptions scores may range from 7 to 56. Means with different subscripts are statistically significant at $p < .05$ in the least significant difference comparison. Exp-smoke = experiential smoking intervention; standard = standard didactic smoking intervention; exp-nutrition = experiential nutrition intervention.

** $p < .01$.

readiness, stage change, pamphlet selection, cessation at follow-up, and smoking reduction at follow-up), female participants in the exp-smoke condition outperformed those in the exp-nutrition condition. Moreover, on three of these measures (posttreatment readiness, stage change, and pamphlet selection), the exp-smoke condition also outperformed the standard intervention. The standard condition outperformed the exp-nutrition condition on all measures except pamphlet selection. Thus, findings provide initial support for the efficacy—among female smokers—of an experiential, dissonance-based intervention for enhancing college students' motivation to quit smoking, as well as some unexpected support for the standard brief didactic/video intervention.

Differential Gender Effects

The intervention effects found among the female smokers is consistent with prior research demonstrating the successful application of social psychology to health interventions (Eitel & Friend, 1999; Wilson et al., 2002). Although we did not anticipate that the exp-smoke intervention would be ineffective among male smokers, other experiential interventions have also found gender effects. For example, the alcohol experiential expectancy challenge paradigm (Darkes & Goldman, 1993, 1998) was developed and validated with male samples, but recent studies have failed to replicate its effect using female samples (Dunn, Lau, & Cruz, 2000; Musher-Eizenman & Kulick, 2003).

There are several possible explanations for why female participants responded more favorably to the exp-smoke intervention. Participants in that condition were encouraged to incorporate their own negative feelings and experiences with smoking. The task relied on them to personalize the information and emphasized self-disclosure. Studies have found that women are more likely to self-disclose (e.g., Arliss, 1991; Pearson, 1985), so it is possible that female smokers may have been more comfortable with the task. The social aspects of the group discussion may have also been more relevant to women, who are more interpersonally and socially oriented (e.g., Markus & Oyserman, 1989).

Studies on gender differences and smoking further support the idea that gender-specific interventions may be needed. Perkins and colleagues (Perkins, 2001; Perkins, Jacobs, Sanders, & Caggiula, 2002) found that male smokers are reinforced to a greater extent by nicotine effects than female smokers, whereas female smokers are more motivated by contextual social smoking cues (i.e., social interaction) than male smokers. Women are also more affected by social influences (Gilpin, Pierce, Goodman, Burns, & Shopland, 1992) and experience greater social pressure to quit smoking. Fiore et al. (1990) found that a group format for smoking cessation is preferred more by women than men. Mermelstein and Borrelli (1995) noted that few studies report whether they examined main effects for gender or Gender \times Treatment interactions, yet sex differences in negative affect, withdrawal, and coping styles suggest that different treatments for each gender may be required for optimal outcomes (Piper, Fox, Welsch, Fiore, & Baker, 2001). Greater effort is warranted to examine and harness these gender differences to further improve tobacco interventions.

Changes in Smoking Behavior

Although the exp-smoke intervention produced increased motivation to quit smoking (among female students) compared with the

standard didactic intervention, and more participants in the exp-smoke condition picked up smoking cessation pamphlets, we found no difference between the two smoking interventions in smoking cessation by the 1-month follow-up. Both smoking conditions produced greater cessation than did the exp-nutrition condition. There are at least two possible explanations for the lack of differential cessation effects of these two interventions. First, in contrast to a typical cessation program, participants were not seeking assistance to quit (mean baseline score on the Contemplation Ladder represents "Think I should quit, but not quite ready"). Moreover, because the intervention was not focused on cessation, we would expect smaller effects on immediate cessation. Second, the intervention was relatively brief, involving a single session, whereas other successful health interventions among college students have used multisession paradigms (Darkes & Goldman, 1993; Wiers & Krummaling, 2004). Indeed, the length and number of smoking intervention sessions have been found to be positively associated with cessation outcome (U.S. Department of Health and Human Services, 2000). Thus, stronger effects may have emerged if we had used a multisession format, used a more intensive intervention, or included specific cessation-focused advice. Strengthening the social psychological parts of the intervention may also lead to greater behavior change (e.g., strengthening hypocrisy by asking college smokers to speak directly to high school students). Given these limitations on the interventions' potency to produce cessation, we examined more intermediate variables that may indicate a motivational move toward eventual cessation. Such variables revealed effects in quitting motivation, selection of smoking cessation pamphlets, and reduction in smoking. Motivational measures have predicted subsequent cessation (Abrams, Herzog, Emmons, & Linnan, 2002), yet longitudinal designs are needed to test if changes in these intermediate variables produce long-term effects on smoking.

Cognitive Dissonance

Both smoking groups exhibited higher levels of dissonance-related affect as compared with the exp-nutrition group. That the exp-smoke intervention apparently produced no greater dissonance than a standard didactic intervention is surprising, as is the relatively low level of dissonance reported. Several factors may account for this. First, the study used a self-report measure of psychological discomfort that may not have been sensitive or focused enough to capture group differences. Future research might benefit from the addition of a physiological measure of arousal (e.g., galvanic skin responses; Elliot & Devine, 1994). Second, scores on the dissonance measure may reflect dissonance levels already reduced by participants' increasing their intentions to quit smoking during or immediately after the intervention. Finally, it is possible that changes in cessation motivation were produced by mechanisms other than dissonance reduction. Perhaps the interactive nature of the exp-smoke intervention produced greater self-efficacy or led participants to process the smoking-risk information deeper, or perhaps there was simply more social or experimenter demand to report changes in intentions to quit smoking. Self-perception theory (Bem, 1972; Weiner, 1974) offers an alternative to dissonance theory for explaining change as a result of behaviors such as the videotaped testimonials in this study. Future studies should broaden the search for mediators and explore alternative ways of measuring key theoretical mediators.

Limitations and Future Research

In addition to the limitations mentioned above, the study relied on self-report measures of smoking behavior. Although the primary focus of the study was on intermediate motivational changes, the measurement of follow-up smoking would have been stronger with objective indices such as biochemical assay (e.g., urine cotinine). Also, we must recognize that the gender effects—albeit understandable in retrospect—were not hypothesized a priori, which must attenuate confidence in the robustness of this finding. Finally, should the experiential intervention used in this study ever be adopted for systematic use with college students, there will be practical challenges to overcome (e.g., how to recruit smokers, how to eliminate any deception about use of the videotapes). Several possibilities exist for the translation of this research for the typical college student sample. First, it may be possible to have colleges screen for current smokers and require that they participate in a smoking cessation program similar to the programs mandated for college drinking and other nontobacco drug use. Second, it may be possible to eliminate the deception used in the current study by telling the college students their assistance is needed to create the “best” smoking cessation video and requesting that they edit the videos to enhance the experiential experience. Third, research on identifying the necessary and sufficient elements of the intervention could greatly inform the development of future interventions. For instance, if making a public commitment is the key factor, it may be enough to simply watch oneself on video (i.e., it may not be critical that they believe the video will be shown to high school students).

In summary, this study is the first to demonstrate the efficacy of an experiential smoking intervention in increasing intentions to quit and modifying smoking behavior among college students. Gender moderated the relationship between condition and readiness to quit smoking such that the smoking interventions were efficacious only among female participants. This finding, together with the broader literature on gender differences, provides support for research on the development of gender-specific smoking interventions for college students. Findings also offer encouragement that college smokers are receptive and malleable to secondary prevention efforts and to experiential interventions in particular.

References

- Abrams, D. B., Herzog, T. A., Emmons, K. M., & Linnan, L. (2002). Stages of change versus addiction: A replication and extension. *Nicotine and Tobacco Research*, 2, 223–229.
- Anthony, J. C., & Echeagaray-Wagner, F. (2000). Epidemiologic analysis of alcohol and tobacco use: Patterns of co-occurring consumption and dependence in the United States. *Alcohol Research and Health*, 24, 201–208.
- Arliss, L. P. (1991). *Gender and communication*. Englewood Cliffs, NJ: Prentice-Hall.
- Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51, 1173–1182.
- Bem, D. J. (1972). Self-perception theory. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 6, pp. 1–62). New York: Academic Press.
- Biener, L., & Abrams, D. B. (1991). The Contemplation Ladder: Validation of a measure of readiness to consider smoking cessation. *Health Psychology*, 10, 360–365.
- Brandon, T. H., & Baker, T. B. (1991). The Smoking Consequences Questionnaire: The subjective expected utility of smoking in college students. *Psychological Assessment: A Journal of Consulting and Clinical Psychology*, 3, 484–491.
- Breslau, N., & Peterson, E. L. (1996). Smoking cessation in young adults: Age at initiation of cigarette smoking and other suspected influences. *American Journal of Public Health*, 86, 214–220.
- Centers for Disease Control and Prevention. (2001). *Chronic disease notes and reports* (Vol. 14). Atlanta, GA: Author.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.
- Copeland, A. L., Brandon, T. H., & Quinn, E. P. (1995). The Smoking Consequences Questionnaire—Adult: Measurement of smoking outcome expectancies of experienced smokers. *Psychological Assessment*, 7, 484–494.
- Darkes, J., & Goldman, M. S. (1993). Expectancy challenge and drinking reduction: Experimental evidence for a mediational process. *Journal of Consulting and Clinical Psychology*, 61, 344–353.
- Darkes, J., & Goldman, M. S. (1998). Expectancy challenge and drinking reduction: Structure and process in expectancy challenge. *Experimental and Clinical Psychopharmacology*, 6, 64–76.
- Dawley, H. H., Fleisher, B. J., & Dawley, L. T. (1985). Attitudes toward smoking and smoking rate: Implications for smoking discouragement. *International Journal of the Addictions*, 20, 483–488.
- Devine, P. G., Tauer, J. M., Barron, K. E., Elliot, A. J., & Vance, K. M. (1999). Moving beyond attitude change in the study of dissonance-related processes. In E. Harmon-Jones & J. Mills (Eds.), *Cognitive dissonance: Progress on a pivotal theory in social psychology* (pp. 297–323). Washington, DC: American Psychological Association.
- Dickerson, C. A., Thibodeau, R., Aronson, E., & Miller, D. (1992). Using cognitive dissonance to encourage water conservation. *Journal of Applied Social Psychology*, 22, 841–854.
- DiClemente, C. C., Prochaska, J. O., Fairhurst, S. K., Velicer, W. F., Velasquez, M. M., & Rossi J. S. (1991). The process of smoking cessation: An analysis of precontemplation, contemplation and preparation stages of change. *Journal of Consulting and Clinical Psychology*, 59, 295–304.
- Draycott, S., & Dabbs, A. (1998). Cognitive dissonance: 1. An overview of the literature and its integration into theory and practice in clinical psychology. *British Journal of Clinical Psychology*, 37, 341–353.
- Dunn, M. E., Lau, H. C., & Cruz, I. Y. (2000). Changes in activation of alcohol expectancies in memory in relation to changes in alcohol use after participation in an expectancy challenge program. *Experimental and Clinical Psychopharmacology*, 8, 566–575.
- Eitel, P., & Friend, R. (1999). Reducing denial and sexual risk behaviors in college students: A comparison of a cognitive and motivational approach. *Annals of Behavioral Medicine*, 21, 12–19.
- Elliot, A. J., & Devine, P. G. (1994). On the motivational nature of cognitive dissonance: Dissonance as psychological discomfort. *Journal of Personality and Social Psychology*, 67, 382–394.
- Festinger, L. (1957). *A theory of cognitive dissonance*. Stanford, CA: Stanford University Press.
- Fiore, M. C., Novotny, T. E., Pierce, J. P., Giovino, G. A., Hatziaandreu, E. J., Newcomb, P. A., et al. (1990). Methods used to quit smoking in the United States: Do cessation programs help? *Journal of the American Medical Association*, 263, 2760–2765.
- Gardiner, P. (2002, March). College students: The next generation of replacement smokers. *Burning Issues*, 5, 4–6.
- Giacopassi, D., & Vandiver, M. (1999). University students' perceptions of tobacco, cocaine, and homicide fatalities. *American Journal of Drug and Alcohol Abuse*, 25, 163–172.
- Gilpin, E., Pierce, J. P., Goodman, J., Burns, D., & Shopland, D. (1992). Reasons smokers give for stopping smoking: Do they relate to success in stopping? *Tobacco Control*, 1, 256–263.

- Gotham, H. J., Sher, K. J., & Wood, P. K. (1997). Predicting stability and change in frequency of intoxication from the college years to beyond: Individual-difference and role transition variables. *Journal of Abnormal Psychology, 106*, 619–629.
- Halpern, M. T. (1994). Effect of smoking characteristics on cognitive dissonance in current and former smokers. *Addictive Behaviors, 19*, 209–217.
- Harmon-Jones, E. (2000). Cognitive dissonance and experienced negative affect: Evidence that dissonance increases experienced negative affect even in the absence of aversive consequences. *Personality and Social Psychology Bulletin, 26*, 1490–1501.
- Heatherton, T. F., Kozlowski, L. T., Frecker, R. C., & Fagerström, K. O. (1991). The Fagerström Test for Nicotine Dependence: A revision of the Fagerstrom Tolerance Questionnaire. *British Journal of Addiction, 86*, 1119–1127.
- Herzog, T. A., Abrams, D. B., Emmons, K. M., & Linnan, L. A. (2000). Predicting increases in readiness to quit smoking: A prospective analysis using the Contemplation Ladder. *Psychology and Health, 15*, 369–381.
- Hughes, J. R., Keely, J. P., Niaura, R. S., Ossip-Klein, D. J., Richmond, R. L., & Swan, G. E. (2003). Measures of abstinence in clinical trials: Issues and recommendations. *Nicotine and Tobacco Research, 5*, 13–25.
- Jenks, R. J. (1992). Attitudes, perceptions, and risk-taking behaviors of smokers, ex-smokers, and nonsmokers. *Journal of Social Psychology, 132*, 569–575.
- Leake, R., Friend, R., & Wadhwa, N. (1999). Improving adjustment to chronic illness through self-presentation: An experimental study on a renal dialysis unit. *Health Psychology, 18*, 54–62.
- Ling, P. M., & Glantz, S. A. (2002). Why and how the tobacco industry sells cigarettes to young adults: Evidence from industry documents. *American Journal of Public Health, 92*, 908–916.
- Markus, H., & Oyserman, D. (1989). Gender and thought: The role of self-concept. In M. Crawford & M. Gentry (Eds.), *Gender and thought: Psychological perspectives* (pp. 100–127). New York: Springer-Verlag.
- McMaster, C., & Lee, C. (1991). Cognitive dissonance in tobacco smokers. *Addictive Behaviors, 16*, 349–353.
- Mermelstein, R. J., & Borrelli, B. (1995). Women and smoking. In A. L. Stanton & S. J. Gallant (Eds.), *The psychology of women's health* (pp. 309–348). Washington, DC: American Psychological Association.
- Miller, R. L., Wozniak, W. J., Rust, M. R., Miller, B. R., & Slezak, J. (1996). Counterattitudinal advocacy as a means of enhancing instructional effectiveness: How to teach students what they do not want to know. *Teaching of Psychology, 23*, 215–219.
- Musher-Eizenman, D. R., & Kulick, A. D. (2003). An alcohol expectancy-challenge prevention program for at-risk college women. *Psychology of Addictive Behaviors, 17*, 163–166.
- Obermayer, J. L., Riley, W. T., Asif, O., & Jean-Mary, J. (2004). College smoking-cassation using cell phone text messaging. *Journal of American College Health, 53*, 71–78.
- Onion, C. W. R., & Bartzokas, C. A. (1998). Changing attitudes to infection management in primary care: A controlled trial of active versus passive guideline implementation strategies. *Family Practice, 15*, 99–104.
- Patterson, F., Lerman, C., Kaufmann, V. G., Neuner, G. A., & Audrain-McGovern, J. (2004). Cigarette smoking practices among American college students: Review and future directions. *Journal of American College Health, 52*, 203–210.
- Pearson, J. C. (1985). *Gender and communication*. Dubuque, IA: William C. Brown.
- Perkins, K. A. (2001). Smoking cessation in women: Special considerations. *CNS Drugs, 15*, 391–411.
- Perkins, K. A., Jacobs, J., Sanders, M., & Caggiula, A. R. (2002). Sex differences in the subjective and reinforcing effects of cigarette nicotine dose. *Psychopharmacology, 163*, 194–201.
- Piper, M. E., Fox, B. J., Welsch, S. K., Fiore, M. C., & Baker, T. B. (2001). Gender and racial/ethnic differences in tobacco-dependence treatment: A commentary and research recommendations. *Nicotine & Tobacco Research, 3*, 291–297.
- Prochaska, J. O., & DiClemente, C. C. (1983). Stages and processes of self-change of smoking: Toward an integrative model of change. *Journal of Consulting and Clinical Psychology, 51*, 390–395.
- Prokhorov, A. V., Warneke, C., de Moor, C., Emmons, K. M., Mullin Jones, M., Rosenblum, C., et al. (2003). Self-reported health status, health vulnerability, and smoking behavior in college students: Implications for interventions. *Nicotine and Tobacco Research, 5*, 545–552.
- Rigotti, N. A., Lee, J. E., & Wechsler, H. (2000). US college students' use of tobacco products: Results of a national survey. *Journal of the American Medical Association, 284*, 699–705.
- Rigotti, N. A., Moran, S. E., & Wechsler, H. (2005). US college students' exposure to tobacco promotion: Prevalence and association with tobacco use. *American Journal of Public Health, 95*, 138–144.
- Simmons, V. N., Webb, M. S., & Brandon, T. H. (2004). College-student smoking: An initial test of experiential dissonance-enhancing intervention. *Addictive Behaviors, 29*, 1129–1136.
- Sobell, L. C., & Sobell, M. B. (1992). Timeline follow-back: A technique for assessing self-reported alcohol consumption. In R. Z. Litten & J. P. Allen (Eds.), *Measuring alcohol consumption: Psychosocial and biochemical methods* (pp. 41–72). Clifton, NJ: Humana Press.
- Stone, J., Aronson, E., Crain, A. L., Winslow, M. P., & Fried, C. B. (1994). Inducing hypocrisy as a means of encouraging young adults to use condoms. *Personality and Social Psychology Bulletin, 20*, 116–128.
- U.S. Department of Health and Human Services. (2000). *Reducing tobacco use: A report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, Office on Smoking and Health.
- Viswesvaran, C., & Schmidt, F. L. (1992). A meta-analytic comparison of the effectiveness of smoking cessation methods. *Journal of Applied Psychology, 77*, 554–561.
- Wechsler, H., Kelley, K., Siebring, M., Kuo, M., & Rigotti, N. A. (2001). College smoking policies and smoking cessation programs: Results of a survey of college health center directors. *Journal of American College Health, 49*, 205–212.
- Wechsler, H., Rigotti, N. A., Gledhill-Hoyt, J., & Lee, H. (1998). Increased levels of cigarette use among college students: A cause for national concern. *Journal of the American Medical Association, 280*, 1673–1678.
- Weiner, M. J. (1974). Cognitive dissonance or self perception, 1965–1974. *Personality and Social Psychology Bulletin, 1*, 144–146.
- Weinstein, N. D. (1998). Accuracy of smokers' risk perceptions. *Annals of Behavioral Medicine, 20*, 135–140.
- Weinstein, N. D., Marcus, S. U., & Moser, R. P. (2005). Smokers' unrealistic optimism about their risk. *Tobacco Control, 14*, 55–59.
- Wenslaff, R. M., & LePage, J. P. (2000). The emotional impact of chosen and imposed thoughts. *Personality and Social Psychology Bulletin, 26*, 1502–1514.
- Wetter, D. W., Welsch, S. K., Smith, S. S., Fiore, M. C., Kenford, S. L., Fouladi, R. T., & Baker, T. B. (2004). Prevalence and predictors of transitions in smoking behavior among college students. *Health Psychology, 23*, 168–177.
- Wiers, R. W., & Kummling, R. H. C. (2004). An experimental test of an alcohol expectancy challenge in mixed gender groups of young heavy drinkers. *Addictive Behaviors, 29*, 215–220.
- Wilson, D. K., Friend, R., Teasley, N., Green, S., Reaves, I. L., & Sica, D. A. (2002). Motivational versus social cognitive interventions for promoting fruit and vegetable intake and physical activity in African American adolescents. *Annals of Behavioral Medicine, 24*, 310–319.
- Zanna, M. P., & Cooper, J. (2000). Dissonance and the pill: An attribution approach to studying the arousal properties of dissonance. In E. Tory Higgins & A. W. Kruglanski (Eds.), *Motivational science: Social and personality perspectives* (pp. 306–312). Philadelphia: Psychology Press.