

THE EFFECTS OF COUNTERFACTUAL THINKING ON READINESS TO  
CHANGE SMOKING-RELATED BEHAVIORS

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THE EFFECTS OF COUNTERFACTUAL THINKING ON READINESS  
TO CHANGE SMOKING-RELATED BEHAVIORS

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## ABSTRACT

### THE EFFECTS OF COUNTERFACTUAL THINKING ON READINESS TO CHANGE SMOKING-RELATED BEHAVIORS

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Cigarette smoking continues to be the leading preventable cause of death in the United States, according to the U.S. Centers for Disease Control. In the current study, counterfactual thinking was investigated as an intervention to encourage readiness to consider quitting smoking. Additionally, individual difference variables were examined to explore their potential roles in smoking behavior change. Participants completed the Consideration of Future Consequences Scale, Optimism/Pessimism Instrument, Fagerstrom Test for Nicotine Dependence, Contemplation Ladder, modified Powe Fatalism Inventory, Beliefs in Fate scale, and Smoking Consequences Questionnaire. Participants were then given a written scenario and instructed to envision it as a prognosis from their doctor. They also received one of four counterfactual conditions and were asked to generate corresponding alternative behaviors. Participants returned one week later and were again given the Fagerstrom Test, the Contemplation Ladder, and the Smoking Consequences Questionnaire. Participants were also given a self-report

measure about their efforts to decrease their smoking and were asked if they would be willing to participate in a lung-capacity test, the behavioral measure of intention to quit.

The analyses revealed no significant effect of the direction or structure of counterfactual condition on readiness to consider quitting smoking, as measured by the Contemplation Ladder. A significant Direction  $\times$  Lung Capacity interaction indicated that participants in downward counterfactual conditions (53.5%) were more likely to sign up for a lung-capacity test than those in upward counterfactual conditions (31.7%),  $\chi^2_{\text{diff}}(1, N = 84) = 4.11, p = .043$ , Cramer's  $V = .22$ . No significant effect of counterfactual structure on willingness to schedule a lung-capacity test was found. Additionally, no significant effect of the personality variables on the receptivity to the counterfactual thinking interventions was detected. Page and Colby (2003) investigated counterfactual thinking as an effective anti-smoking strategy, finding that additive counterfactuals influenced willingness to participate in a lung-capacity test. The current findings, however, indicated no effect of structure but did reveal that participants in the downward counterfactual condition were more likely to sign up for a lung-capacity test. Potential explanations for the failure to replicate previous results and suggestions for future research are addressed.

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## INTRODUCTION

According to the U.S. Centers for Disease Control and Prevention, cigarette smoking continues to be the leading preventable cause of death in the United States. It has been estimated that one out of five deaths each year is caused by smoking-related illnesses. More people die from smoking-related illnesses than from HIV, illegal drug use, alcohol use, motor vehicle injuries, suicides, and murders combined. Adults who smoke die an average of 14 years earlier than non-smokers, and of the more than 3000 individuals who start smoking each day, approximately 80% have their first cigarette before age 18 (Centers for Disease Control and Prevention, 2010).

The American Cancer Society (2012) concluded that over 30% of all cancer deaths are caused by cigarette smoking. More specifically, cigarette smoking accounts for approximately 80% of lung cancer deaths. In addition to cancers, which account for about half of smoking-related deaths, smoking also causes heart disease, bronchitis, emphysema, and strokes. Tobacco also damages women's reproductive health and is associated with increased risk of miscarriage, premature birth, stillbirth, infant death, and low birth weight.

Although smoking clearly leads to deleterious consequences for smokers of all ages, the aging cohort of smoking adolescents has produced a dramatic increase in smoking among college students and young adults – an increase of nearly 30% between

1993 and 1997 (Wechsler, Rigotti, Gledhill-Hoyt, & Lee, 1998). According to the 2010 National Survey on Drug Use and Health, 24.8% of full-time college students and 39.9% of part-time college students reported smoking. College students are an especially appropriate target of smoking cessation programs because of the transitional nature of the college years. As explained by Emmons, Wechsler, Dowdall, and Abraham (1988), it is during the college years that young adults who smoke typically either quit or become nicotine dependent. Therefore, interventions that can help college students quit smoking before they become nicotine dependent are of critical importance.

The current study was an investigation of the effect of counterfactual thinking on smoking cessation, building on Page and Colby's (2003) research on counterfactual thinking as an effective anti-smoking strategy. Specifically, they found that counterfactual thoughts influence individuals' intentions regarding health-related behavior, as well as actual future health behavior. In the current study, counterfactual thoughts as a tool in smoking cessation interventions were examined, as well as the possible role of individual differences regarding optimism/pessimism, the consideration of future consequences, readiness to change, and fatalism/ perceptions of addiction in individuals' intentions to quit smoking.

Smoking cessation programs and interventions are vital in decreasing the incidence of smoking and, consequently, the number of smoking-related deaths. Numerous attempts have been made to help people quit smoking, and some of these efforts have taken the form of mass media campaigns. Such large-scale efforts to educate people about the dangers of smoking reach the highest numbers of young individuals and have the most widespread impact on smoking behavior (Wakefield, Flay, Nichter, &

Giovino, 2002). Regardless of the size of the audience, researchers have noted that ads with optimal effectiveness will go beyond capturing the attention of youth and will encourage them to actively elaborate on the message in order to promote strong opinions about smoking (Wakefield et al.). Indeed, there is a wealth of literature indicating that attitudes based on extensive elaboration are stronger and more predictive of behavior than are those based on less effortful processing (e.g., Fazio, 1995; Fazio, Powell, & Williams, 1989; Petty, Cacioppo, & Schumann, 1983).

One means of encouraging individuals to generate their own arguments regarding an issue, thus requiring elaborative processing, is using counterfactual thinking (McGill & Klein, 1993; Roese, 1994, 2000; Wells, Taylor, & Turtle, 1987). Counterfactual thinking is a cognitive heuristic that involves comparing reality to “what might have been” or “what could have been.” Engaging in counterfactual thinking is a common, fundamental element in many daily cognitive activities, especially in response to unpleasant or negative events (Berry-Cahoon, 1998; Epstude & Roese, 2008; Gilovich, 1983). Epstude and Roese have asserted that “thinking about what might have been, about alternatives to our own pasts, is central to human thinking and emotion” (p. 168).

### **Counterfactual Thinking**

Counterfactual means contrary to the facts. Counterfactual thinking consists of the generation of alternative outcomes for a past event by mentally changing one or more factors. Generating alternative realities can serve an affective and/or a preparative function. The affective function of thinking about different outcomes can make people feel better or worse about their situation, largely via contrast effects. A contrast effect

occurs when an emotion about a situation becomes more extreme when that situation is compared to a certain standard (Roese, 2004).

Medvec, Madey, and Gilovich (1995) provided an interesting example of the counterfactual contrast effect that emerged from observations of Olympic athletes. Specifically, bronze medalists expressed more satisfaction than silver medalists. Athletes awarded the silver medal tend to view second place as a missed opportunity to be the best athlete and win the gold, whereas athletes awarded the bronze medal are often satisfied merely to be a medal winner. It is very easy for bronze medalists to compare their reality to having earned no medal at all (a downward counterfactual), whereas silver medalists often have thoughts of “what if” their performance had just been a little bit better, thus earning the gold (an upward counterfactual).

In the research literature, counterfactual thoughts were once primarily associated with negative affect and missed opportunities. Indeed, thoughts about what might have been can lead to regret and despair. According to Fong (2004), regret may be a key variable in understanding the experience of smokers, the vast majority of whom continue to smoke despite desiring to quit. Using a sample drawn from four countries, Fong found that approximately 90% of smokers either agreed or strongly agreed with the statement “If you had to do it over again, you would not have started smoking.”

Although counterfactual thinking is often associated with negative emotions, counterfactual thoughts can also have beneficial effects. For example, thinking about what might have happened can also lead to thoughts about what can still occur (Roese, 1997). This preparative function of counterfactual thinking can motivate individuals to participate in behaviors that may lead to an improved future. Imagining alternative

realities can lead people to develop a plan for behavior change, which could aid with future accomplishments (Page & Colby, 2003). The use of counterfactual thoughts can be an instrument for behavior adaptation and the pursuit of goals (Roese, 2004).

The *direction* and *structure* of counterfactual thoughts may partly determine whether they serve an affective or preparative function. Counterfactual thoughts can have an upward or downward direction. Upward counterfactuals are alternative scenarios that are comparatively better than reality. For example, a smoker with an emphysema diagnosis could think, “If only I had not smoked, I would not have emphysema.”

Although often serving a preparative function, counterfactual thoughts that portray a better situation (e.g., not having emphysema) often lead to negative affect such as regret and disappointment, primarily via a contrast effect. The preparative function of upward counterfactuals can influence future behavior by revealing actions needed to accomplish future goals. Downward counterfactual thoughts involve alternatives that are comparatively worse than reality. For example, a smoker with emphysema could think, “At least I do not have cancer.” Downward counterfactuals tend to elicit positive affect such as relief, also via a contrast effect. There is no preparative function of downward counterfactual thinking because there is no motivation to change (Page & Colby, 2003). Downward counterfactuals thus only serve the function of helping individuals regulate or manage their emotions.

Counterfactual thoughts can also differ in their structure, i.e., they can be additive, subtractive, or substitutional. When imagining an alternative reality, additive counterfactuals involve adding antecedents, whereas subtractive counterfactuals involve removing antecedents. Additive counterfactual thoughts include a new element in the

scenario that could have changed the situation. For example, an individual could think, “If only I had gotten regular check-ups, I would not have advanced emphysema now.” Subtractive counterfactuals remove an element to create the alternative outcome. The smoker with emphysema could reason, “If only I’d never tried that first cigarette, I would not have developed emphysema.” Substitutional counterfactuals are mental simulations that involve both an additive and a subtractive element. To fully understand the effect of counterfactual thinking, both the structure and direction of the counterfactuals must be considered (Page & Colby, 2003).

Although research has found that people tend to have stronger emotional reactions when thinking about acts of commission rather than omission, imagining consequences of inaction can still have an impact on future behaviors. Additive counterfactuals are thought to aid in creating future plans of action by thinking about ways to avoid the recurrence of unpleasant events. Subtractive counterfactual thoughts have not been found to influence future behaviors as much as additive counterfactuals because they do not highlight specific actions needed to achieve goals; they only remove an antecedent from the original event (Roese, 1994). However, the relative influence of additive and subtractive counterfactuals may partly depend on how much the individual perceives the unpleasant outcome to be reversible. That is, a person who reasons that the damage is already done and cannot be undone will have little motivation to change his or her behavior, but if the person believes that quitting smoking will greatly improve one’s health condition or possibly render one’s condition curable, he or she will be more likely to initiate behavioral changes.



Counterfactual thinking has been found to facilitate behavioral intentions in two ways, through content-specific and content neutral pathways (Epstude & Roese, 2008). The distinction between content-specific and content-neutral pathways is made by the way counterfactual thinking influences behavior. The content-specific pathway focuses on how counterfactuals influence behavior by the formation of related behavioral intentions; that is, those that invoke the same behavior indicated by the counterfactual. For example, a counterfactual involving quitting smoking activates a behavioral intention to quit smoking, which results in an increase in efforts to actually quit smoking. The content-neutral pathway includes situations where counterfactuals lead to behavioral effects unrelated to the content of the counterfactual scenarios; that is, they influence behavior in areas that are independent of the counterfactual context. The general consideration of alternatives can evoke unrelated behavior change. For example, a counterfactual thought in one area, like health behavior, can influence behavior in a different domain, like academics. Both the content-specific and content-neutral pathways contribute to the impact of counterfactual thinking on behavioral intentions and can work concurrently or independently (Smallman & Roese, 2009).

### **Counterfactual Thinking and Smoking Cessation**

Page and Colby (2003) investigated the use of counterfactual thinking as one strategy to influence smoking cessation. They asked participants to read detrimental smoking scenarios and then prompted them to write various types of counterfactual thoughts. The two dependent measures in their study were participants' affective evaluations of the unpleasant smoking scenarios and their willingness to take part in a physical assessment related to smoking (i.e., a lung-capacity test). Page and Colby found

that certain types of counterfactual thinking, differing with respect to direction (upward or downward) and structure (additive or subtractive), significantly influenced participants' intentions to engage in a lung-capacity test.

According to Epstude and Roese (2008), counterfactual thinking may be considered primarily "a useful, beneficial, and utterly necessary component of behavior regulation" (p. 169). Specifically, upward counterfactuals have been shown to influence future behavior in a number of applications (Roese & Olson, 1997; Segura & Morris, 2005). In Page and Colby's study, upward counterfactuals generated more negative affect in response to reading unpleasant smoking scenarios than did downward counterfactuals but had no effect on participants' willingness to schedule the lung-capacity test. In the same study, additive counterfactuals had the greatest impact on individuals' willingness to participate in the lung-capacity test, despite exerting no effect on participants' affective evaluations of the negative smoking scenarios.

### **Individual Differences and Counterfactual Thinking**

**Consideration of Future Consequences.** Individual differences likely play a role in the effect of counterfactual thinking on attitudes and behavior. One particularly relevant individual difference is whether a participant is generally more focused on the present or the future. Participants focused mostly on the present may not be as concerned about the future health impact of smoking as participants focused on the future. Instead, they are likely to focus more on the immediate rewards of smoking, such as stress release or relaxation.

The Consideration of Future Consequences Scale (Strathman, Gleicher, Boninger, & Edwards, 1994) measures the degree to which people are likely to think about the

future results of their current behavior, and has been found to be a dependable predictor of behavior when the connection between present behavior and future consequences is clear. Scores at one end of the continuum are indicative of individuals who sacrifice immediate benefits to achieve desirable future outcomes. Scores at the other end of the continuum indicate individuals who do not consider possible future consequences of their actions. Rather, they focus primarily on the present benefits of their current behavior regardless of the future results.

The degree to which people consider the future consequences of their actions rather than focusing primarily on immediate effects is likely associated with the effects of counterfactual thinking on their attitudes and behavior. Individuals high in the consideration of the future consequences of their behavior may likely be more affected by counterfactual thinking, because they will tend to analyze and attempt to understand why they have experienced certain outcomes. Individuals low in the tendency to consider future outcomes may likely be less influenced by counterfactual thinking, because they will tend to be focused primarily on their present circumstances rather than dwelling on the past or planning for the future.

**Optimism and Pessimism.** Optimists usually expect positive outcomes, whereas pessimists usually expect negative outcomes. People are more likely to attempt to overcome difficult situations when they expect favorable results. Those who expect negative outcomes are less likely to try to change their behavior (L. Kubzansky, P. Kubzansky, & Maselko, 2004). Optimists and pessimists may both be influenced by counterfactual thinking but for different reasons. Optimists are more likely to expect

positive outcomes, so upward and/or additive counterfactuals may have an effect on smoking cessation behavior via a belief that they can be successful in quitting smoking.

Although both optimists and pessimists engage in counterfactual thinking, research has revealed distinctions between them with respect to affect, motivation, and performance. Optimists may be more likely to use downward counterfactuals to achieve positive affect, such as relief, whereas pessimists may be more likely to use upward counterfactuals as motivation to prevent negative outcomes from transpiring. Sanna, Chang, Carter and Small (2006) found that optimists prefer not to think about the future, and when they do think about the future, they tend to believe they have ample time to prepare for outcomes. This manner of thinking about the future may play a detrimental role in smoking cessation. Optimists may disregard the health risks caused by smoking if they believe they have time to quit in the future. Pessimists are more likely to think about the future, but assume a negative viewpoint. Like optimists, pessimists may be influenced by upward and/or additive counterfactuals, but via differing pathways: pessimists are likely to experience anxiety and negative affect when thinking about the future. Unfavorable emotions may motivate these individuals to prevent negative outcomes from occurring by changing their smoking behavior.

Sanna (1996) has provided evidence that pessimists and optimists use different strategies of mental simulation. Pessimists and optimists tend to have diverse responses when dealing with various life events. The counterfactual thinking strategies of pessimists and optimists have different preparative and affective consequences, which correspond to the functions of upward and downward mental simulations. Optimists often use downward counterfactuals to achieve positive affect, such as relief, whereas

pessimists are more likely to use upward counterfactuals for motivation to prevent negative outcomes from transpiring.

**Readiness to Change.** When evaluating any program aimed at changing people's behavior, it is critical to determine individuals' readiness and willingness to change. Arguably, even the most effective behavioral intervention will likely have minimal impact if the target individual fails to recognize the need to change or lacks the motivation to change. Thus, in the current study, participants' readiness to change was assessed using The Contemplation Ladder (Biener & Abrams, 1991), which assesses smokers' positions on a continuum ranging from having no thoughts about quitting smoking to taking action to quit their smoking behavior. The Contemplation Ladder is consistent with the Transtheoretical Model of Behavior Change (Prochaska, Velicer, DiClemente, & Fava, 1988), which is an analysis of the stages and processes people go through when attempting to change their behavior. Both the Contemplation Ladder and the Transtheoretical Model of Behavior Change can be used for intervention purposes. Individuals' readiness to change may govern how counterfactual thinking affects health behavior modifications by determining how receptive they are to change. Counterfactual thinking scenarios may influence an individual's readiness to consider quitting smoking, but actual behavior changes will not occur until the individual is ready to implement them.

Prochaska et al. proposed that smoking cessation is the culmination of a long process of behavior change, which includes progressing through the following stages: the precontemplation stage, the contemplation stage, the preparation stage, the action stage, and the maintenance stage. Individuals who have no intention to change their behavior

are in the *precontemplation stage*. Many people in this stage are unaware that they have a problem and do not typically excel in intervention programs. People who are aware of their problem but have not yet committed to taking action are in the *contemplation stage*. Often people in the contemplation stage are still weighing the pros and cons of their behavior. Those in the *preparation stage* intend to change but have not committed themselves to eliminating the behavior, although they may have modified their behavior to some extent. Individuals who have modified their behavior to overcome the problem and committed time and energy to truly changing their behavior are in the *action stage*. And finally, people who have worked to prevent relapse and remained abstinent from the behavior for more than six months are in the *maintenance stage* (Prochaska et al.).

The Contemplation Ladder builds on the Transtheoretical Model's five stages and expands these five stages to an 11-point continuum. The continuum represents an attempt to provide socially acceptable ways to indicate lower levels of readiness to consider quitting such as, "I think I need to consider quitting someday." According to the Transtheoretical Model of Behavior Change, on which the Contemplation Ladder is based, stages are moderated by several factors, including "decisional balance." With regard to smoking, this refers to the relative weight given to the "pros" and "cons" of smoking; individuals' perceptions of this balance can influence whether action is taken or not. The "cons" clearly include smoking-related health risks and costs. The experimental manipulations of the current study were designed to emphasize the "cons" of smoking, thus encouraging stage progression.

In addition to the Transtheoretical Model of Behavior Change, other important theoretical perspectives, such as the Theory of Planned Behavior (Ajzen, 1991), the

Health Belief Model (Rosenstock, 1974), and self-efficacy theory (Bandura, 1977, 2001) can also be used to understand individuals' health behavior. The Theory of Planned Behavior is the idea that the performance of any behavior is determined by both behavioral intention and perceived behavioral control (Ajzen, 1991). Behavioral intentions represent one's plans of action and motivation to engage in a behavior. The more motivation one has to engage in a behavior, the more likely he or she will successfully perform the intended behavior. Perceived behavioral control indicates an individual's confidence in his or her ability to execute a particular behavior (Armitage, 2005).

The Health Belief Model enables an understanding of why people practice (or fail to practice) health behaviors, as well as predicting some of the circumstances under which the health behaviors will change. The model states that two factors aid in understanding whether an individual practices a certain health behavior: the degree to which an individual perceives a personal health threat and the perception that the particular health practice will be effective in decreasing the threat. The perception of a personal health threat is influenced by three factors, including general health values, specific beliefs about vulnerability to a particular disorder, and beliefs about the consequences of the ailment/ disorder. Whether an individual believes a certain health practice will reduce a personal health threat depends on whether the individual thinks the health practice will be effective and whether the cost of executing that practice exceeds the benefits. Studies that have highlighted perceived vulnerability while simultaneously increasing the perception that a certain health behavior will decrease the personal health

threat have been rather successful in changing behavior (Rosenstock, Strecher, & Becker, 1988).

Self-efficacy refers to an individual's beliefs in his or her ability to complete a task or reach a specific goal. Bandura's self-efficacy theory (1977, 1999) addresses a cognitive process in which individuals assess their ability to succeed in a given situation. The two components of self-efficacy include outcome expectancy and efficacy expectancy. Outcome expectancy is the belief in the probable consequences of a specific behavior, whereas efficacy expectancy refers to one's perceived ability to perform a particular behavior (Holloway & Watson, 2002). An individual's confidence in his or her ability to succeed in a specific situation can have a significant influence on whether one decides he or she can achieve a desired goal. For example, smokers who believe they do not have the ability to quit smoking will probably not try to discontinue smoking regardless of their knowledge of the detrimental effects of smoking or their desire to quit (Taylor, 1998). According to Bandura (1977, 2001), the higher an individual's self-efficacy, the more likely the individual will view difficult tasks as possible to achieve. Efficacy beliefs influence whether individuals think optimistically or pessimistically about an obstacle as well as how long they persevere, how much effort they put forth, and how much stress they experience when coping with a difficult challenge. Although the current study focuses on the Transtheoretical Model of Behavior Change in regards to individuals' readiness to change, the contributions of applying the Theory of Planned Behavior, the Health Belief Model, and self-efficacy theory to understanding health behavior modification are also acknowledged.



**Fatalism.** Fatalism is the belief that events are predetermined and unable to be changed. More specifically, cancer fatalism is the belief that death is inevitable when one is diagnosed with cancer (Powe, 2001). Cancer fatalism has been found to influence individuals' motivation to quit smoking (Schnol et al., 2004). Individuals high in cancer fatalism believe they have poor control of their health, which can lead to the perception of minimal disease preventability. For example, fatalistic beliefs about cancer have led to diminished involvement in cancer preventive behaviors (Ferrer, Hall, Portnoy, Ling, Han, & Klein, 2011). Individual differences in levels of cancer fatalism likely play a role in the effect of counterfactual thinking on smoking attitudes and behavior. People who score high in cancer fatalism may ignore the opportunity to change presented by the alternative outcome included in counterfactual thoughts. Individuals low in cancer fatalism, however, may be more influenced by counterfactual thinking because they feel they have more control of their health and may be more motivated to consider quitting smoking as a result of thinking counterfactually.

The Powe Fatalism Inventory (Powe, 1995) measures individuals' fatalistic beliefs about cancer. The Powe Fatalism Inventory consists of 15 yes-or-no questions, and higher scores on the inventory indicate higher levels of cancer fatalism. The questions address four defining features of cancer fatalism, which include fear, pessimism, predetermination, and inevitability of death. *Fear*, the first aspect of cancer fatalism, addresses individuals' anxiety about being diagnosed with cancer as well as dying from cancer. The degree of *pessimism* focuses on individuals' beliefs in the likelihood of dying from cancer. *Predetermination* addresses individuals' beliefs that a cancer diagnosis is beyond their control, regardless of their smoking behavior. The

fourth aspect of cancer fatalism, *inevitability of death*, addresses beliefs that a cancer diagnosis equates to unavoidable death, regardless of treatment or early diagnosis. A modified version of the Powe Fatalism Inventory was used in the current study to assess participants' fatalistic beliefs about smoking and cancer. To obtain a measure of participants' more general fatalistic perspectives, the Beliefs in Fate scale (Jasa, 1999) was also administered.

### **Contributions of the Current Study**

The current study builds on Page and Colby's (2003) identification of counterfactual thinking as an effective anti-smoking strategy via replication plus investigation of additional individual differences in smoking cessation interventions. That is, Page and Colby found that counterfactual thoughts influenced individuals' intentions regarding health-related behavior, as well as actual future health behavior. A unique contribution of the current study is the investigation of a variety of individual differences; knowing the role of these may lead to a better understanding of how to tailor smoking-cessation programs to specific target populations. Another important aspect of the current study is that both self-report and behavioral measures were used to gauge effectiveness of the interventions. Each type of dependent measure yields important information; using both strengthens the design of the current study. Successful smoking cessation intervention is essential in the ongoing efforts to counter the deadly effects of smoking.

### **Design of the Current Study**

A between-subjects design was used to assess the impact of the counterfactual thinking manipulations on participants' self-reports and behavioral measures regarding

smoking. Four scenarios were designed to elicit the following types of counterfactual thoughts: upward additive, upward subtractive, downward additive, or downward subtractive (see Appendix B). Participants' self-reports of their intentions to make sincere efforts to quit smoking were assessed both initially and post-intervention, and their willingness to sign up for a lung-capacity test was assessed post-intervention. In addition, participants' individual differences with respect to their consideration of future consequences, optimism-pessimism, readiness to change, and fatalistic beliefs were assessed to determine if these covariates accounted for any of the observed results.

### **Hypotheses**

Using counterfactual thinking in interventions may increase behavioral intentions to decrease smoking. Participants were presented with one of four counterfactual thinking scenarios. It was hypothesized that upward counterfactuals, more so than downward counterfactuals, would result in participants' increased readiness and behavioral intentions to decrease smoking. In regards to structure, additive counterfactuals, more so than subtractive counterfactuals, were hypothesized to result in increased readiness and behavioral intentions to decrease smoking.

Specifically:

H1: Upward as opposed to downward counterfactuals were predicted to result in a greater increase in readiness to consider quitting smoking.

H2: Additive as opposed to subtractive counterfactuals were expected to result in a greater increase in readiness to consider quitting smoking.

It was also hypothesized that in addition to an increase in readiness to consider quitting smoking, upward counterfactuals, more so than downward counterfactuals,

would result in more willingness to schedule a lung-capacity test. In relation to structure, additive counterfactuals, more so than subtractive counterfactuals, were also expected to be associated with participants' willingness to schedule a lung-capacity test.

Specifically:

H3: Upward as opposed to downward counterfactuals were expected to result in greater willingness to schedule a lung-capacity test.

H4: Additive as opposed to subtractive counterfactuals were expected to result in greater willingness to schedule a lung-capacity test.

Receptivity to interventions was expected to vary as a function of individual differences. Specifically, whether participants were classified as optimistic or pessimistic, their consideration of future consequences, their readiness to change, and their level of fatalistic beliefs were expected to interact with the counterfactual thinking interventions. These individual differences were examined in an exploratory fashion to determine their influence on participants' responses to the manipulations. Generally, optimists were expected to be more likely to respond to the downward counterfactual manipulation by using these thoughts to achieve positive affect, such as relief, whereas pessimists were expected to be more likely to respond to the upward counterfactual manipulation by using them as motivation to prevent negative outcomes from transpiring. Individuals higher in the consideration of the future consequences of their behavior were expected to be more affected by counterfactual thinking overall than those lower in the consideration of future consequences. Participants higher on the Contemplation Ladder were expected to be more affected overall by the counterfactual thinking interventions because they may be more ready to make a behavior change, whereas those individuals indicating less

readiness to change were expected to be less influenced by the interventions overall. The experimental manipulations of the current study were designed to emphasize the dangers and negative aspects of smoking, thus encouraging stage progression. Individuals with lower fatalistic beliefs were expected to be more affected by the counterfactual thinking interventions than participants with greater fatalism.

## METHOD

### **Participants**

Undergraduates ( $N = 85$ ; 42 males, 43 females) from a private, Midwestern university comprised the convenience sample. Most (87.1%) of the participants were Caucasian, 4.7% of the participants were African-American, another 4.7% of the participants were Hispanic, 1.2% self-identified as Asian, 1.2% responded as “Other” and 1.2% chose not to respond. The participants’ ages ranged from 18-23 years old.

### **Procedure**

At the first session, participants were greeted and then asked to read and sign the Informed Consent sheet (see Appendix C). Upon consenting to participate, they were presented with a demographics questionnaire. Participants were asked to list the names and contact information of two people who could verify their smoking behavior (see Appendix E). The bogus pipeline technique (BPL; see Jones & Sigall, 1971) was used to increase the truthfulness of participants’ self-reported smoking behavior. This application of the bogus pipeline technique has been shown to enhance the accuracy of self-reported smoking (Roese & Jamieson, 1993).

Participants were then presented with the Consideration of Future Consequences Scale (Strathman, Gleicher, Boninger, & Edwards, 1994), the O/P Instrument (Dember,

Martin, Hummer, Howe, & Melton, 1989), the Fagerstrom Test for Nicotine Dependence (Fagerstrom, 1978), the Contemplation Ladder (Biener & Abrams, 1991), the modified Powe Fatalism Inventory (Powe, 1995), the Beliefs in Fate scale (Jasa, 1999), and the Smoking Consequences Questionnaire (Brandon & Baker, 1991).

Participants were then presented with a written scenario, which they were told to envision as a prognosis they just received from their doctor (Appendix A). Participants were randomly assigned to one of four counterfactual conditions and asked to write down alternative behaviors (Appendix B) that corresponded to the presented scenario.

All participants were asked to return one week later to complete the study. The delay of one week allowed the investigation of the influence of counterfactual thinking on relatively longer-term behavioral intentions. At the second meeting, participants were again given the Fagerstrom Test for Nicotine Dependence, the Contemplation Ladder, and the Smoking Consequences Questionnaire. Participants were also given a self-report measure about their efforts to decrease smoking (see Appendix M). Participants were then asked if they would be willing to participate in a lung-capacity test, which served as the behavioral measure of intentions to quit (see Appendices N and O). They were informed that the test was being offered by the University's Health and Sport Science department. Participants were also told that the test would only take a few minutes and that the results of the lung-capacity test would be available immediately. Participants who were willing to take the lung-capacity test were asked to write down their name, email address, and phone number on the "Lung-Capacity Test Sign-up Sheet" so the department would be able to contact them to schedule the test. In reality, the lung-

capacity test was not offered. Participants were debriefed about this deception immediately after completing the study (see Page & Colby, 2003).

### **Ethical Considerations**

Minor deception was used in this study in the form of the lung-capacity test and the bogus pipeline. A lung-capacity test was not actually performed as part of this study, but participants were given contact information for the University's health clinic to use if they were truly interested in testing their lung capacity. Prior arrangements were made with the student health clinic to ensure that the lung-capacity test was available to any students who were interested in participating in that assessment. Having the lung-capacity signup was necessary to measure participants' intentions to quit smoking, and actually performing the lung-capacity test would have been more intrusive. Immediately after finishing the study, participants were debriefed about this aspect of the study and told of the option to have the test conducted at the health clinic (see Appendix P).

The bogus pipeline consisted of asking the participants to list the names and contact information of two people who could verify their smoking behavior. The individuals listed were not contacted, but the bogus pipeline was used to increase the truthfulness of the participants' self-report answers. The bogus pipeline technique was necessary to gain accurate smoking behavior information and alternative methods (such as saliva swabs) would have been more intrusive. Immediately following the second session, participants were debriefed and told that the individuals they listed would not actually be contacted.



## Measures

**Demographics Questionnaire.** The demographic questionnaire (see Appendix D) included items regarding participants' age, sex, education level, marital status, ethnicity, parental education level, and current grade point average. Participants were also asked if they had smoked a cigarette in the past 30 days.

**Consideration of Future Consequences Scale.** This scale (CFC; Strathman, Gleicher, Boninger, & Edwards, 1994) is a 12-item questionnaire measuring the extent to which people consider immediate versus distant consequences of their behaviors as well as the extent to which they are influenced by the potential consequences (see Appendix F). Participants rate how characteristic they consider each of 12 statements to be of themselves, ranging from 1 (extremely uncharacteristic) to 5 (extremely characteristic). Individuals on one end of the continuum consider the future outcomes of their behavior and are willing to sacrifice immediate benefits to achieve more desirable future outcomes. Individuals on the other end of the continuum are more concerned with maximizing immediate benefits at the cost of future outcomes. Strathman et al. (1994) provided evidence attesting to the reliability and validity of the scale. In the current study, the CFC failed to achieve acceptable reliability ( $\alpha = .581$ ). The CFC captures a unique aspect of participants' thinking (i.e., present- or future-focused) and was used to measure an individual difference variable that was expected to influence responses to the counterfactual thinking interventions.

**O/P Instrument.** This instrument (Dember, Martin, Hummer, Howe, & Melton, 1989), which was used to assess participants' optimism and pessimism, consists of 56 statements representing various individual differences in viewpoint (see Appendix G). It

includes two 18-item scales that measure optimism and pessimism, as well as 20 additional filler items. Participants respond to each statement on a scale ranging from 1 (strongly agree) to 4 (strongly disagree). Unlike several other measures of this construct, the O/P Instrument provides separate scores for optimism and pessimism, in addition to an overall total. The O/P Instrument has been found to be a valid and reliable test of individual differences in optimism and pessimism (Burke, Joyner, Czech, & Wilson, 2000). In the current study, Cronbach's alpha indicated acceptable reliability for both the optimism scale ( $\alpha = .822$ ) and pessimism scale ( $\alpha = .853$ ).

**Fagerstrom Test for Nicotine Dependence.** The FTND (Fagerstrom, 1978) consists of six questions about smoking and was used to measure participants' level of dependence on nicotine (see Appendix H). Participants' responses to the multiple-choice items correspond to a number and the total number of points represents the level of nicotine dependence. Total scores range from 0-10, with 0 points indicating no nicotine dependence and 10 points indicating high nicotine dependence. Hudmon, Pomerleau, Brigham, Javitz, and Swan (2005) found the test to be a reliable and valid measurement for use in studies on tobacco use and nicotine dependence. However, in the current study, the FTND failed to achieve acceptable reliability ( $\alpha = .586$ ).

**Modified Powe Fatalism Inventory.** The modified Powe Fatalism Inventory (mPFI; Powe, 1995) measures individuals' fatalistic beliefs about cancer. The mPFI consists of 15 yes/no questions, and higher scores on the inventory indicate higher levels of cancer fatalism (see Appendix J). The questions address four defining features of cancer fatalism, including fear, pessimism, predetermination, and inevitability of death. Schnoll et al. (2004) found the inventory to be a consistent and valid scale to measure

fatalistic beliefs about cancer. The modified Powe Fatalism Inventory was used to assess participants' fatalistic beliefs about smoking and cancer, and in the current study the Kuder-Richardson Formula 20 (KR-20) statistic indicated acceptable reliability ( $\alpha = .76$ ) for this instrument. Similarly, the 24-item Beliefs in Fate scale (Jasa, 1999) was used to measure participants' more general perspectives on fate (see Appendix K). Participants responded to each statement using a 7-point scale ranging from *strongly disagree* to *strongly agree*. The psychometrics of this unpublished scale have not yet been established in the literature, but in the current study none of the three subscales (locus of control, destiny, and luck) achieved acceptable reliability ( $\alpha = .23, .07, .31$ ), respectively.

**Smoking Consequences Questionnaire.** The SCQ (Brandon & Baker, 1991) is a 50-item instrument designed to assess the subjective expectancies of cigarette smoking on four factors: Positive Reinforcement/Sensory Satisfaction, Negative Reinforcement/Negative Affect Reduction, Appetite/Weight Control, and Negative Consequences (see Appendix L). Each smoking consequence item is rated for both the likelihood of occurrence from 0 (completely unlikely) to 9 (completely likely) and desirability from -5 (highly undesirable) to 5 (highly desirable). Wetter et al. (1994) found the SCQ to be a reliable and valid instrument when used with dependent smokers, and in the current administration Cronbach's alpha indicated acceptable reliability (see Table 1). The SCQ was used to measure changes in positive and negative expectancies as a result of the counterfactual thinking interventions.

**Smoking Self-report Measure.** The smoking self-report questionnaire (Simmons, 2004) consists of seven questions about smoking behavior (see Appendix M).

This measure was administered following the counterfactual thinking interventions to assess participants' current smoking behavior as well as intentions to decrease smoking.

**Contemplation Ladder.** The Contemplation Ladder (Biener & Abrams, 1991) is a single-item instrument designed to identify participants' readiness to consider quitting smoking. The Contemplation Ladder consists of an 11-point response continuum ranging from having no thoughts of quitting to taking action to quit (see Appendix I). The Contemplation Ladder was used to assess the effect of counterfactual thinking on intentions and efforts to quit smoking. This measurement was necessary to assess participants' stage of readiness and to investigate whether such readiness influenced the effectiveness of counterfactual thinking on strengthening behavioral intentions to decrease smoking. Knowing the stage of readiness for an individual can also aid in determining appropriate interventions. Biener and Abrams (1991) found this instrument to be adequate with respect to three indicators of validity, including known groups' validity, concurrent validity, and predictive validity. The Contemplation Ladder was used in the current study to measure participants' readiness to make an attempt to quit smoking before and after the counterfactual thinking interventions.

**Behavioral Measure.** All participants were given the opportunity to sign up for a lung-capacity test following the counterfactual thinking interventions, as was done in Page and Colby's (2003) research. The test was not actually administered, but this behavioral measure was used to assess participants' intentions to quit smoking (see Appendix O).

## RESULTS

College student smokers from a private, Midwestern university were randomly assigned to one of four counterfactual conditions that differed with respect to their counterfactual structure (additive or subtractive) and direction (upward or downward). Individual differences (present vs. future focus, optimism-pessimism, nicotine dependence, belief in fate, and subjective expectancies associated with cigarette smoking) were also assessed to determine if they moderated the hypothesized relationships. See Table 1 for descriptive statistics regarding these variables, and Table 2 for specific items and responses regarding nicotine dependence. Hypothesis 1 was that upward as opposed to downward counterfactuals would result in a greater increase in readiness to consider quitting smoking, operationalized as movement on the Contemplation Ladder.

Hypothesis 2 was that additive as opposed to subtractive counterfactuals would result in a greater increase in readiness to consider quitting smoking. To investigate these hypotheses, a 2 (Direction) x 2 (Structure) x 2 (Ladder: Time 1 and Time 2) mixed ANOVA with repeated measures on the Contemplation Ladder was conducted. No significant main nor interactive effects emerged,  $F_s(1, 66) < 1.80, p_s > .18$ . Participants' scores on the Contemplation Ladder did not differ significantly across the two administrations (Time 1:  $M = 7.49, SD = 3.03$ ; Time 2:  $M = 7.28, SD = 3.16$ ). The results failed to support the hypothesis that upward as opposed to downward counterfactuals would result in a greater increase in readiness to consider quitting smoking.

Additionally, the results failed to provide support for the hypothesis that additive as opposed to subtractive counterfactuals would result in a greater increase in readiness to consider quitting smoking.

Table 1

*Descriptive Statistics of Measures*

<b>Measure</b>	<b># of Items</b>	<b>Scale</b>	<b>Anchors</b>	<b>Range</b>	<b><i>M</i> (<i>SD</i>)</b>	<b><i>A</i></b>
Consideration of Future Consequences	12	1 – 5	Extremely (un)characteristic	12 – 60	36.69 (5.06)	.58
Optimism-Pessimism Instrument						
Optimism	18	1 – 4	Strongly (dis)agree	18 – 72	34.72 (6.26)	.82
Pessimism	18	1 – 4	Strongly (dis)agree	18 – 72	52.80 (6.95)	.85
Powe Fatalism Inventory <sup>1</sup>	15	0 – 1	No/Yes	0 – 15	4.00 (2.62)	.76
Jasa Beliefs in Fate Scale						
Locus of Control	7	1 – 7	Strongly (dis)agree	7 – 49	31.16 (3.43)	-.23
Destiny	3	1 – 7	Strongly (dis)agree	3 – 21	16.31 (2.49)	.07
Luck	6	1 – 7	Strongly (dis)agree	6 – 42	24.65 (3.99)	.31
Fagerstrom Test for Nicotine Dependence <sup>2</sup>	6	–	–	0 – 10	–	–
Time 1					12.53 (.97)	.59
Time 2					12.58 (.93)	.49
Smoking Consequences Questionnaire						
Negative Consequences, Time 1	18	0 – 9	Extremely (un)likely	0 – 9	5.31 (1.45)	.89
Positive Reinforcement, Time 1	15	0 – 9	Extremely (un)likely	0 – 9	3.73 (2.02)	.95
Negative Reinforcement, Time 1	12	0 – 9	Extremely (un)likely	0 – 9	3.81 (2.36)	.97
Appetite-Weight Control, Time 1	5	0 – 9	Extremely (un)likely	0 – 9	2.84 (2.28)	.95
Negative Consequences, Time 2	18	0 – 9	Extremely (un)likely	0 – 9	5.37 (1.59)	.91
Positive Reinforcement, Time 2	15	0 – 9	Extremely (un)likely	0 – 9	3.55 (2.05)	.95
Negative Reinforcement, Time 2	12	0 – 9	Extremely (un)likely	0 – 9	3.55 (2.45)	.98
Appetite-Weight Control, Time 2	5	0 – 9	Extremely (un)likely	0 – 9	2.78 (2.37)	.98

<sup>1</sup>Reliabilities for this scale correspond to Kuder-Richardson 20.<sup>2</sup>See Table 2 for a list of the items on this scale

Table 2  
*Fagerstrom Test of Nicotine Dependence Items, Coding, and Frequencies*

Item	Response options	Coded values	%
1. How soon after you wake up to you smoke your first cigarette?	Within 5 minutes	3	0
	6 – 30 minutes	2	3.6
	31 – 60 minutes	1	6.0
	After 60 minutes	0	90.4
2. Do you find it difficult to refrain from smoking in places where it is forbidden (e.g., in church, at the library, in a cinema, etc.)?	Yes	1	3.5
	No	0	96.5
3. Which cigarette would you hate most to give up?	The first one in the morning	1	17.1
	All others	0	82.9
4. How many cigarettes/day do you smoke?	10 or less	0	100
	11 – 20	1	0
	21 – 30	2	0
	31 or more	3	0
5. Do you smoke more frequently during the first hours after waking than during the rest of the day?	Yes	1	4.8
	No	0	95.2
6. Do you smoke if you are so ill that you are in bed most of the day?	Yes	1	7.1
	No	0	92.9



Hypothesis 3 was that upward as opposed to downward counterfactuals would result in a greater willingness to schedule a lung-capacity test. Hypothesis 4 was that additive as opposed to subtractive counterfactuals would result in a greater willingness to schedule a lung-capacity test. A hierarchical log-linear analysis was conducted to evaluate these hypotheses. Ill-fitting paths were removed in a stepwise backward elimination procedure to arrive at the simplest model that adequately fit the data. This analysis revealed one significant path (see Table 3), resulting in acceptable model fit,  $\chi^2(4, N = 84) = .612, p = .962$ . A significant Direction  $\times$  Lung Capacity interaction indicated that, counter to hypothesis 3, participants in downward counterfactual conditions (53.5%) were more likely to sign up for a lung capacity test than those in upward counterfactual conditions (31.7%),  $\chi^2_{\text{diff}}(1, N = 84) = 4.11, p = .043$ , Cramer's  $V = .22$ . The analysis did not reveal any significant effects of structure on willingness to schedule a lung-capacity test (additive 43.2%, subtractive 42.5%). That is, the results failed to support the hypothesis that additive as opposed to subtractive counterfactuals would result in greater willingness to schedule a lung-capacity test.

Table 3  
*Source Table for Tests of Hypotheses 3 and 4*

	<i>SS</i>	<i>Df</i>	<i>MS</i>	<i>F</i>	<i>P</i>	$\eta_p^2$
Direction	1.642	1	1.642	.089	.767	.001
Structure	8.354	1	8.354	.451	.504	.007
Direction $\times$ Structure	22.586	1	22.586	1.219	.274	.018
Error	1223.285	66	18.535			
Ladder	1.824	1	1.824	1.800	.184	.027
Ladder $\times$ Direction	.731	1	.731	.721	.399	.011
Ladder $\times$ Structure	.001	1	.001	.001	.974	.000
Ladder $\times$ Structure x Direction	.008	1	.008	.008	.928	.000
Error	66.881	66	1.013			

Limitations in statistical power prevented the inclusion of all variables in one analysis, so separate hierarchical log-linear analyses were conducted to evaluate the influence of the individual difference variables and the independent variables on participants' decision to sign up for a lung capacity test. The results revealed that the personality characteristics were all significantly associated with the manipulated variables independently of any association with the dependent variables, indicating that the randomization procedure used to establish equivalent groups failed (see Table 4). This may explain the unexpected result that participants in the downward counterfactual condition were more likely to sign up for a lung capacity test than those in the upward counterfactual condition (rather than vice versa, as hypothesized).

We were also interested in whether personality characteristics might moderate the influence of the counterfactual thinking manipulations on the lung-capacity test variable. As shown in Table 4, Optimism and cancer fatalism (as measured by the Powe) scores did not predict participants' decision to sign up for a lung-capacity test in their respective log-linear analyses. The final model of the log-linear analysis containing participants' Pessimism scores suggested that Pessimism predicted participants' decisions to sign up for a lung capacity test. However, a follow-up Chi square analysis indicated that participants who scored high (38.4%) and low (51.4%) on the pessimism scale did not differ in their likelihood of signing up for the lung-capacity test,  $\chi^2(1, N = 83) = 2.308, p = .129, \phi = .167$ .

Participants' receptivity to the counterfactual thinking interventions was expected to vary as a function of individual differences. More specifically, these individual differences included whether participants were classified as optimistic or pessimistic,

their consideration of future consequences, their readiness to change, and their level of fatalistic beliefs. These individual differences were examined in an exploratory fashion to determine their influence on participants' responses to the counterfactual thinking scenarios. For example, individuals higher in the consideration of the future consequences of their behavior were expected to be more affected by counterfactual thinking in general than those lower in the consideration of future consequences. Similarly, participants indicating more readiness to change, as well as those with lower fatalistic beliefs, were expected to be more affected by the counterfactual thinking interventions than those individuals lower on the contemplation ladder and those with higher fatalistic beliefs, respectively. However, the statistical analyses revealed no significant effects of these personality variables on the influence of the counterfactual thinking interventions.

Table 4  
*Log-linear Models Investigating the Influence of Individual Differences and Manipulations on Lung-Capacity Test Decision*

Individual Difference	Likelihood $\chi^2$	Df	p
Optimism	5.463	10	.858
Direction $\times$ Lung-Capacity			
Structure $\times$ Optimism			
Pessimism	3.522	10	.966
Direction $\times$ Lung-Capacity			
Pessimism $\times$ Lung-Capacity			
Powe	4.253	6	.642
Direction $\times$ Structure $\times$ Powe			
Direction $\times$ Lung-Capacity			

Finally, a mixed ANOVA was performed to see if there were any changes in the personality measures from pre-treatment to post-treatment or any interactions of the personality measures with the treatment. This analysis revealed a significant main effect between pre-treatment and post-treatment on the Smoking Consequences Questionnaire. Specifically, the subjective expectancies of cigarette smoking on two factors (i.e., Positive Reinforcement/ Sensory Satisfaction and Negative Reinforcement/ Negative Affect Reduction) decreased between the two administrations. Typically no change in personality measures would be expected across a 1-week span. This main effect could be cautiously interpreted as indicating that any counterfactual thinking induction may change perceptions of smoking consequences. However, this study did not include a counterfactual thinking control group, so this result may be due to a history effect or regression to the mean, rather than truly indicating a sensitizing effect to the consequences of smoking as a result of any counterfactual thinking induction (regardless of direction or structure). Table 5 includes the matrix of inter-correlations among the individual difference variables.

Table 5  
Correlation Matrix of Individual Differences Measures

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Optimum-Pessimism Instrument – O	–													
2. Optimum-Pessimism Instrument – P	-.44*	–												
3. Contemplation Ladder, Time 1	-.17	.20	–											
4. Contemplation Ladder, Time 2	-.09	.10	.90*	–										
5. Powe, Time 1	-.04	-.33	-.17	.01	–									
6. Powe, Time 2	-.01	-.20	-.18	.01	.86*	–								
7. Smoking Consequences-NC, Time 1	-.18	-.18	.15	.23	-.02	-.01	–							
8. Smoking Consequences-PR, Time 1	.15	-.31	-.30	.10	.33	.33	.12	–						
9. Smoking Consequences-NR, Time 1	.21	-.35	-.35	.19	.34	.31	.27	.82*	–					
10. Smoking Consequences-AWC, Time 1	.03	-.24	-.24	.12	.34	.37*	.25	.67*	.68*	–				
11. Smoking Consequences-NC, Time 2	-.18	-.12	-.12	.27	.02	.02	.84*	.08	.23	.21	–			
12. Smoking Consequences-PR, Time 2	.16	-.32	-.33	.09	.31	.31	.11	.93*	.77*	.62*	.12	–		
13. Smoking Consequences-NR, Time 2	.20	-.37*	-.25	.17	.35	.32	.24	.79*	.94*	.69*	.25	.81*	–	
14. Smoking Consequences-AWC, Time 2	.10	-.27	-.23	.09	.34	.35	.21	.68*	.71*	.91*	.22	.70*	.76*	–

\*Significant using Bonferroni procedure to control for Type I error inflation,  $p < .00055$ . OPI = Optimism-Pessimism Instrument. NC = Negative Consequences. PR = Positive Reinforcement. NR = Negative Reinforcement. AWC = Appetite-Weight Control.

## DISCUSSION

Four main hypotheses were investigated in this study regarding the direction and structure of counterfactual thinking and the possible effects of these on readiness to consider quitting smoking and willingness to schedule a lung-capacity test. Specifically, Hypothesis 1 was that upward as opposed to downward counterfactuals would result in a greater increase in readiness to consider quitting smoking. Hypothesis 2 was that additive as opposed to subtractive counterfactuals would result in a greater increase in readiness to consider quitting smoking. Hypothesis 3 was that upward as opposed to downward counterfactuals would result in greater willingness to schedule a lung-capacity test. Hypothesis 4 was that additive as opposed to subtractive counterfactuals would result in greater willingness to schedule a lung-capacity test.

The statistical analyses of the effects of the counterfactual scenarios on readiness to quit smoking and willingness to schedule a lung-capacity test revealed one significant result, which was counter to the prediction of Hypothesis 3. The results indicated that participants in downward counterfactual conditions were more likely to sign up for a lung capacity test than those in upward counterfactual conditions, which was unexpected. As addressed earlier, hierarchical log-linear analyses of the individual difference variables and their association with the independent and dependent variables revealed that the personality characteristics were significantly associated with the independent variables



independently of any association with the dependent variables, indicating that the randomization procedure used to establish equivalent groups failed. This may help account for the finding that individuals in the downward counterfactual condition were more likely to sign up for a lung-capacity test, although participants in the upward counterfactual condition were expected to do so. Proper procedures were followed to prevent this challenge to interpretation, including random assignment to the four counterfactual condition groups and testing an adequate number of participants. Despite following appropriate randomization procedures, the experimental groups apparently differed from one another in ways other than the counterfactual scenario to which they were assigned.

The current study expands upon Page and Colby's (2003) investigation of counterfactual thinking as an effective anti-smoking strategy by including the use of The Contemplation Ladder as an additional dependent variable. Page and Colby found that additive counterfactuals influenced individuals' willingness to participate in a lung-capacity test, whereas the results of the current study indicated that participants in the downward counterfactual condition were more likely to sign up for a lung-capacity test. One possible explanation for this difference could be due to the timing of the administration of the behavioral measure of signing up for the lung-capacity test. Page and Colby conducted three separate studies and queried the participants about signing up for a lung-capacity test as part of each, which varied in delay: immediately after the counterfactual manipulation, 2 days later, or 7 days after the counterfactual manipulation. They found that the willingness to participate in a lung-capacity test was strongest when individuals were asked the same day as the study in comparison to 2 or 7 days later. In

the current study, participants' willingness to sign up for a lung-capacity test was assessed 7 days later, which may have decreased the strength of the possible effect of the counterfactual conditions on individuals' willingness to participate in the lung-capacity test. Although Page and Colby still found a significant willingness to participate in a lung-capacity test 7 days after the counterfactual manipulation, the same result was not found in the current study.

Additional factors that may have had an influence on the results of the current study include an unsuccessful randomization procedure and the use of a convenience sample. Unsuccessful randomization may have influenced the results of the current study because the groups differed from one another, unlike the presumably equivalent groups used in Page and Colby's study. Also, the use of a convenience sample in the current study may have influenced the results by limiting the diversity of participants; no demographics beyond age and sex were reported by Page and Colby, so direct comparisons regarding these potential demographic issues are not possible.

### **Limitations of the Current Study**

The results of the current study did not replicate the findings of Page and Colby (2003). This may be due in part to the experimental groups in the current study differing from one another despite following proper procedures for randomization. Although the participants were randomly assigned to the four counterfactual conditions and an adequate sample size was used, the experimental groups differed from one another in ways other than the counterfactual scenario to which they were assigned. One suggestion to prevent this from occurring in the future would be to employ block randomization. Block randomization is a procedure in which each block (or grouping) includes a random

order of the conditions. The benefits of using this procedure to assign participants to conditions include ensuring an equal number of participants in each condition and balancing the effect of extraneous variables across conditions of the independent variables (Shaughnessy, Zechmeister, & Zechmeister, (2009). That is, block randomization controls for some sources of variability, leading to greater internal validity (Xiao, Lavori, Wilson, & Ma, 2011).

In addition to the experimental groups differing from one another despite randomization, the use of a convenience sample from a private-Midwestern University to compose the participant pool limited the diversity of the study's participants. Although there was an equivalent number of male and female participants, (N = 85; 42 males, 43 females) a majority (62.7%) of the participants were Caucasian, and the ages only varied from 18-23 years old. The homogeneity of the demographic characteristics of the participants limits the generalization of any findings (or lack thereof), and may have had a limiting influence on the results of the study.

Lastly, when a mixed ANOVA was performed to see if there were any changes in the personality measures from pre-treatment to post-treatment, a significant main effect was found pre-treatment to post-treatment on the Smoking Consequences Questionnaire. The subjective expectancies of cigarette smoking on two factors (i.e., Positive Reinforcement/Sensory Satisfaction and Negative Reinforcement/Negative Affect Reduction) changed between the two administrations. Normally, no change in personality measures would be expected across a 1-week span. The main effect could be an indication that *any* counterfactual thinking induction may change perceptions of smoking consequences. One limitation of this study was not having a counterfactual

thinking control group, so it is also possible that this result may be due to a history effect or regression to the mean, rather than actually indicating a sensitizing effect to the consequences of smoking as a result of any counterfactual thinking induction.

### **Directions for Future Research**

Beneficial smoking cessation intervention is crucial to counter the deadly effects of smoking. Although the current study did not obtain the hypothesized results, future studies could be conducted to expand upon Page and Colby's (2003) research. Further studies could include alternative or additional measures to enhance the examination of the effects of counterfactual thinking on smoking cessation. Additionally, including Bandura's Social Cognitive Theory, specifically incorporating the idea of self-efficacy, would be beneficial in future studies.

Self-efficacy is the belief that one has the ability to succeed in a given situation, involving a cognitive process in which individuals evaluate their capabilities to perform in designated behavioral domains (Bandura, 1977, 2001). There are two components that comprise an individual's perceptions of self-efficacy, including outcome expectancy and efficacy expectancy. Outcome expectancy refers to the belief in the likely consequences that behavior will produce, whereas efficacy expectancy refers to an individual's perceived ability to perform a behavior (Holloway & Watson, 2002). An individual's confidence in his or her ability to succeed in a specific scenario can have a significant influence on whether one decides he or she can achieve a desired goal, like quitting smoking.

It may be beneficial to include in future studies a measure of participants' self-efficacy, such as the General Self-Efficacy Scale (Scherbaum, Cohen-Charash, & Kern,

2006), as an additional individual difference variable. Individuals' past experiences and prior attributions of success to chance or skill result in different levels of generalized self-efficacy expectations. The General Self-Efficacy Scale measures the degree to which individuals perceive they can cope successfully with challenging demands, which is related to, but distinct from, other constructs such as self-esteem (feelings of general self-worth: Coopersmith, 1967). Including this measurement could contribute to the understanding of the role of individual differences in the effectiveness of using counterfactual thinking to encourage smoking cessation.

The current study was an investigation of the effects of counterfactual thinking as well as the role of individual differences in efforts to encourage smoking cessation readiness. There are many individual differences that could be investigated in addition to the effects of counterfactual thinking on smoking cessation, which could aid in understanding how to modify smoking-cessation programs to better meet the needs of specific populations. Counterfactual thinking can be a beneficial tool in influencing and regulating behavior (Epstude & Roese, 2008), and future research can extend the link between counterfactual thinking and health-related behaviors.

## REFERENCES

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179-211. doi:10.1016/0749-5978(91)90020-T
- American Cancer Society. (2012). Cancer Facts and Figures 2012 [On-line]. Available: <http://www.cancer.org/acs/groups/content/@epidemiologysurveillance/documents/document/acspc-031941.pdf>
- Armitage, C. J. (2005). Can the theory of planned behavior predict the maintenance of physical activity? *Health Psychology*, 24(3), 235-245. doi:10.1037/0278-6133.24.3.235
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84(2), 191-215. doi: 10.1037/0033-295X.84.2.191
- Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology* (Vol. 52, pp. 1-26). Palo Alto, CA: Annual Reviews. doi: doi:10.1146/annurev.psych.52.1.1
- Biener, L., & Abrams, D. B. (1991). The Contemplation Ladder: Validation of measure of readiness to consider smoking cessation. *Health Psychology*, 10(5), 360-365. doi:10.1037//0278-6133.10.5.360
- Burke, K. L., Joyner, A. B., Czech, D. R., & Wilson, M. J. (2000). An investigation of concurrent validity between two optimism/pessimism questionnaires: The Life

- Orientation Test-Revised and the Optimism/Pessimism Scale. *Current Psychology*, 19(2), 129-136. doi:10.1007/s12144-000-1009-5
- Centers for Disease Control and Prevention. (2010). Youth and Tobacco Use [On-line]. Available: [http://www.cdc.gov/tobacco/data\\_statistics/fact\\_sheets/youth\\_data/tobacco\\_use/index.htm](http://www.cdc.gov/tobacco/data_statistics/fact_sheets/youth_data/tobacco_use/index.htm)
- Coopersmith, S. (1967). *The antecedents of self-esteem*. San Francisco: Freeman.
- Dember, W. N., Martin, S. H., Hummer, M. K., Howe, S. R., & Melton, R. S. (1989). The measurement of optimism and pessimism. *Current Psychology: Research & Reviews*, 8(2), 102-119. doi:10.1007/BF02686675
- Emmons, K., Wechsler, H., Dowdall, G., & Abraham, M. (1998). Predictors of smoking among US college students. *American Journal of Public Health*, 88(1), 104-107. doi:10.2105/AJPH.88.1.104
- Epstude, K., & Roese, N. J. (2008). The functional theory of counterfactual thinking. *Personality and Social Psychology Review*, 12(2), 168-192. doi:10.1177/1088868308316091
- Fagerstrom, K. (2002). The epidemiology of smoking: Health consequences and benefits of cessation. *Drugs*, 62(2), 1-9. doi:10.2165/00003495-200262002-00001
- Fazio, R. H. (2007). Attitudes as object–evaluation associations of varying strength. *Social Cognition*, 25(5), 603-637. doi: 10.1521/soco.2007.25.5.603
- Fazio, R. H., Powell, M. C., & Williams, C. J. (1989). The role of attitude accessibility in the attitude-to-behavior process. *Journal of consumer Research*, 16, 280-288. doi:10.1086/209214
- Ferrer, R. A., Hall, K. L., Portnoy, D. B., Ling, B. S., Han, P. K. J., Klein, W. M. P.

- (2011). Relationships among health perceptions vary depending on stage of readiness for colorectal cancer screening. *Health Psychology, 30*(5), 525-535. doi:10.1037/a0023583
- Fong, G. T. (2004). The near-universal experience of regret among smokers in four countries: Findings from the International Tobacco Control Policy Evaluation Survey. *Nicotine and Tobacco Research, 6*(3), 341-351. doi:10.1080/14622200412331320743
- Gilovich, T. (1983). Biased evaluation and persistence in gambling. *Journal of Personality and Social Psychology, 44*, 1110-1126. doi:10.1037//0022-3514.44.6.1110
- Heatherton, T. F., Kozlowski, L. T., Frecker, R. C., & Fagerstrom, K. (1991). The Fagerstrom Test for Nicotine Dependence: A revision of the Fagerstrom Tolerance Questionnaire. *British Journal of Addiction, 86*, 1119-1127. doi:10.1111/j.1360-0443.1991.tb01879.x
- Holloway, A., & Watson, H. E. (2002). Role of self-efficacy and behaviour change. *International Journal of Nursing Practice, 8*(2), 106-115. doi:10.1046/j.1440-172x.2002.00352.x
- Hudmon, K. S., Pomerleau, C. S., Brigham, J., Javitz, H., & Swan, G. E. (2005). Validity of retrospective assessments of nicotine dependence: A preliminary report. *Addictive Behaviors, 30*(3), 613-617. <http://dx.doi.org/10.1016/j.addbeh.2004.08.006>
- Jasa, K. K. (1999). The construction of a scale to measure belief in fate. Paper prepared for Psychology 933 course, University of Kansas, Lawrence, KS.



- Jones, E. E., & Sigall, H. (1971). The bogus pipeline: A new paradigm for measuring affect and attitude. *Psychological Bulletin*, 76, 349-364. doi:10.1037/h0031617
- Kubzansky, L. D., Kubzansky, P. E., & Maselko, J. (2004). Optimism and pessimism in the context of health: Bipolar opposites or separate constructs? *Personality and Social Psychology Bulletin*, 30(8), 943-956. doi:10.1177/0146167203262086
- McGill, A. L., & Klein, J. G. (1993). Contrastive and counterfactual thinking in causal judgment. *Journal of Personality and Social Psychology*, 64, 897-905. doi:10.1037//0022-3514.64.6.897
- Page, C. M. & Colby, P. M. (2003). If only I hadn't smoked: The impact of counterfactual thinking on a smoking-related behavior. *Psychology & Marketing*, 20(11), 955-976. doi:10.1002/mar.10104
- Petty, R. E., Cacioppo, J. T., & Schumann, D. (1983). Central and peripheral routes to advertising effectiveness: The moderating role of involvement. *Journal of Consumer Research*, 10, 135-146. doi:10.1086/208954
- Powe, B. D. (2001). Cancer fatalism among elderly African American women: Predictors of the intensity of the perceptions. *Journal of Psychosocial Oncology*, 19(3/4), 85-95. doi:10.1300/J077v19n03\_07
- Powe, B. D., Hamilton, J., & Brooks, P. (2006). Perceptions of cancer fatalism and cancer knowledge: A comparison of older and younger African American women. *Journal of Psychosocial Oncology*, 24(4), 1-13. doi:10.1300/J077v24n04\_01
- Prochaska, J. O., Velicer, W. F., DiClemente, C. C., & Fava, J. (1988). Measuring processes of change: Applications to the cessation of smoking. *Journal of*

- Consulting and Clinical Psychology*, 56(4), 520-528. doi:10.1037//0022-006X.56.4.520
- Roese, N. J. (1994). The functional basis of counterfactual thinking. *Journal of Personality and Social Psychology*, 66, 805-818. doi:10.1037//0022-3514.66.5.805
- Roese, N. J. (1997). Counterfactual thinking. *Psychological Bulletin*, 121(1), 133-148. doi:10.1037//0033-2909.121.1.133
- Roese, N. J. (2000). Counterfactual thinking and marketing: Introduction to the special issue. *Psychology & Marketing*, 17, 277-280. doi:10.1002/(SICI)1520-6793(200004)17:4<277::AID-MAR1>3.0.CO;2-S
- Roese, N. J. (2004). Twisted pair: Counterfactual thinking and the hindsight bias. In *Blackwell's Handbook of Judgment and Decision-making*. D.J. Koheler & N. Harvey (eds.), pp. 258-273. doi:10.1002/9780470752937.ch13
- Roese, N. J., & Jamieson, D. W. (1993). Twenty years of bogus pipeline research: A critical review and metal-analysis. *Psychological Bulletin*, 114(2), 363-375. doi:10.1037//0033-2909.114.2.363
- Roese, N. J., & Olson, J. M. (1997). Counterfactual thinking: The intersection of affect and function. In M. P. Zanna (Ed.), *Advances in experimental social psychology*: Vol. 29 (pp. 1-59). San Diego, CA: Academic Press. doi:10.1016/S0065-2601(08)60015-5
- Roese, N. J. & Summerville, A. (2005). What we regret most ... and why. *Personality and Social Psychology Bulletin*, 31(9), 1273-1285. doi:10.1177/0146167205274693

- Rosenstock, I. M. (1974). Historical origins of the health belief model. *Health Education Monographs*, 2, 328-335. doi: 10.1177/109019817400200403
- Rosenstock, I. M., Strecher, V. J., & Becker, M. H. (1988). Social learning theory and the Health Belief Model. *Health Education Quarterly*, 15(2), 175-183.  
doi:10.1177/109019818801500203
- Sanna, L. J. (1996). Defensive pessimism, optimism, and simulating alternatives: Some ups and downs of prefactual and counterfactual thinking. *Journal of Personality and Social Psychology*, 71(5), 1020-1034. doi:10.1037/0022-3514.71.5.1020
- Sanna, L. J. (1998). Defensive pessimism and optimism: The bitter-sweet influence of mood on performance and prefactual and counterfactual thinking. *Cognition and Emotion*, 12(5), 635-665. doi:10.1080/026999398379484
- Schnoll, R. A., Rothman, R. L., Newman, H., Lerman, C., Miller, S. M., Movsas, B., Sherman, E., Ridge, J. A., Unger, M., Langer, C., Goldberg, M., Scott, W., & Cheng, J. (2004). Characteristics of cancer patients entering a smoking cessation program, and correlates of quit motivation: Implications for the development of tobacco control programs for cancer patients. *Psycho-Oncology*, 13(5), 346-358.  
doi:10.1002/pon.756
- Sanna, L. J., Chang, E. C., Carter, S. E., & Small, E. M. (2006). The future is now: Prospective temporal self-appraisals among defensive pessimists and optimists. *Personality and Social Psychology Bulletin*, 32(6), 727-738.  
doi:10.1177/0146167205285896
- Scherbaum, C. A., Cohen-Charash, Y., & Kern, M. J. (2006). Measuring General Self-Efficacy: A Comparison of Three Measures Using Item Response Theory.

*Educational and Psychological Measurement*, 66(6), 1047-1063. doi:  
10.1177/0013164406288171

Segura, S., & Morris, M. W. (2005). Scenario simulations in learning. Forms and function at the organizational level. In D. R. Mandel, D. J. Hilton, & P. Catellani (Eds.), *The psychology of counterfactual thinking* (pp. 94-109). New York: Routledge.

Shaughnessy, J. J., Zechmeister, E. B., & Zechmeister, J. S. (2009). *Research methods in psychology* (8<sup>th</sup> ed). New York: McGraw-Hill.

Simmons, V. N., Webb, M. S., & Brandon, T. H. (2004). College-student smoking: An initial test of an experiential dissonance-enhancing intervention. *Addictive Behaviors*, 29, 1129-1136. doi:10.1016/j.addbeh.2004.03.005

Smallman, R. & Roese, N. J. (2009). Counterfactual thinking facilitates behavioral intentions. *Journal of Experimental Social Psychology*, 45(4), 845-852. doi:10.1016/j.jesp.2009.03.002

Strathman, A., Gleicher, F., Boninger, D. S., & Edwards, C. S. (1994). The consideration of future consequences: Weighing immediate and distant outcomes of behavior. *Journal of Personality and Social Psychology*, 66(4), 742-752. doi:10.1037/0022-3514.66.4.742

Substance Abuse and Mental Health Services Administration. (2010). Results from the 2010 National Survey on Drug Use and Health. [On-line]. Available: <http://www.samhsa.gov/data/NSDUH/2k10NSDUH/2k10Results.htm#4.6>

Taylor, S. E. (1998). *Health psychology*. (4<sup>th</sup> ed.) New York: McGraw-Hill.

Wakefield, M., Flay, B., Nichter, M., & Giovino, G. (2003). Effects of anti-smoking

- advertising on youth smoking: A review. *Journal of Health Communication*, 8(3), 229-247. doi:10.1080/10810730305686
- Wechsler, H., Rigotti, N., Gledhill-Hoyt, J., & Lee, H. (1998). Increased levels of cigarette use among college students: A cause for national concern. *The Journal of the American Medical Association*, 280(19), 1673-1678. doi:10.1001/jama.280.19.1673
- Wells, G. L., Taylor, B. R., & Turtle, J. W. (1987). The undoing of scenarios. *Journal of Personality and Social Psychology*, 53(3), 421-430. doi:10.1037/0022-3514.53.3.421
- Wetter, D. W., Smith, S. S., Kenford, S. L., Jorenby, D. E., Fiore, M. C., Hurt, R. D., Offord, K. P., & Baker, T. B. (1994). Smoking outcome expectancies: Factor structure, predictive validity, and discriminant validity. *Journal of Abnormal Psychology*, 103(4), 801-811. doi:10.1037/0021-843X.103.4.801
- Xiao, L., Lavori, P. W., Wilson, S. R., & Ma, J. (2011). Comparison of dynamic block randomization and minimization in randomized trials: A simulation study. *Clinical Trials*, 8(1), 59-69. doi: 10.1177/1740774510391683

## APPENDIX A

### PHYSICIAN'S REPORT

You have occasionally smoked cigarettes for the past 4 years. You are very confident that because you are young, eat relatively well, and occasionally exercise, your risk of having lung-related problems is extremely low. Upon your last visit to the doctor, you discover that your lung capacity has decreased by 30 percent and that you have an abnormal growth in your lungs. The doctor is concerned that the growth started 2 years ago and has progressively gotten worse. The doctor wants to take a biopsy from your lungs to check for cancer.

## APPENDIX B

### COUNTERFACTUAL SCENARIOS

#### Upward Additive

People often have thoughts like “if only . . .” after negative events, in that they can see how things may have turned out better. For example, an Albany woman who recently sustained minor injuries when she was hit by a car told reporters, “If only I had looked down the street a second time, I would’ve been fine.” Often, we wish we had done something to avoid a negative outcome.

Please complete the statement below, listing some *specific actions* that, in retrospect, you could have done to *improve* your current health condition.

If only I had . . .

#### Upward Subtractive

People often have thoughts like “if only . . .” after negative events, in that they can see how things may have turned out better. For example, an Albany woman who recently sustained minor injuries when she was hit by a car told reporters, “If only I had not been in such a rush, I would’ve been fine.” Often, we wish we hadn’t done something that led to a negative outcome.

Please complete the statement below, listing some *specific actions* that, in retrospect, you should not have done, i.e., not having done them would have *improved* your current health condition.

If only I had not . . .

#### Downward Additive

People often have thoughts like “well at least . . .” after negative events, in that they can see how things may have turned out worse. For example, an Albany woman who recently sustained minor injuries when she was hit by a car told reporters, “At least I didn’t try to move around a lot after the accident, or it would have been a lot worse.” Often, there are things that could have happened that would have made a negative outcome worse.

Please complete the statement below, listing some *specific actions* that, in retrospect, you could have done that would have made your current health condition *even worse*.

Well, at least I did not . . .

### **Downward Subtractive**

People often have thoughts like “well at least . . .” after negative events, in that they can see how things may have turned out worse. For example, an Albany woman who recently sustained minor injuries when she was hit by a car told reporters, “At least I had my medic-alert bracelet on, or it would have been a lot worse.” Often, negative outcomes could have been worse if certain actions had not been taken.

Please complete the statement below, listing some *specific actions* you did that would have made your current health condition *even worse* if you had not done them.

Well, at least I . . .



## APPENDIX C

### INFORMED CONSENT TO PARTICIPATE IN A RESEARCH PROJECT

<b>Project Title:</b>	Social Health Behaviors
<b>Investigator(s):</b>	Erika Eavers and Melissa A. Berry Ph.D. (faculty sponsor)
<b>Description of Study:</b>	Participants will be asked to fill out questionnaires about their smoking behavior and various beliefs and attitudes related to health behaviors, and also asked to read a brief scenario involving a potential cancer diagnosis and provide a written response to it.
<b>Adverse Effects and Risks:</b>	Adverse effects that may be possible as a result of participating in this study include potential stress and/or discomfort associated with efforts toward reducing/quitting smoking.
<b>Duration of Study:</b>	This study consists of two sessions, each lasting 30-60 minutes.
<b>Confidentiality of Data:</b>	Your name will be kept separate from the data and will be identified only by code. Only the investigators named above will have access to the data. Your name will not be revealed in any document resulting from this study.
<b>Contact Person:</b>	Students may contact Erika Eavers (erikaeavers@gmail.com; 937-532-9510) or Melissa Berry, Ph.D. ( <a href="mailto:melissa.berry@notes.udayton.edu">melissa.berry@notes.udayton.edu</a> ; 937-229-2290) in SJ 317 if they have questions or problems after the study. If participants have any questions regarding their rights in psychological studies as outlined by the APA Code of Ethics they may also contact the acting chair of the Psychology Department's Research Review and Ethics Committee at the University of Dayton, Dr. Greg Elvers in SJ 312, 937-229-2171 (greg.elvers@notes.udayton.edu). Any students experiencing discomfort from participating in this study may wish to contact the UD Counseling Center in Gosiger Hall, open 8:30 am - 4:30 pm, 937-229-3141.

**Consent to Participate:**

“I have voluntarily decided to participate in this study. The investigator named above has adequately answered any and all questions I have about this study, the procedures involved, and my participation. I understand that the investigator named above will be available to answer any questions about research procedures throughout this study. I also understand that I may voluntarily terminate my participation in this study at any time and still receive full credit. I also understand that the investigator named above may terminate my participation in this study if s/he feels this to be in my best interest. In addition, I certify that I am 18 (eighteen) years of age or older.”

---

Signature of Student

Student's Name (printed)

Date

---

Signature of Witness

Date

APPENDIX D  
DEMOGRAPHICS QUESTIONNAIRE

Please help us understand our participants better by responding to the following items about you and your life situation. You are under no obligation to answer any question that you find objectionable. However, we would appreciate your answering as many questions as possible. All responses will be kept confidential.

Participant #: \_\_\_\_\_

Today's Date: \_\_\_\_\_

1. What is your sex?   ☐ Male                      ☐ Female
2. Date of Birth: \_\_\_\_\_  
   mm/dd/year
3. What is your current year in school?  
    ☐ First Year   ☐ Sophomore   ☐ Junior   ☐ Senior   ☐ Other (Please explain) \_\_\_\_\_
4. What level of education did your mother complete?  
    ☐ Elementary School  
    ☐ Junior High School  
    ☐ High School  
    ☐ Business or Technical Training  
    ☐ Some College (no degree)  
    ☐ University Degree, Bachelor level or equivalent  
    ☐ Post-graduate Degree
5. What level of education did your father complete?  
    ☐ Elementary School  
    ☐ Junior High School  
    ☐ High School  
    ☐ Business or Technical Training  
    ☐ Some College (no degree)  
    ☐ University Degree, Bachelor level or equivalent  
    ☐ Post-graduate Degree
6. What is your current approximate GPA? \_\_\_\_\_

7. What is your marital status?
- ☐ Single   ☐ Separated   ☐ Widowed   ☐ Married   ☐ Divorced
8. With which ethnic/racial group do you most identify yourself? (please check one)
- ☐ Asian/Asian-American/Pacific Islander  
☐ Black/African/African-American  
☐ Hispanic or Latino/a  
☐ Native American  
☐ White/Caucasian  
☐ Other
9. Have you had a cigarette in the past 30 days?
- ☐ Yes                      ☐ No

APPENDIX E

BOGUS PIPELINE

Please list the names and contact information of two people who can verify your smoking behavior for us.

	NAME	EMAIL	PHONE #
(1)	_____	_____	_____
(2)	_____	_____	_____

## APPENDIX F

### CONSIDERATION OF FUTURE CONSEQUENCES SCALE

**For each of the statements below, please indicate whether or not the statement is characteristic of you. If the statement is extremely *uncharacteristic* of you (not at all like you) please write a “1” on the line next to the item number; if the statement is extremely *characteristic* of you (very much like you) please write a “5” on the line. And, of course, use the numbers in the middle if you fall between the extremes. Please keep the following scale in mind as you rate each of the statements below.**

- |  | 1                | 2                | 3         | 4              | 5              |
|--|------------------|------------------|-----------|----------------|----------------|
|  | extremely        | somewhat         | uncertain | somewhat       | extremely      |
|  | uncharacteristic | uncharacteristic |           | characteristic | characteristic |
- 
- \_\_\_ 1. I consider how things might be in the future, and try to influence those things with my day to day behavior.
  - \_\_\_ 2. Often I engage in a particular behavior in order to achieve outcomes that may not result for many years.
  - \_\_\_ 3. I only act to satisfy immediate concerns, figuring the future will take care of itself.
  - \_\_\_ 4. My behavior is only influenced by the immediate (i.e., a matter of days or weeks) outcomes of my actions.
  - \_\_\_ 5. My convenience is a big factor in the decisions I make or the actions I take.
  - \_\_\_ 6. I am willing to sacrifice my immediate happiness or well-being in order to achieve future outcomes.
  - \_\_\_ 7. I think it is important to take warnings about negative outcomes seriously even if the negative outcome will not occur for many years.
  - \_\_\_ 8. I think it is more important to perform a behavior with important distant consequences than a behavior with less-important immediate consequences.
  - \_\_\_ 9. I generally ignore warnings about possible future problems because I think the problems will be resolved before they reach crisis level.

- \_\_\_ 10. I think that sacrificing now is usually unnecessary since future outcomes can be dealt with at a later time.
- \_\_\_ 11. I only act to satisfy immediate concerns, figuring that I will take care of future problems that may occur at a later date.
- \_\_\_ 12. Since my day to day work has specific outcomes, it is more important to me than behavior that has distant outcomes.

## APPENDIX G

### OPTIMISM/PESSIMISM INSTRUMENT

**Instructions:** The 56 statements printed below represent individual differences in viewpoint. Using the scale below, please respond with your own point of view to all of the statements. For example, if you *strongly agree* with a statement, write a “1” on the line. Don’t spend a lot of time thinking about each one; just indicate your first impression. Remember: respond to these statements according to how you feel about them right now.

A	B	C	D
1	2	3	4
strongly agree	agree	disagree	strongly disagree

- \_\_\_\_ (1) I like people I get to know.
- \_\_\_\_ (2) It is best not to set your hopes too high since you will probably be disappointed.
- \_\_\_\_ (3) There is so much to be done and so little time to do it in.
- \_\_\_\_ (4) I have a tendency to make mountains out of molehills.
- \_\_\_\_ (5) Rarely do I expect good things to happen.
- \_\_\_\_ (6) Everything changes so quickly these days that I often have trouble deciding which are the right rules to follow.
- \_\_\_\_ (7) All in all the world is a good place.
- \_\_\_\_ (8) When it comes to my future plans and ambitions in life, I expect more to go wrong than right.
- \_\_\_\_ (9) My hardest battles are with myself.
- \_\_\_\_ (10) I believe there’s not much hope for the human race.
- \_\_\_\_ (11) It does not take me long to shake off a bad mood.
- \_\_\_\_ (12) If you hope and wish for something long and hard enough, you will eventually get it.
- \_\_\_\_ (13) People get ahead by using “pull” and not because of what they know.
- \_\_\_\_ (14) Even when things in my life are going okay, I expect them to get worse soon.
- \_\_\_\_ (15) With enough faith, you can do almost anything.
- \_\_\_\_ (16) I enjoy myself most when I am alone, away from other people.



***Continue responding to the statements on this page according to how you feel about them right now, using the scale below:***

A	B	C	D
1	2	3	4
strongly agree	agree	disagree	strongly disagree

- \_\_\_ (17) When I undertake something new, I expect to succeed.
- \_\_\_ (18) Honesty is the best policy in all cases.
- \_\_\_ (19) I generally look at the brighter side of life.
- \_\_\_ (20) If I make a decision on my own, I can pretty much count on the fact that it will turn out to be a poor one.
- \_\_\_ (21) I generally make light of my problems.
- \_\_\_ (22) It is always a good thing to be frank.
- \_\_\_ (23) Where there's a will, there's a way.
- \_\_\_ (24) I have a tendency to blow up problems so they seem worse than they really are.
- \_\_\_ (25) All in all, it is better to be humble and honest than important and dishonest.
- \_\_\_ (26) As time goes on, things will most likely get worse.
- \_\_\_ (27) It is the slow, steady worker who usually accomplishes the most in the end.
- \_\_\_ (28) When I go to a party I expect to have fun.
- \_\_\_ (29) Times are getting better.
- \_\_\_ (30) Everyone should have an equal chance and an equal say.
- \_\_\_ (31) Better to expect defeat: then it doesn't hit so hard when it comes.
- \_\_\_ (32) It is wise to flatter important people.
- \_\_\_ (33) I expect to achieve most of the things I want in life.
- \_\_\_ (34) It seems the cards of life are stacked against me.
- \_\_\_ (35) What is lacking in the world today is the old kind of friendship that lasted a lifetime.
- \_\_\_ (36) When the forecast predicts 50% chance of rain, you might just as well count on seeing rain.
- \_\_\_ (37) Before an interview, I am usually confident that things will go well.
- \_\_\_ (38) Sometimes I feel down, but I bounce right back again.
- \_\_\_ (39) The future seems too uncertain for people to make serious plans.
- \_\_\_ (40) When I have undertaken a task, I find it difficult to set it aside even for a short time.
- \_\_\_ (41) Tenderness is more important than love.
- \_\_\_ (42) When gambling, I expect to lose.

***Continue responding to the statements on this page according to how you feel about them right now, using the scale below:***

A	B	C	D
1	2	3	4
strongly agree	agree	disagree	strongly disagree

- \_\_\_\_ (43) Anybody who is willing to work hard has a good chance for success.
- \_\_\_\_ (44) The future looks very dismal.
- \_\_\_\_ (45) If I had to choose between happiness and greatness, I'd choose greatness.
- \_\_\_\_ (46) Minor setbacks are something I usually ignore.
- \_\_\_\_ (47) In general, things turn out all right in the end.
- \_\_\_\_ (48) It is better to be a dead hero than a live coward.
- \_\_\_\_ (49) Give me 50/50 odds and I will choose the wrong answer every time.
- \_\_\_\_ (50) It is hard to get ahead without cutting corners here and there.
- \_\_\_\_ (51) If I were in a competition and the contestants were narrowed down to me and one other person, I would expect to be runner-up.
- \_\_\_\_ (52) April showers bring May flowers.
- \_\_\_\_ (53) I can be comfortable with nearly all kinds of people.
- \_\_\_\_ (54) The worst defeats come after the best victories.
- \_\_\_\_ (55) In the history of the human race there have probably been just a handful of really great thinkers.
- \_\_\_\_ (56) Every cloud has a silver lining.

## APPENDIX H

### FAGERSTROM TEST FOR NICOTINE DEPENDENCE

- (1) How soon after you wake up do you smoke your first cigarette?
  - a. within 5 minutes
  - b. 6-30 minutes
  - c. 31-60 minutes
  - d. after 60 minutes
  
- (2) Do you find it difficult to refrain from smoking in places where it is forbidden (e.g., in church, at the library, in a cinema, etc.)?
  - a. yes
  - b. no
  
- (3) Which cigarette would you hate most to give up?
  - a. the first one in the morning
  - b. all others
  
- (4) How many cigarettes/day do you smoke?
  - a. 10 or less
  - b. 11-20
  - c. 21-30
  - d. 31 or more
  
- (5) Do you smoke more frequently during the first hours after waking than during the rest of the day?
  - a. yes
  - b. no
  
- (6) Do you smoke if you are so ill that you are in bed most of the day?
  - a. yes
  - b. no

## APPENDIX I

### CONTEMPLATION LADDER

Each rung on this ladder represents where various smokers are in their thinking about quitting. Circle the number that indicates where you are now.

10	→	Taking action to quit (e.g., cutting down, enrolling in a program).
9		
8	→	Starting to think about how to change my smoking patterns.
7		
6		
5	→	Think I should quit but not quite ready.
4		
3		
2	→	Think I need to consider quitting someday.
1		
0	→	No thought of quitting.

Please check box if this questionnaire is not applicable to you (i.e., you have NOT had a cigarette in the past month).

## APPENDIX J

### MODIFIED POWE FATALISM INVENTORY

1. I think if someone is meant to have cancer, it doesn't matter whether they smoke, they will get cancer anyway.	<b>YES</b> <b>1</b>	<b>NO</b> <b>2</b>
2. I think if someone has cancer, it is already too late to get treated for it.	<b>YES</b> <b>1</b>	<b>NO</b> <b>2</b>
3. I think someone can smoke all their life, and if they are not meant to get cancer, they won't get it.	<b>YES</b> <b>1</b>	<b>NO</b> <b>2</b>
4. I think if someone is meant to get cancer, they will get it no matter what they do.	<b>YES</b> <b>1</b>	<b>NO</b> <b>2</b>
5. I think if someone gets cancer, it was meant to be.	<b>YES</b> <b>1</b>	<b>NO</b> <b>2</b>
6. I think if someone gets cancer, their time to die is soon.	<b>YES</b> <b>1</b>	<b>NO</b> <b>2</b>
7. I think if someone gets cancer, that's the way they were meant to die.	<b>YES</b> <b>1</b>	<b>NO</b> <b>2</b>
8. I think getting checked for cancer makes people scared that they may really have cancer.	<b>YES</b> <b>1</b>	<b>NO</b> <b>2</b>
9. I think if someone is meant to have cancer, they will have cancer.	<b>YES</b> <b>1</b>	<b>NO</b> <b>2</b>
10. I think some people don't want to know if they have cancer because they don't want to know they may be dying from it.	<b>YES</b> <b>1</b>	<b>NO</b> <b>2</b>
11. I think if someone gets cancer, it doesn't matter whether they find it early or late, they will still die from it.	<b>YES</b> <b>1</b>	<b>NO</b> <b>2</b>
12. I think if someone has cancer and gets treatment for it, they will probably still die from the cancer.	<b>YES</b> <b>1</b>	<b>NO</b> <b>2</b>

13. I think if someone was meant to have cancer, it doesn't matter what doctors and nurses tell them to do, they will get cancer anyway.	<b>YES 1</b>	<b>NO 2</b>
14. I think if someone is meant to have cancer, it doesn't matter if they smoke or not, they will still get cancer.	<b>YES 1</b>	<b>NO 2</b>
15. I think cancer will kill you no matter when it is found or how it is treated.	<b>YES 1</b>	<b>NO 2</b>

## APPENDIX K

### BELIEFS IN FATE SCALE

**Scale Items and Directions:** Read each statement and then write the number that comes closest to how much you **Disagree** or **Agree** with the statement, according to the following scale:

- 1 = strongly disagree
- 2 = moderately disagree
- 3 = slightly disagree
- 4 = neither agree nor disagree
- 5 = slightly agree
- 6 = moderately agree
- 7 = strongly agree

- \_\_\_ 1. If something is meant to happen, it will.
- \_\_\_ 2. Things that happen in life are the result of choices made.
- \_\_\_ 3. Careful drivers are just as likely to get hurt in traffic accidents as careless ones.
- \_\_\_ 4. Things that happen in life are part of a greater plan.
- \_\_\_ 5. Too many people refuse to take charge of their own lives.
- \_\_\_ 6. Luck played a large part in where I am today.
- \_\_\_ 7. Success in life depends mostly on being in the right place at the right time.
- \_\_\_ 8. Nowadays a person has to live pretty much for today and let tomorrow take care of itself.
- \_\_\_ 9. I can do just about anything I really set my mind to do.
- \_\_\_ 10. What happens to me in the future mostly depends on me.
- \_\_\_ 11. Whether you succeed in business is mostly a function of being in the right place at the right time.
- \_\_\_ 12. Our future is largely the result of choices we make today.
- \_\_\_ 13. I got where I am today because of my own talent and hard work.
- \_\_\_ 14. "Eat, drink, and be merry, for tomorrow you may die" is a good philosophy to live by.
- \_\_\_ 15. I have little control over the things that happen to me.
- \_\_\_ 16. Meeting the right romantic partner is really a question of fate.
- \_\_\_ 17. I can do very little to change my destiny.
- \_\_\_ 18. Everything happens for a reason.

- \_\_\_ 19. Life is like playing the lottery.
- \_\_\_ 20. I've always felt like the right person was out there waiting for me.
- \_\_\_ 21. I feel like I was put here on earth for a reason.
- \_\_\_ 22. There is little I can do to change my future.
- \_\_\_ 23. When something bad happens, it is usually because something good is right around the corner.
- \_\_\_ 24. I have a great deal of influence on what happens to me.



## APPENDIX L

### SMOKING CONSEQUENCES QUESTIONNAIRE

**Instructions:** This questionnaire is designed to assess beliefs people have about the consequences of smoking a cigarette. Below is a list of statements about smoking. We would like you to rate how **LIKELY** or **UNLIKELY** you believe each consequence is for you when you smoke. If the consequence seems **UNLIKELY** to you, indicate a number from “0” to “4”. If the consequence seems **LIKELY** to you, indicate a number from “5” to “9.” That is, if you believe the consequence would never happen, indicate 0; if you believe the consequence would happen every time you smoke, indicate 9.

	0	1	2	3	4	5	6	7	8	9
	Completely Unlikely	Extremely	Very	Somewhat	A little	A little	Somewhat	Very	Extremely	Completely Likely
1. Cigarettes taste good.	0	1	2	3	4	5	6	7	8	9
2. Smoking controls my appetite.	0	1	2	3	4	5	6	7	8	9
3. Smoking reduces my anger.	0	1	2	3	4	5	6	7	8	9
4. Cigarettes help me concentrate.	0	1	2	3	4	5	6	7	8	9
5. My throat burns after smoking.	0	1	2	3	4	5	6	7	8	9
6. Cigarettes help me deal with anxiety or worry.	0	1	2	3	4	5	6	7	8	9
7. I enjoy the taste sensations while smoking.	0	1	2	3	4	5	6	7	8	9
8. Smoking helps me deal with depression.	0	1	2	3	4	5	6	7	8	9
9. I become more addicted the more I smoke.	0	1	2	3	4	5	6	7	8	9
10. If I'm tense, a cigarette helps me to relax.	0	1	2	3	4	5	6	7	8	9
11. Cigarettes keep me from overeating.	0	1	2	3	4	5	6	7	8	9
12. Cigarettes help me deal with anger.	0	1	2	3	4	5	6	7	8	9

Please continue to rate how **LIKELY** or **UNLIKELY** you believe each consequence is for you when you smoke. If the consequence seems **UNLIKELY** to you, circle a number from “0” to “4”. If the consequence seems **LIKELY** to you, circle a number from “5” to “9”. That is if you believe the consequence would never happen, circle 0; if you believe the consequence would happen every time you smoke, circle 9.

0	1	2	3	4	5	6	7	8	9						
Completely Unlikely	Extremely	Very	Somewhat	A little	A little	Somewhat	Very	Extremely	Completely Likely						
13. When I smoke the taste is pleasant.						0	1	2	3	4	5	6	7	8	9
14. Cigarettes make my lungs hurt.						0	1	2	3	4	5	6	7	8	9
15. If I'm disappointed in myself, a good smoke can help.						0	1	2	3	4	5	6	7	8	9
16. I will probably die earlier if I continue to smoke.						0	1	2	3	4	5	6	7	8	9
17. I will enjoy the flavor of a cigarette.						0	1	2	3	4	5	6	7	8	9
18. Smoking makes me seem less attractive.						0	1	2	3	4	5	6	7	8	9
19. I will enjoy feeling a cigarette on my tongue.						0	1	2	3	4	5	6	7	8	9
20. Smoking will make me cough.						0	1	2	3	4	5	6	7	8	9
21. If I have nothing to do, a smoke can help kill time.						0	1	2	3	4	5	6	7	8	9
22. By smoking I risk heart disease and lung cancer.						0	1	2	3	4	5	6	7	8	9
23. Cigarettes help me reduce or handle tension.						0	1	2	3	4	5	6	7	8	9
24. I enjoy parties more when I'm smoking.						0	1	2	3	4	5	6	7	8	9
25. People think less of me if they see me smoking.						0	1	2	3	4	5	6	7	8	9
26. When I am sad, smoking makes me feel better.						0	1	2	3	4	5	6	7	8	9
27. Cigarettes control me more and more the longer I smoke.						0	1	2	3	4	5	6	7	8	9
28. If I'm feeling irritable, a smoke will help me relax.						0	1	2	3	4	5	6	7	8	9
29. My mouth tastes bad after smoking.						0	1	2	3	4	5	6	7	8	9
30. I like to watch the smoke from my cigarette.						0	1	2	3	4	5	6	7	8	9
31. I will become more dependent on cigarettes if I smoke.						0	1	2	3	4	5	6	7	8	9
32. Smoking helps me control my weight.						0	1	2	3	4	5	6	7	8	9
33. I really enjoy a cigarette when relaxed and feeling good.						0	1	2	3	4	5	6	7	8	9
34. Cigarettes give me something to do with my hands.						0	1	2	3	4	5	6	7	8	9

Please continue to rate how **LIKELY** or **UNLIKELY** you believe each consequence is for you when you smoke. If the consequence seems **UNLIKELY** to you, circle a number from “0” to “4”. If the consequence seems **LIKELY** to you, circle a number from “5” to “9”. That is if you believe the consequence would never happen, circle 0; if you believe the consequence would happen every time you smoke, circle 9.

	0	1	2	3	4	5	6	7	8	9
	Completely Unlikely	Extremely	Very	Somewhat	A little	A little	Somewhat	Very	Extremely	Completely Likely
35. When I'm upset with someone, a cigarette helps me cope.	0	1	2	3	4	5	6	7	8	9
36. The more I smoke, the more I risk my health.	0	1	2	3	4	5	6	7	8	9
37. Each cigarette I smoke maintains my addiction.	0	1	2	3	4	5	6	7	8	9
38. Cigarettes keep me from eating more than I should.	0	1	2	3	4	5	6	7	8	9
39. I look ridiculous while smoking.	0	1	2	3	4	5	6	7	8	9
40. Smoking keeps my weight down.	0	1	2	3	4	5	6	7	8	9
41. The longer I smoke, the harder it will be to quit.	0	1	2	3	4	5	6	7	8	9
42. Smoking is hazardous to my health.	0	1	2	3	4	5	6	7	8	9
43. I enjoy the feeling of the smoke hitting my mouth and the back of my throat.	0	1	2	3	4	5	6	7	8	9
44. Smoking calms me down when I feel nervous.	0	1	2	3	4	5	6	7	8	9
45. Smoking irritates my mouth and throat.	0	1	2	3	4	5	6	7	8	9
46. Smoking temporarily reduces repeated urges for cigarettes.	0	1	2	3	4	5	6	7	8	9
47. When I'm angry a cigarette can calm me down.	0	1	2	3	4	5	6	7	8	9
48. I feel more at ease with other people if I have a cigarette.	0	1	2	3	4	5	6	7	8	9
49. Cigarettes are good for boredom.	0	1	2	3	4	5	6	7	8	9
50. Smoking is taking years off my life.	0	1	2	3	4	5	6	7	8	9

APPENDIX M

SMOKING SELF-REPORT MEASURE

1. Have you smoked at all in the past week?
  - a. yes
  - b. no

1-A. If yes, how much did you smoke?  
Approximately \_\_\_\_\_ cigarettes per day
2. In the past week, have you changed your smoking behavior at all? Have you cut down or increased the number of cigarettes you smoke?
  - a. cut down the number of cigarettes smoked
  - b. no change in my smoking behavior
  - c. increased the number of cigarettes smoked
3. Are you seriously considering quitting smoking in the next six months?
  - a. yes
  - b. no
4. Are you planning to quit smoking cigarettes in the next 30 days?
  - a. yes
  - b. no
5. How many times in the last week have you stopped smoking for at least 24 hours?
  - a. Once
  - b. Twice
  - c. 3 times
  - d. 4 times
  - e. 5 times
  - f. 6 times
  - g. 7 times

6. How confident are you that you will not be smoking a year from now?
- a. Extremely confident
  - b. Very confident
  - c. Somewhat confident
  - d. Slightly confident
  - e. Not confident
7. How determined are you that you will not be smoking a year from now?
- a. Extremely determined
  - b. Very determined
  - c. Somewhat determined
  - d. Slightly determined
  - e. Not at all determined

APPENDIX N

EXPERIMENTER SCRIPT

“We would like to know if you are willing to participate in a lung-capacity test. The test is being offered by the *Health and Sport Science* department here at the university. The test will only take a few minutes and the results of the lung-capacity test will be available immediately. If you are willing to participate in the lung-capacity test, please write down your name, email and phone number so someone from the department can contact you to schedule the test.”

## APPENDIX O

### BEHAVIORAL MEASURE: LUNG-CAPACITY TEST SIGN-UP

**NAME**

**EMAIL**

**PHONE #**

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## APPENDIX P

### DEBRIEFING FOR “SMOKING VIEWS AND BEHAVIORS”

#### **Information about the Study**

The goal of this study is to encourage smoking cessation efforts through the use of counterfactual thinking. *Counterfactual thinking* is when we consider “What might have been,” or when we begin thoughts with “If only...”. People often consider such alternatives to reality, and research has shown that these thoughts have the potential to influence future behavior. You were asked to read a scenario and write counterfactual thoughts in response to the contents of that scenario.

We administered several scales to better understand our participants’ beliefs surrounding smoking behavior and their efforts to quit smoking. One scale was the Consideration for Future Consequences scale, which measures the extent to which people consider immediate versus distant consequences of their behaviors. We also assessed participants’ overall optimism and pessimism, as well as their beliefs in fate (both generally and specifically regarding cancer). The Fagerstrom Test for Nicotine Dependence was included to measure participants’ level of nicotine dependence, and the Contemplation Ladder was used to help us determine participants’ various stages with respect to their intentions to quit smoking.

We are also interested in participants’ stated intentions to quit smoking, as well as their willingness to participate in a lung-capacity test (which served as a behavioral measure of the intention to quit). Although we are not actually conducting the lung-capacity test as part of this study, you may contact the student health center or your family physician to ask about having such a test performed. Deception was necessary and was less invasive than actually conducting the lung-capacity test. We also asked participants to list two people who could verify their smoking behavior. The individuals listed were not contacted but the list was used to increase the truthfulness of participants’ self-report answers. The deception was necessary to gain accurate smoking behavior information, and alternative methods (such as saliva swabs) would be more intrusive. All deception was used only when necessary.

We will do statistical tests on all participants’ responses to see how these factors interact with our counterfactual thinking intervention. If you have any questions, please ask the researcher. For further information about this area of psychological research, you may wish to read the articles listed below.



## References

- Page, C.M. & Colby, P.M. (2003). If only I hadn't smoked: The impact of counterfactual thinking on a smoking-related behavior. *Psychology & Marketing*, 20(11), 955-976.
- Fried, C.B. & Aronson, E. (1995). Hypocrisy, misattribution, and dissonance reduction. *Personality and Social Psychology Bulletin*, 21(9), 925-933.

Additionally, any participants who are interested in learning more about the effects of smoking or who are looking for supportive resources to aid in their efforts to reduce their smoking or to quit altogether may wish to consult the following websites:

- [www.smokefree.gov](http://www.smokefree.gov), specifically [www.smokefree.gov/resources.htm](http://www.smokefree.gov/resources.htm) or [www.smokefree.gov/pubs/Clearing-The-Air\\_acc.pdf](http://www.smokefree.gov/pubs/Clearing-The-Air_acc.pdf)
- [www.smoking-cessation.org/](http://www.smoking-cessation.org/)

## Assurance of Privacy

We are seeking general principles of behavior and are not evaluating you personally in any way. Your responses will be confidential and your responses will only be identified by a participant number in the data set along with other participants' numbers.

## Deception

As part of this study, you were asked about your smoking behaviors, and you were also asked to provide the names and contact information of two individuals who could verify your smoking behavior. Research has indicated that this is an effective way to increase the accuracy of people's self-reports about such behaviors. Likewise, that was our purpose; we will not actually contact the individuals you listed. Please know that we only use deception in research when it is necessary. If for any reason you do not wish for your data to be included in our analyses, please contact us using the information provided on this sheet and we will remove your responses from the overall data set.

## Contact Information

Students may contact Erika Eavers ([erikaeavers@gmail.com](mailto:erikaeavers@gmail.com); 937-532-9510) or Melissa Berry, Ph.D. in SJ 317 ([melissa.berry@notes.udayton.edu](mailto:melissa.berry@notes.udayton.edu); 937-229-2290) if they have questions or problems after the study. If participants have any questions regarding their rights in psychological studies as outlined by the APA Code of Ethics they may also contact the acting chair of the Psychology Department's Research Review and Ethics Committee at the University of Dayton, Dr. Greg Elvers in SJ 312 937-229-2171; [greg.elvers@notes.udayton.edu](mailto:greg.elvers@notes.udayton.edu)). Any students experiencing discomfort from participating in this study may wish to contact the University of Dayton Counseling Center, in Gosiger Hall, 8:30 am - 4:30 pm, at 937-229-3141. Confidential counseling services are available at no charge to students. Additionally, students interested in reducing/quitting smoking are invited to contact the Student Health Center in Gosiger Hall, 8:30am-6:00pm, at 937-229-3131.

Thank you for participating in this study. We will make sure you receive research credit.

APPENDIX Q

PERSONALITY VARIABLES' ASSOCIATION WITH INDEPENDENT AND  
DEPENDENT VARIABLES

Table 6  
*Hierarchical Log-linear Analyses*

Measure	$\chi^2$	N	df	P
Optimism				
Direction X Lung Capacity	5.463	82	10	.858
<b>Structure X Optimism</b>				
Pessimism				
Direction X Lung Capacity	3.522	82	10	.966
Lung Capacity X Pessimism				
Powe Fatalism Inventory <sup>1</sup>				
<b>Direction X Structure X Powe</b>	4.253	82	6	.642
Direction X Lung Capacity				

<sup>1</sup>Reliabilities for this scale correspond to Kuder-Richardson 20.

## VITA

2004                      B. S., University of Dayton, Dayton, OH

## Publication

Lutz-Zois, C. J., Bradley, A. C., Mihalik, J. L., & Moorman-Eavers, E. R. (2006).

Perceived similarity and relationship success among dating couples: An  
idiographic approach. *Journal of Social & Personal Relationships*, 23(6), 865-  
880. doi:10.1177/026540