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Risk Perception and Smoking Behavior In Medically Ill Smokers: A Prospective Study

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Abstract

Aims—To examine the influence of risk perception on intentions to quit smoking and post-treatment abstinence.

Design—Prospective and longitudinal.

Setting—United States

Participants—237 adult smokers (M age = 56 years) receiving medical care from home health care nurses. Participants did not have to want to quit smoking to participate, but received cessation counseling within the context of their medical care.

Measurements—Three measures of risk perception were given pre- and post-treatment: Perceived Vulnerability, Optimistic Bias, and Precaution Effectiveness. Smoking status was biochemically verified at end of treatment and at 2, 6, and 12 months later.

Findings—Principal Components Analysis supported the theoretical discriminability of the risk perception measures, and intercorrelations provided evidence for concurrent and predictive validity. Elevated risk perception was associated with a variety of sociodemographic and psychosocial characteristics. Optimistic bias was significantly associated with older age and ethnic minority status. Smokers in Precontemplation had lower perceived vulnerability and precaution effectiveness, and greater optimistic bias than those in Contemplation and Preparation. Smokers in Preparation had higher perceived vulnerability and lower optimistic bias than those in earlier stages. Change in perceived vulnerability predicted smoking cessation at follow-up. Optimistic bias predicted a lower likelihood of cessation and precaution effectiveness predicted a greater likelihood of smoking cessation, but only among those with a smoking related illness.

Conclusions—In patients receiving medical care from home health care nurses, change in perceived vulnerability to smoking-related disease is predictive of smoking cessation. In those with smoking-related illnesses, optimistic bias predicts continued smoking while precaution effectiveness predicts cessation.

Keywords

perceived risk; smoking cessation; medically ill smokers; optimistic bias; nurse counseling

Introduction

Despite the availability of effective smoking cessation treatments, 20.6% of adults in the United States smoke[1]. Many have smoking-related illness, but do not personalize the health risks of smoking [2–8]. One study [9] found that 47.6% of smokers admitted to the Emergency Department for acute respiratory care did not believe that they had a condition that was caused or made worse by smoking. The Precaution Adoption Process Model [10,11] focuses on risk communication, how people process risks, and the association between risk perception and health protective behavior. Risk perception is conceptualized as a multi-dimensional construct that includes perceived vulnerability, optimistic bias, and precaution effectiveness. Perceived vulnerability is the degree to which an individual feels personally vulnerable to the health effects of their risky behavior.[11–14] High levels of perceived vulnerability are associated with greater intentions to quit smoking,[15–20] greater likelihood of joining a smoking cessation group,[16,21] and greater likelihood of making a quit attempt.[22,23] Among cancer patients, high levels of perceived vulnerability are associated with greater motivation to quit[24] and smoking cessation.[25]

Optimistic bias occurs when an individual inaccurately believes they are at lower risk than their counterparts.[21,26–29] For example, adolescents believe that they are less likely to become addicted to cigarettes than their peers.[30] Current smokers believe they are less personally susceptible to smoking-related illness than former or other smokers.[21,28,29] Heavy smokers or smokers with cardiac risk factors believe they are less at risk for cancer or other smoking-related diseases compared to other smokers.[31]

Precaution effectiveness is the degree to which an individual believes that engaging in the precautionary behavior (e.g., quitting smoking) will have personal health benefits.[10] Smokers with strong intentions to quit perceive greater benefits of quitting. [32], and smokers with greater perceived benefits of quitting smoking are more likely to achieve abstinence.[22] Alternatively, current smokers tend to underestimate the benefits of quitting compared to former smokers and nonsmokers.[33]

The aim of the current paper is to examine the degree to which these risk perception constructs are prospectively related to smoking cessation among medically ill smokers. No other studies assess these three risk perception constructs simultaneously, and only a few prospectively assess the relationship between risk perception and smoking cessation . [18,22,25,34] We hypothesized that increases in perceived vulnerability, increases in precaution effectiveness, and decreases in optimistic bias would be prospectively associated with greater intentions to quit smoking and with smoking cessation. We also hypothesized that the interaction between smoking related illness and risk perception would predict smoking cessation.

We also present psychometric analyses on the risk perception constructs. We explored the associations between a variety of smoker characteristics and the risk perception constructs both to provide further evidence for the construct validity of each risk perception variable and to identify the types of smokers at pretreatment who would have high or low levels risk perception. We also assessed whether differentiation between current risk perception (e.g, to what extent do you feel that smoking is responsible for your current illness) and future risk perception (e.g., what do you think your likelihood is of developing heart disease if you continue to smoke) enhances descriptive and predictive validity. Though differentiation between current and future risk has not been previously studied, we hypothesized that such discrimination may be necessary based on previous literature that indicates that risk for distal events may not be as motivating as risk for proximal events. Understanding the role of

risk perception among those who continue to smoke despite illness is important for developing smoking cessation interventions.

Methods

We used data from a previous study (Project CARES [35]) in which home health care nurses were randomized to deliver one of two smoking cessation interventions to their medically ill patients who smoke. Eligible patients were receiving home care services for an acute or chronic illness, > 18 years old, smoked ≥ 3 cigarettes per day, spoke English, were not currently receiving treatment for smoking, achieved a Mini Mental state score of ≥ 20 , and were not receiving hospice care. Participants did not have to want to quit smoking to be in the study. This study received ethical approval from our institution's Human Subjects Internal Review Board.

Participants

Participants were 237 smokers (53.6 % female, mean age = 56 years (SD = 14.1). The ethnic composition was 81.4% Caucasian, 13.9% African-American, 2.5% Hispanic, 1.3% American Indian, and .8% Cape Verdian; 39.2% had < 12 years of education and the majority (61.5%) earned < \$10,000 per year. The mean number of cigarettes smoked per day was 21.1 (SD = 14.0), the mean number of years smoking was 40.9 (SD = 13.6), and the mean Fagerstrom score for nicotine dependence [36,37] was 6.4 (SD = 3.2). Medical conditions were lung disease (32.6%) hypertension (34.7%), cardiovascular disease (39.4%), diabetes (28.8%), lung cancer (2.1%), other cancers (9.7%), depression (2.7%), and other mental health problems (14%).

Measures

Sociodemographics—Age, gender, race/ethnicity, marital status, employment status, education, and income were assessed.

Smoking History, nicotine dependence and smoking urges—The number of cigarettes smoked per day and years smoking were assessed. Nicotine dependence was assessed with The Fagerstrom Test for Nicotine Dependence [36,37]. We measured urge to smoke with: “How much of the time have you felt the urge to smoke today (1 = none of the time, 6 = all of the time[38]).

Attitudes and Beliefs about Smoking—Motivation to quit was measured on a 1–10 scale [Contemplation Ladder,39] and by Stage of Change (Precontemplation-not thinking of quitting; Contemplation-thinking of quitting but no plans within the next 30 days; Preparation-planning to quit within the next 30 days[40]). Self-efficacy to quit smoking was assessed with Confidence Questionnaire [(Cronbach's alpha = .91) 44–47]. Perceived Pros and Cons of smoking were measured with the Smoking Decisional Balance Scale (Cronbach's alpha = .87–.90) [41]

Medical Illness and Quality of Life—The number of days receiving home care services and length of hospitalization were assessed. Quality of life was assessed with the Medical Outcomes Study Short-Form General Health Survey (SF-12)[41], which includes both emotional and physical quality of life subscales (Cronbach alphas = >.85).[42] Medical diagnoses were collected via medical chart review and were divided into smoking-related (cardiovascular disease, hypertension, lung disease, lung cancer and other cancers) and not smoking related by physician associated with the study.[43] Smokers with 1 or more smoking-related illnesses were coded “1”, if not, they were coded as “0”.

Psychosocial Measures—The Center for Epidemiologic Studies Depression Scale (CES-D[44]) measured depressed mood (Cronbach alpha = .84). The Perceived Stress Scale (PSS [45]) measured stress (Cronbach alpha = .84). Social support was measured with the Interpersonal Support Evaluation List (ISEL[46]), (Cronbach alpha = .88[47]) which has four factors: tangible, appraisal, self-esteem, and belonging support.

Risk Perception was assessed at baseline and end of treatment (EOT). *Current perceived vulnerability (CPV)* was measured with “To what extent do you feel your overall health has been affected by smoking?” and “How much do you feel smoking is responsible for your current illness?” (1= Not at All to 5=Very Much; Cronbach’s alpha = .67 [48,49]). *Future perceived vulnerability (FPV)* was measured with three items: “What do you think your likelihood is of developing (or if you have, the worsening of) the following diseases if you continue smoking?” Vulnerability to cancer, heart disease, and lung disease were each assessed (1=not at all, 5 = very likely; Cronbach’s alpha = .82 in our sample [34,50]). *Current Precaution Effectiveness (CPE)* was measured with: “How much do you think that quitting smoking could help your current health?” (1 = Not at all, 4 = Very much [22]). *Future Precaution Effectiveness (FPE)* was measured with three items: “What do you think is your likelihood of developing (or if you have, worsening of) the following disease if you quit smoking?” Cancer, heart disease, and lung disease were each assessed (1=Not at all, 5 = Very likely[50]). This scale demonstrated good reliability (Cronbach’s alpha = .84). *Current optimistic bias (COB[51])* was assessed with: “How would you compare your overall health to the average smoker your age?” and “How would you compare your overall health to the average non-smoker your age?” (1=much worse, 5= much better; Cronbach’s alpha for our sample = .72). *Future optimistic bias (FOB)* was assessed with: “Compared to other people who smoke cigarettes, do you think that you are less likely, about as likely, or more likely to get sick from smoking?” ([52]).

Smoking status was assessed at end of treatment as well as at two, six, and twelve months later. Continuous abstinence was defined as no smoking, not even a puff, since the last contact, whereas 7-day point prevalence abstinence was defined as no smoking, not even a puff, in the past 7 days. Carbon Monoxide testing was used to verify abstinence (<10 ppm = abstinent; Bedfont, CO Ecolyzer).

Analytic Plan

We first examined the internal structure of our risk perception measures by entering all 12 items into a Principal Components Analysis, specifying a 6-component, varimax-rotated solution to examine the hypothesized dimensional structure of the six risk perception constructs (i.e. current and future risk perception items for each of perceived vulnerability, optimistic bias, and precaution effectiveness). Pearson correlations were used to examine their interrelationships. Second, we used multivariate linear regression to examine the associations between each of the six risk perception constructs and each of the five sets of baseline variables: sociodemographics (age, gender, ethnicity, marital status, employment status, education, income), smoking (number of cigarettes smoked per day, years smoking, number of quit attempts, nicotine dependence, smoking urge), attitudes and beliefs about smoking (Contemplation Ladder, self-efficacy to quit, pros and cons of smoking), medical illness and quality of life (number of days receiving home care, length of previous hospitalization, SF-12, smoking related disease) and psychosocial measures (depressed mood, stress, social support). Third, we examined the relationship between each of the risk perception variables and stage of change using analysis of variance with Tukey post-hoc comparisons. Fourth, logistic regression was used to examine the prospective relationship between changes in each of the risk perception variables (between baseline and end-of-treatment) and smoking cessation at each post-treatment follow-up (2, 6, and 12 months

after end of treatment), controlling for treatment condition, nicotine dependence, motivation to quit, and baseline risk perception. Finally, we tested the interaction between baseline risk perception and having a smoking-related illness on smoking outcome. Multi-collinearity was not found in any model.[53] Missing data for smoking outcomes were coded as “smoking” in accordance with an intent to treat. All analyses used the Statistical Package for the Social Sciences (SPSS 14.0.1[54]).

Results

Dimensional Analyses and Intercorrelations (Table 1)

The results of the Principal Components Analysis with forced six-component varimax-rotated extraction accounted for 81.4% of the variance. All items had very good to excellent item loadings,[55] ranging from .62 to .96 on their respective hypothesized component. Cronbach alphas ranged from .67 (CPV) to .84 (FPE), indicating acceptable to very good reliability.[56] We also examined a 3 component solution to explore whether the present and future perceptions of each risk construct would merge, but found that the theorized constructs did not emerge into a conceptually clear and interpretable pattern. The values of item loadings of the 3 component solution were generally lower and displayed more complexity than the 6 component solution, which provided a clear and theoretically interpretable solution.

The intercorrelations among the risk variables provided evidence for concurrent and predictive validity. As expected, both perceived vulnerability measures (CPV and FPV) were significantly negatively correlated with measures of optimistic bias (COB and FOB), indicating that higher perceived vulnerability was associated with lower optimistic bias. CPV and FPV were significantly positively associated with CPE, such that higher levels of perceived vulnerability were related to greater levels of perceived benefits of smoking cessation.

Relationship Between Baseline Participant Characteristics and Risk Perception

Perceived Vulnerability—CPV was higher among those who reported greater urges to smoke ($B=.152$, $SE=.038$, $p\leq.001$), greater motivation to quit ($B=.114$, $SE=.035$, $p\leq.001$), greater pros ($B=.048$, $SE=.019$, $p<.05$) and cons ($B=.060$, $SE=.018$, $p<.001$) of smoking, lower levels of self-esteem social support ($B=-.042$, $SE=.021$, $p<.05$), lower levels of tangible social support ($B=-.050$, $SE=.023$, $p<.05$), lower physical ($B=-.017$, $SE=.007$, $p<.05$) and mental ($B=-.012$, $SE=.005$, $p<.05$) quality of life, and shorter hospital stays ($B=-.138$, $SE=.060$, $p<.05$). Those with lung cancer had greater CPV vs. those with other medical conditions ($B=.401$, $SE=.143$, $p<.05$).

FPV was associated with younger age ($B=-.017$, $SE=.006$, $p<.005$), greater motivation to quit ($B=.190$, $SE=.045$, $p<.001$), more cons of smoking ($B=.085$, $SE=.023$, $p<.001$), and lower mental quality of life ($B=-.020$, $SE=.006$, $p<.005$). Those with hypertension had greater FPV vs. those with other medical conditions ($B=.488$, $SE=.172$, $p<.01$). *Precaution Effectiveness*. CPE was greater among those who were employed ($B=.542$, $SE=.247$, $p<.05$), smoked fewer cigarettes per day ($B=-.009$, $SE=.005$, $p<.05$), had greater motivation to quit smoking ($B=.163$, $SE=.035$, $p<.001$), reported more cons of smoking ($B=.073$, $SE=.017$, $p<.001$), and better physical quality of life ($B=.014$, $SE=.007$, $p<.05$). Those with hypertension had greater CPE vs. those with other medical conditions ($B=.351$, $SE=.136$, $p<.05$). FPE was greater for those who were older ($B=.012$, $SE=.005$, $p<.05$), not partnered ($B=-.386$, $SE=.178$, $p<.05$), and fewer cons of smoking ($B=-.056$, $SE=.023$, $p<.05$). Those with hypertension had greater FPE vs. those with other medical conditions ($B=.514$, $SE=.154$, $p<.005$).

Optimistic Bias—Smokers with greater COB were older ($B = .024$, $SE = .005$, $p < .001$), of minority ethnicity ($B = -.584$, $SE = .178$, $p \leq .001$), employed ($B = .732$, $SE = .274$, $p < .01$), had less perceived stress ($B = -.059$, $SE = .023$, $p < .05$), greater self-esteem ($B = .056$, $SE = .025$, $p < .05$), and greater physical ($B = .032$, $SE = .008$, $p < .001$) and mental ($B = .018$, $SE = .006$, $p < .005$) quality of life.

Smokers with greater FOB were older ($B = .009$, $SE = .004$, $p < .05$), had fewer quit attempts in the past year ($B = -.038$, $SE = .035$, $p < .05$), fewer cons of smoking ($B = -.073$, $SE = .016$, $p < .001$), greater physical quality of life ($B = .019$, $SE = .006$, $p \leq .001$), and a longer hospitalization ($B = .121$, $SE = .053$, $p < .05$).

Stage of Change (SOC; Table 2)—As hypothesized, smokers in Precontemplation had significantly lower levels of Perceived Vulnerability (current and future) and Precaution Effectiveness (current) and significantly higher levels of Optimistic Bias (future) than smokers in Contemplation and Preparation. FPE and COB did not discriminate Precontemplators from Contemplators or Preparers. Also, as hypothesized, Contemplators had significantly lower Perceived Vulnerability (current) and significantly higher Optimistic Bias (future) than Preparers. There were no significant differences between Contemplators and Preparers in either Current or Future Precaution Effectiveness.

Effects of Risk Perception on Smoking Cessation

Change in Risk Perception and Smoking Cessation—Change in Perceived Vulnerability (current and future) was the only risk perception construct to prospectively predict smoking outcomes after controlling for covariates. Increases in FPV during treatment predicted both continuous and seven-day point prevalence abstinence two months later. The odds of continuous abstinence increased 3.4-fold ($OR = 3.39$, 95% CI 1.09–10.55, $p < .05$) and the odds of 7-day point prevalence abstinence increased 2.4 fold with each one unit change in FPV ($OR = 2.43$, 95% CI 1.27–4.67, $p < .01$).

Change in both CPV and FPV during treatment predicted continuous abstinence at six months later. With each one-unit change in CPV and FPV, the odds of continuous abstinence increased by 4.41 and 3.16 times respectively (CPV: $OR = 4.41$, 95% CI 1.32–14.75, $p < .05$; FPV: $OR = 3.16$, 95% CI 1.16–8.57, $p < .05$). Change in Optimistic Bias and Precaution Effectiveness over the course of treatment were not related to smoking cessation at any time point.

The Effect of Risk Perception and Smoking-Related Illness on Smoking Cessation—The majority of the sample (69.1%) had at least one smoking-related illness and were not more likely to drop out than those who did not have a smoking related illness. Optimistic Bias and Precaution Effectiveness were the only two risk perception constructs at baseline to interact with medical illness to predict smoking cessation at follow-up, after controlling for covariates. At baseline, the interaction between FOB and having a smoking-related illness was significantly associated with smoking status at the end of treatment ($OR = .108$, 95% CI .017–.708, $p < .05$) and two months later ($OR = .185$, 95% CI .034–.994, $p < .05$). Among those with a smoking-related illness, there was a 65.6% decrease in the odds of 7-day point prevalence abstinence at the end of treatment for every one-unit increase in FOB ($OR = .344$, 95% CI 0.12–0.99, $p < .05$). Similarly, there was a 74.7% decrease in the odds of 7-day point prevalence abstinence at the two month follow-up for every one-unit increase in FOB among those with a smoking-related illness ($OR = .252$, 95% CI 0.068–0.939 $p < .05$). On the other hand, among those without a smoking related illness, FOB did not have a deleterious effect on smoking cessation outcomes.

The interaction between FPE and smoking-related illness significantly predicted smoking status 12 months later (OR = 14.9, 95% CI 1.003–224.06, $p=.05$). Among those with smoking-related illness, there was nearly a 13-fold increase in the odds of being continuously abstinent at 12 months for every one-unit increase in baseline FPE (OR = 12.94, 95% CI 0.987–167.6 $p=.05$). Among those without a smoking-related illness, no such effect was observed.

Discussion

The main findings of our paper are 1) the risk perception measures were theoretically discriminable, with good reliability and construct validity, 2) differentiating between current and future risk perception is important because each were associated with different smoker characteristics, stages of change, and smoking cessation outcomes; 3) change in both current and future perceived vulnerability was prospectively associated with smoking status, and 4). greater optimistic bias predicted a lower likelihood of cessation and precaution effectiveness predicted a greater likelihood of smoking cessation, but only among those with a smoking related illness. An important feature of our study is that the sample consisted of non-treatment seeking smokers. Studying risk perception in treatment seeking smokers is likely to yield artificially high levels of risk perception, because treatment seeking is associated with high levels of risk perception.[21,34,57]

This is the first study to assess both current and future perceptions of risk. The intercorrelations between risk perception constructs were in line with our hypotheses and support the major theoretical tenets of The Precaution Adaption Model. 10] Current and future risk perception were each characterized by different socio-demographic and psychosocial variables. CPE and FPE, for example, had no common correlates, providing further evidence to examine them as separate constructs.

Risk perception also varied by medical condition. Smokers with lung cancer had higher levels of current perceived vulnerability than those with other medical conditions, but did not have higher levels of precaution effectiveness, suggesting that they believe that quitting smoking will have little to no effect on their condition. On the other hand, those with hypertension had both greater future perceived vulnerability and precaution effectiveness than those with other medical conditions, suggesting that they perceived the risks of smoking and believed that quitting smoking could help their health.

Current and future risk perception were each associated with a variety of different smoker characteristics. Optimistic bias, for example, was significantly associated with older age and with ethnic minority status. Older age may be related to greater optimistic bias because cognitive distortions may increase as age increases (e.g., “I’ve smoked for 30 years and I’m not dead yet”). [31,59] Risk perception varied by stage of change, consistent with other studies [24,28].

Increases in current and future perceived vulnerability during treatment were significantly associated with smoking cessation, in contrast to others who have found that increased risk perception is associated with a lower likelihood of behavior change.[22] High perceived vulnerability, without perceived benefits of health behavior change, could lead to heightened anxiety and fatalism, and less motivation to change.[60] Research has shown that the same communication strategies can produce opposite effects, either motivating behavior change or causing defensiveness, fear, and denial[61]. The influence of moderators may be important in determining a response to risk information. Augmenting already high levels of health concern may be iatrogenic for smoking cessation, whereas those with low levels of health concern may benefit from such augmentation [62].

Unlike Perceived Vulnerability, change in Optimistic Bias and Precaution Effectiveness did not predict smoking cessation. However, both Optimistic Bias and Perceived Effectiveness measured at pre-treatment interacted with the presence of medical illness to predict smoking cessation at follow-up. Among those with a smoking related illness, increases in optimistic bias were related to a lower likelihood of quitting smoking. Helping smokers overcome optimistic bias is challenging because they selectively attend to messages that support their beliefs [10,63,64] and exhibit counterarguments when faced with disconfirming evidence. [65] Provision of physiological feedback that provokes both emotional (e.g., raises worry), and cognitive reactions (raises risk), show promise in increasing motivation to quit. [35,66,67]. Moreover, among those with at least one smoking related illness, there was a substantial increase in the odds of continuous abstinence with increases in future precaution effectiveness. This provides further evidence that it is important that smokers, especially those who are already sick from smoking, believe that it is never too late to quit.

One limitation of our study was that our sample was mostly Caucasian (>80%), precluding analysis of ethnic differences. Also, our method of bioverification has a short-half life (~8 hours), so long-term abstinence cannot be bioverified. However, our study sample was not aware of the short half life, thereby diminishing some of this concern. Also, although we conducted a large number of tests, Rothman [68] and others have argued that correction for multiple tests may be deleterious in areas of emerging research, increasing the chance of Type 2 error, as well as the potential for discrepant and arbitrary findings (e.g., two researchers studying the same phenomenon might come to different conclusions based only on the fact that they tested a different number of outcomes). All of our tests were based on apriori hypotheses, and a theoretical model of risk perception. Therefore we believe that findings were less likely to capitalize on chance.

Our results have implications for risk perception theory and measurement, as well as clinical practice. The construct validity of our risk perception measures were supported. Practitioners should be aware that certain smoker characteristics (e.g., medical condition, age, ethnic minorities) are associated with lower risk perception and that these patients might benefit from approaches that enhance their risk perception and their perception of the benefits of quitting. Perceived vulnerability, optimistic bias, and precaution effectiveness may be useful constructs in addition to assessing readiness to change when developing a treatment plan for smoking cessation.

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Table 1

Bivariate Correlations Between Risk Perception Scales

Risk Perception Scale	COB	FOB	CPV	FPV	CPE	FPE
1 Current Optimistic Bias	—	.36**	-.34**	-.26**	-.09	.19**
2 Future Optimistic Bias	.36**	—	-.50**	-.39**	-.20*	.12
3 Current Perceived Vulnerability	-.36**	-.50**	—	.42**	.27**	-.03
4 Future Perceived Vulnerability	-.26**	-.39**	.42**	—	.48**	-.26**
5 Current Precaution Effectiveness	-.09	-.20**	.27**	.48**	—	-.08
6 Future Precaution Effectiveness	.19*	.12	-.03	-.26**	-.08	—

* p<.05

** p<.01

COB = Current Optimistic Bias, FOB = Future Optimistic Bias, CPV = Current Perceived

Vulnerability, FPV = Future Perceived Vulnerability, CPE = Current Precaution Effectiveness, FPE = Future Precaution Effectiveness

Table 2
Differences in Risk Perception between those in Pre-contemplation, Contemplation, and Preparation

Risk Variables	Stages of Change				
	Pre-C	Cont	Prep		
	M (SD)	M (SD)	M (SD)	df	F
CPV	-.39 (.85) ^a	-.001(.85) ^b	.37(.86) ^c	2	11.56***
FPV	3.12(1.22) ^a	3.94(1.10) ^b	4.31(.84) ^b	2	18.35***
COB	2.62(1.10)	2.57(1.01)	2.42(1.12)	2	0.562
FOB	2.20(.83) ^a	1.78(.77) ^b	1.42(.65) ^c	2	15.33***
CPE	2.50(1.00) ^a	3.31(.80) ^b	3.58(.69) ^b	2	26.80***
FPE	3.76(1.21)	3.72(1.01)	3.72(1.02)	2	0.04
					p=.963

*Notes: Post-hoc comparisons are based on Tukey HSD.

CPV = current perceived vulnerability; FPV = Future Perceived Vulnerability; COB = Current Optimistic Bias; FOB = Future Optimistic Bias; CPE = Current Precaution Effectiveness; FPE = Future Precaution Effectiveness; Pre-C = Precontemplation; Cont = Contemplation; Prep = Preparation