AN ANALYSIS OF ANXIETY VULNERABILITY MODELS

AND SMOKING MOTIVATION

By

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Submitted to the Faculty of the College of Arts and Sciences

Of American University

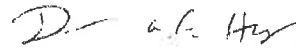In Partial Fulfillment of

The Requirements for the Degree of

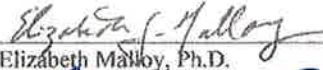Doctor of Philosophy

In

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April 12, 2013

Date

2013

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DEDICATION

I dedicate this work first to David A.F. Haaga, PhD whose timely, sagely, and supportive wisdom has been indispensable in navigating my journey through my graduate career. Time and time again Dr. Haaga has been an advocate for my success. The patience as well as benevolence he has shown during this process has served as a model for how I aspire to be in my own professional life.

To my gracious wife, I do not have the words to express the gratitude I have for you through these years. You have endured cross-country moves, my anxieties, and the burden that fulfilling this dream of mine has cost. Your selfless giving and ongoing encouragement has daily reaffirmed how truly blessed I am to have you in my life. I strive to follow your example.

To my parents, thank you for providing me with the resources and strength of character to persevere and pursue an advanced education. Without you, none of this would be possible.

Finally to my little Katelyn, you have been the light of my life through the toughest parts of this process. You inspire me to use my skills to make this a better world for those to come.

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ABSTRACT

The present work examined how looming cognitive style (LCS) and anxiety sensitivity (AS) related to smoking for negative affect reduction (NAR) and motivation to quit (MtQ) smoking. A pilot measure was developed in Study One to assess how appraisal of smoking consequences may mediate the relationship between LCS/AS and MtQ. The Looming Smoking Consequences Scale (LSCS) assessed smokers' perception that the consequences of smoking were growing over time. In Study One 124 daily smokers demonstrated that the LSCS had strong internal consistency and showed convergent validity with smokers' associated anxiety, LCS, perception of smoking-related consequences as likely, and MtQ smoking. Study Two consisted of 143 online daily smokers, showing that while both AS (r = .20) and LCS (r = .22) were directly related with motivation for NAR smoking, neither independently predicted this motivation. MtQ smoking was correlated with both AS (r = .72-.74) and LCS (r = .51); however, only AS predicted MtQ independently. Smoking consequence appraisal completely mediated the relationship between LCS and MtQ a partially mediated the relationship between AS and MtQ smoking. Specifically, AS's correspondence with MtQ smoking was independently mediated by likelihood estimates of smoking consequences in terms of how true reasons for quitting were. However, AS's correspondence with MtQ was independently mediated by smokers' looming perception of smoking consequences in terms of how motivated smokers were to engage in smoking cessation treatment.

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INTRODUCTION

<u>Anxiety and Smoking</u>

A growing body of empirical literature has established the relationship between anxiety and smoking behavior, though much of this association remains somewhat unclear. Findings have shown that trait anxiety has been linked to smoking to reduce negative affect (Audrain, Lerman, Gomez-Caminero, Boyd, & Orleans, 1998; Comeau, Stewart, & Loba, 2001; Scheitrum & Akillas, 2002) as well as smoking for stimulation and nicotine dependence in general (Audrain, Lerman, Gomez-Caminero, Boyd, & Orleans, 1998; Scheitrum & Akillas, 2002). In terms of Axis I psychopathology, those suffering from anxiety disorders are more likely to be smokers (Collins & LePore, 2009; Morrell & Cohen, 2006) and have been shown to have less success in smoking cessation treatment than those without anxiety disorders (McClave, Dube, Strine, Kroenke, Caraballo, & Mokdad, 2009; Piper, Smith, Schlam, Fleming, Bittrich, Brown et al., 2010). Moreover, smokers suffering from an anxiety disorder reported greater anxiety symptoms and negative affect in general when compared to non-smokers with anxiety disorders (Morissette, Brown, Kamholz, & Gulliver, 2006).

Researchers have tried to determine the relationship between smoking and specific anxiety disorders, and have found some promising links. Panic disorder research has been at the forefront of this movement. Smokers with panic disorder have been found to smoke more to reduce negative affect as compared with individuals who do not have a panic disorder diagnosis (Zvolensky, Schmidt, Antony, McCabe, Forsyth, Feldner et al., 2005). As a result of these findings there has been an impetus to integrate treatment for panic disorder and smoking behavior due to their high co-occurrence and interrelatedness (Zvolensky, Lejuez, Kahler, &

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Brown, 2003). However, that is not to say that anxiety's relation to smoking can be completely accounted for by panic attacks or concerns for panic attack. Smokers suffering from social phobia, posttraumatic stress disorder, and generalized anxiety disorder have also been found to smoke more in comparison to smokers with no anxiety disorder diagnosis (Morissette, Tull, Gulliver, Kamholz, & Zimering, 2007; Sonntag, Wittchen, Hofler, Kessler, & Stein, 2000).

<u>Anxiety Vulnerability Models and Smoking</u>

To extend this knowledge of how anxiety relates to smoking behavior, researchers have examined specifically how anxiety vulnerability factors (AVFs) interact with smoking and smoking-related variables. To clarify, anxiety vulnerability factors are defined as theoretical constructs that are stable, inherent characteristics that increase the likelihood of anxious symptoms developing. In fact, there has been evidence to suggest that variables considered to be AVFs relate to smoking behavior even beyond the influence of anxiety. Two AVFs that have shown some promise in explaining the perceptions of smokers are Anxiety Sensitivity and Looming Cognitive Style. Both of these AVFs are considered to be cognitive-based and have been explored in prior work as to how they may relate to smoking behavior. According to Reardon & Williams (2007), looming cognitive style and anxiety sensitivity share several features. These include that both are biased cognitive appraisals that contribute to anxious symptoms, both are stable characteristics, and that both "operate as distal phenomena that may be causally implicated in the genesis of more proximal related cognitive processes such as interpretative biases" (p. 638). As such they represent prime factors for examination as they correspond to smokers' estimation of their smoking motivation.

The first of these, Anxiety Sensitivity, has shown a consistent relationship to anxiety symptoms (for review see Taylor, 1999). Anxiety Sensitivity is "a cognitive-based risk factor for anxiety psychopathology defined as the fear of anxiety and anxiety-related sensations" (Leen-Feldner, Zvolensky, van Lent, Vujanovic, Bleau, Bernstein et al., 2007, p. 70). Anxiety sensitivity is regarded as cognitive-based construct because this fear of anxiety is due to beliefs that these symptoms will lead to negative outcomes such as physical illness, social embarrassment, or loss of mental control (Reiss, Peterson, Gursky, & McNally, 1986). Anxiety sensitivity is considered a particularly strong risk factor for panic disorder and has been shown to predict the onset of panic attacks (Schmidt, Zvolensky, & Maner, 2006; Schmidt & Zvolensky, 2007; Taylor, 1999), even when controlling for participants' trait anxiety and history of panic attacks (Plehn & Peterson, 2002). However, anxiety sensitivity has also been significantly linked to other anxiety disorders (Cox, Borger, & Enns, 1999; Naragon-Gainey, 2010; Schmidt, Zvolensky, & Maner, 2006; Taylor, Koch, & McNally, 1992).

Anxiety sensitivity has been proposed as an explanatory model to account for the relationship between anxiety and smoking behavior. For instance, smokers with higher levels of anxiety sensitivity smoke more (McLeish, Zvolensky, Bonn-Miller, & Bernstein, 2006). Moreover, smokers with anxiety disorders, compared to non-smokers with anxiety disorders, report greater anxiety sensitivity; though these differences were largely accounted for by sufferers of panic disorder (Morrisette, Brown, Kamholz, & Gulliver, 2006).

In addition to anxiety sensitivity's relationship with one's degree of smoking, anxiety sensitivity has been associated with motivation to smoke. Researchers have found that anxiety sensitivity is related to several forms of smoking motivation, including habitual-addictive and negative affect reduction motivations to smoke (Comeau, Stewart, & Loba, 2001; Gonzalez,

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Zvolensky, Vujanovic, Leyro, & Marshall, 2008; Leyro, Zvolensky, Vujanovic, Bernstein, 2008). Anxiety sensitivity predicted these types of motivation to smoke even after controlling for the number of cigarettes smoked daily (Leyro, Zvolensky, Vujanovic, & Bernstein, 2008). It is believed that those with elevated anxiety sensitivity experience higher levels of negative affect. As such, those individuals may be more motivated to use smoking as a coping mechanism. Moreover, this type of coping is believed to be engaged in reflexively, explaining the heightened level of habitual motivation to smoke and possibly leading to greater nicotine addiction.

Anxiety sensitivity has also been found to inhibit attempts to quit smoking. Specifically, anxiety sensitivity predicts greater subjective intensity of withdrawal symptoms when quitting smoking (Zvolensky, Baker, Leen-Feldner, Bonn-Miller, Feldner, & Brown, 2004). Researchers theorize that smokers with heightened levels of anxiety sensitivity, marked by an increased fear of internal sensations, will be more sensitive to interoceptive symptoms that are part of nicotine withdrawal (Zvolensky, Baker, Leen-Feldner, Bonn-Miller, Feldner, & Brown, 2004).

Anxiety sensitivity has also been positive correlated with motivation to quit and predicts this motivation even beyond nicotine dependence (Zvolensky, Baker, Leen-Feldner, Bonn-Miller, Feldner, & Brown, 2004; Zvolensky, Vujanovic, Miller, Bernstein, Yartz, Gregor et al., 2007). Thus, anxiety sensitivity is considered an important factor in the process of smoking cessation.

Another AVF that has been extensively validated is the Looming Cognitive Vulnerability Model (LCVM; for review see Riskind & Williams, 2006). Many cognitive vulnerability models of anxiety have stemmed from the theory that anxiety is created by schemas that perceive stimuli as dangerous (Watson & Kendall, 1989). LCVM postulates that anxiety is not only produced because a stimulus is perceived as dangerous, but because the stimulus is also perceived as

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approaching or moving towards the individual through space or time. A contributing factor of anxiety, according to this model, is that the individual envisions the process by which potentially negative personal consequences become increasingly threatening and the sequence of events that unfold for this to occur. Through this perception of movement, the individual perceives the threatening stimuli as a changing and increasing personal threat. The perception of movement extends beyond static appraisals of threat such as the perceived likelihood, immediacy, unpredictability, and uncontrollability of negative consequences (Riskind & Williams, 2005).

Patterns of looming cognitions have been demonstrated with the fear of spiders (Riskind, Moore, & Bowley, 1995), performance anxiety (Riskind, Long, Duckworth, & Gessner, 2004), and fear of contamination (Tolin, Worhunsky, & Maltby, 2004). The tendency to perceive threats as dynamically approaching or growing has demonstrated convergent validity across a variety of anxiety disorders, such as obsessive-compulsive disorder, post-traumatic stress disorder, generalized anxiety disorder, social phobia, and specific phobia (Williams, Shahar, Riskind, & Joiner, 2005). In addition to empirical links to Axis I anxiety disorders, LCVM has been shown to correlate with general trait anxiety, state anxiety, and meta-worry (Riskind, Williams, Gessner, Chrosniak, & Cortina, 2000). Looming cognitive style also corresponds with explicit and implicit memory for threatening visual stimuli (Riskind, Williams, Gessner, Chrosniak, & Cortina, 2000). In short, LCVM has a shown a relationship with a wide range of anxiety-related constructs and is not limited to only explaining vulnerability for anxiety in reference to a specific disorder or trait.

At this point it is unclear how looming cognitive style specifically relates to smoking behavior as few studies have explored this connection. However, LCVM's extensive relation to anxiety makes it a candidate for exploring how AVFs impact smoking behavior. For instance, an

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individual high in looming cognitive style most likely will experience increased negative affect. This state of negative affect may increase motivation to smoke as a type of coping mechanism. In contrast, elevated levels of looming cognitive style may also lead smokers to perceive the negative consequences of smoking as increasingly dangerous. Such a perception would most likely lead to an increased motivation to quit smoking. In McDonald, O'Brien, Farr, and Haaga (2010), an intervention was designed to enhance smokers' perception that smoking related health consequences were dynamically increasing over time. The results of this work suggested that looming cognitions of smoking consequences may impact motivation to quit smoking and smoking cessation behavior. Looming cognitive style was not specifically examined in this study. However, the intervention was based on a dynamic appraisal process, particularly related to smoking consequences.

<div align="center">Smoking-Specific Threat Appraisal Processes</div>

Specifically, perception of smoking's negative consequences is of particular interest as the perception that one is vulnerable to these consequences has been associated with greater readiness to quit smoking (Prokhorov, Warneke, de Moor, Emmons, Jones, Rosenblum, 2003). It has been proposed that type of threat perception may explain the relationship between trends of general threat perception (i.e., anxiety sensitivity, looming cognitive style) and smoking motivation.

While there are several types of cognitive appraisals related to smoking consequences (e.g., immediacy), the one most validated is the perceived likelihood of smoking consequences. The Smoking Consequences Questionnaire-Adult Version (SCQ-A; Copeland, Brandon, & Quinn, 1995) has been established to measure likelihood estimates of smoking consequences,

including negative affect reduction, stimulation-state enhancement, health risk, taste-sensorimotor manipulation, social facilitation, weight control, craving-addiction, negative physical feelings, and boredom reduction. These expectancies have been shown to distinguish non-smokers and smokers (Brandon & Baker, 1991; Copeland, Brandon, & Quinn, 1995) and have been utilized to predict successful smoking cessation (Copeland, Brandon, & Quinn, 1995; Wetter, Kenford, Welsch, Smith, Fouladi, Fiore et al., 2004; Wetter, Smith, Kenford, Jorenby, Fiore, Hurt et al., 1994).

In an experimental setting, Copeland & Brandon (2000) were able to promote progression in the Stages of Change among smokers when enhancing likelihood estimates of smoking-related health risks. Here we see the utility of having an established type of cognitive appraisal specifically related to smoking. These findings suggest the value of exploring other types of smoking consequence appraisals that can lead to a greater understanding of smoking behavior.

In addition to likelihood estimates of smoking consequences it may be useful to consider dynamic appraisals of smoking-related consequences as well, how smokers perceive smoking-related consequences as approaching or increasing over time. McDonald, Farr, O'Brien, and Haaga (2010) found that an increase in looming perception of smoking consequences led to an increase in state anxiety and a difference in self-generated outcome expectancies for smoking. This looming perception also contributed to a difference in the number of cigarettes smoked one month later, even when controlling for initial number of cigarettes smoked per day. These findings in a limited sample size suggest that a dynamic appraisal of smoking consequences may have an effect on how smokers perceive potential outcomes and subsequently act. Developing a

measure to assess looming perception of smoking consequences would inform researchers of how another type of cognitive appraisal may impact motivation to quit smoking.

Similar questionnaires that were designed to measure specific dynamic appraisals have been previously developed. These questionnaires include the Looming Cancer Scale that measured dynamic appraisals of cancer-related consequences (Levin, Riskind, & Li, 2007) and a measure assessing looming perception of contamination (Tolin, Worhunsky, & Maltby, 2004). However, no questionnaire so far has been developed to assess dynamic appraisals of smoking-related consequences despite how widespread the habit is and the number of consequences associated with smoking. The proposed scale would be qualitatively different from the SCQ-A as this measure evaluates a static appraisal of how likely consequences of smoking are to occur at one point, while the new scale evaluates the perception that smoking-related threats will change over time. The new measure could be used to gauge the success of interventions that attempt to manipulate these types of beliefs, as in McDonald, Farr, O'Brien, and Haaga (2010) or to evaluate how smoking-related consequence perceptions interact with one another.

One further use would be to evaluate how these specific types of cognitive appraisals may explain the relationship between cognitive-based AVFs and smoking behavior. The influence of these general patterns of cognitive-based AVFs, such as fearful perceptions of anxiety symptoms characteristic (i.e., anxiety sensitivity) as well as the general tendency to see threats as increasing and coming closer (i.e., looming cognitive style) on smoking behavior may be accounted for by examining specific appraisals of smoking-related consequences. In other words, cognitive appraisals of smoking consequences may mediate the relationship between smoking behavior and the general traits of anxiety sensitivity and looming cognitive style. In the case of both anxiety sensitivity and looming cognitive style, those that report high levels of these

traits have been found to interpret ambiguous stimuli as more threatening and to exaggerate the threat that a stimuli presents (McCabe, 1999; McNally, Hornig, Hoffman, & Han, 1999; Riskind, Williams, Gessner, Chrosniak, & Cortina, 2000; Teachman, 2005).

The effect of AVFs, such as anxiety sensitivity, on increasing smoking behavior may be that heightened interpretation of threats leads individuals to turn to smoking as a coping mechanism. Such a relationship could be mediated by the belief that negative affect reduction is a consequence of smoking. In fact, anxiety sensitivity has consistently predicted smokers' belief that negative affect reduction would be a consequence of smoking (Gregor, Zvolensky, McLeish, Bernstein, Morissette, 2008; Johnson, Zvolensky, Marshall, Gonzalez, Abrams, & Vujanovic, 2008; Zvolensky, Feldner, Leen-Feldner, Bonn-Miller, McLeish, & Gregor, 2004).

Alternatively, the impact that anxiety sensitivity and looming cognitive style are proposed to have on motivation to quit may be explained by the fact that those reporting high levels of these factors perceive the negative consequences of smoking as more dangerous. Logically if someone has a general pattern of interpreting stimuli as dangerous or exaggerating the extent to which a stimulus is dangerous it would be more likely that they would form more specific beliefs that smoking consequences could be threatening. In terms of anxiety sensitivity, it has already been found that anxiety sensitivity predicts smokers' perception that negative smoking-related consequences are more likely (Gregor, Zvolensky, McLeish, Bernstein, Morissette, 2008; Johnson, Zvolensky, Marshall, Gonzalez, Abrams, & Vujanovic, 2008; Zvolensky, Feldner, Leen-Feldner, Bonn-Miller, McLeish, & Gregor, 2004). In the case of one's degree of looming cognitive style, seeing threats as generally approaching and increasing over time would most likely be associated with seeing a specific threat as approaching and increasing

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over time (i.e., smoking-related threats). Here we see how specific cognitive appraisals of smoking can be related to cognitive-based anxiety vulnerability traits.

The current project has three goals. (1) To develop a measure that can assess dynamic appraisal of smoking related consequences. (2) To study how anxiety sensitivity and looming cognitive style correspond with motivation to smoke to reduce negative affect. (3) To examine how anxiety sensitivity and looming cognitive style relate to motivation to quit smoking, as well as to evaluate how cognitive appraisals of smoking-related consequences may influence this relationship. These goals will be accomplished through two studies.

CHAPTER 2

STUDY ONE: VALIDATION OF THE CIGARETTE SMOKING

LOOMING CONSEQUENCE SCALE

The first study sought to create a measure of dynamic appraisal of smoking consequences, based on the findings of McDonald, O'Brien, Farr, and Haaga (2010) and the extensive validation of dynamic appraisals of threat in general. The proposed preliminary version of this measure will be called the Cigarette Smoking Looming Consequences Scale (CSLCS). This venture is similar to efforts to develop a questionnaire that measures dynamic appraisals of threat related to cancer (Levin, Riskind, & Li, 2007) and contamination (Tolin, Worhunsky, & Maltby, 2004).

The CSLCS was composed of scenarios in which participants evaluated the extent potential threats were increasing over time or approaching, similar to the Looming Maladaptive Style Questionnaire (Riskind, Williams, Gessner, Chrosniak, & Cortina, 2000). The key difference is that in the CSLCS these threats, or negative consequences, are all related to smoking.

An exploratory factor analysis was conducted to establish what scenarios most accurately measured dynamic appraisals of smoking-related threats. Through this analysis, possible underlying subfactors of looming smoking consequences were explored.

Moreover, the construct validity of the CSLCS was evaluated by determining its relationship to other relevant factors. These factors included motivation to quit smoking, perceived likelihood that negative consequences of smoking will occur, and looming cognitive style.

It was predicted that the CSLCS would correlate with the Negative Consequences Subscale of the SCQ-A, as both are forms of smoking related threat appraisal processes this correspondence was suggested in McDonald, O'Brien, Farr and Haaga (2010). A correlation of CSLCS scores with the Looming Maladaptive Style Questionnaire (LMSQ) was expected as both assess types of dynamic appraisals of threat. The CSLCS would likely correspond with the LMSQ as it would be an extension of this general trend. In addition CSLCS scores for negative consequence perception was predicted to be correlated with smokers' motivation to quit, as represented by the Contemplation Ladder and the subscales of the Reasons for Quitting Scale. CSLCS scores would likely relate to motivation to quit as heightened appraisals of negative smoking consequences would lead to a greater desire to avoid these consequences.

Study One Methods

Participants

One hundred twenty four participants were recruited in total. This number allowed for at least six participants for each scenario included in the proposed CSLCS. Participants were made up of online participants and community members from the District of Columbia area, including American University students. These participants were recruited through fliers on American University's campus, advertisements in the City Paper's Health and Wellness section, and online advertisements. Compensation included twenty dollars, extra credit, or an entry into a drawing to win a fifty dollar gift card. Inclusion criteria for this experiment required that the participants were daily smokers, at least 18 years of age, able to understand both spoken and written English, and United States residents.

In study one, data from online assessments were integrated with in-person pencil-and-paper assessments in order to increase the sample size of participants, thus increasing the power of statistical analyses.

Measures

Demographic Questionnaire

Each participant filled out a questionnaire that describes several demographic variables, including age, gender, ethnicity, level of education, employment status, and annual household income.

Smoking History Questionnaire

The Smoking History Questionnaire (SHQ; Brown, Lejuez, Kahler, & Strong, 2002) is a self-report measure that assesses the participants' smoking rate, age of first cigarette, years of being a regular smoker, as well as past quit attempts and treatment seeking. Quit attempts in this instance refers to at least a twenty-four hour period in which the smoker quit smoking as the result of an intentional choice. Also, treatment seeking in this context refers to seeking out a professional (e.g., physician) or a support group with the express purpose of quitting smoking. The Smoking History Questionnaire has no composite score, but is simply a questionnaire inquiring these smoking-related behaviors. This measure has been widely utilized in past to determine smoking history and current smoking behavior (Marshall, Zvolensky, Vujanovic, Gibson, Gregor, & Bernstein, 2008; Zvolensky, Feldner, Leen-Feldner, Bonn-Miller, McLeish, & Gregor, 2004; Zvolensky, Yartz, Gregor, & Gonzalez, 2008).

Fagerstrom Test of Nicotine Dependence

The Fagerstrom Test of Nicotine Dependence (FTND; Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991) is a six-item self-report measure that ascertains the participants' level of physiological dependence for nicotine and control over smoking habit based on behavioral markers and participant preferences. This measure has been shown to demonstrate moderate internal consistency (Cronbach's α = .72; Weinberger , Reutenauer, Allen, Termine, Vessichio, Sacco et al., 2007) and moderate retest reliability over 2-3 weeks (r = .88). FTND scores have been correlated with cotinine levels (r = .39) and the number of years that a participant has smoked (r = .52; Pomerleau, Carton, Lutzke, Flessland, & Pomerleau, 1994).

Contemplation Ladder

The Contemplation Ladder (CL; Biener & Abrams, 1991) is a widely utilized one-item self-report measure that gauges an individual's contemplation of smoking cessation. The CL is an eleven-point Likert scale (represented as a ladder) measuring readiness to quit smoking. The scale does not specify a specific time frame for quitting but rather one's contemplation of quitting and has been proven to effectively identify readiness to quit smoking according to the Stages of Change (Herzog, Abrams, Emmons, & Linnan, 2000).

Smoking Consequences Questionnaire-Adult Version

The Smoking Consequences Questionnaire- Adult Version (SCQ-A; Copeland, Brandon, & Quinn, 1995) represents a standardized assessment of participant smoking beliefs. The SCQ-A is a fifty five-item self-report measure that assesses a smokers' expectations about their smoking along ten subscales: Negative Affect Reduction, Negative Social Impression, Boredom Reduction, Stimulation/State Enhancement, Health Risk, Taste/Sensorimotor Manipulation,

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Social Facilitation, Weight Control, Craving/Addiction, and Negative Physical Feelings. For each of the 55 items, the participant rates how likely each is to occur on a 0 to 9 Likert scale, with 0 being "Completely Unlikely" to 9 being "Completely Likely". The SCQ-A has been shown to demonstrate strong internal consistency within each of its subscales (Cronbach's α = .83-.96; Copeland, Brandon, & Quinn, 1995).

Reasons for Quitting Scale

The Reasons For Quitting Scale (RFQ; Curry, Wagner, & Grothaus, 1990) presents a list of twenty reasons that smokers commonly would have to stop smoking. For each reason, participants rated a scale from 0 to 4 how true that reason is for them currently. These twenty reasons make up the measure's four subscales: Intrinsic- Health Concerns, Intrinsic- Self-Control, Extrinsic- Immediate Reinforcement, and Extrinsic- Social Pressure, with each domain representing the various types of motivation that a smoker would have to quit smoking. These subscales can also be combined to form intrinsic and extrinsic subscales as well as total composite scale to measure a smoker's motivation to quit smoking. These subscales have demonstrated moderate internal consistency (intrinsic subscale Cronbach's α = .83; extrinsic subscale Cronbach's α = .75; Curry, Wagner, & Grothaus, 1990).

Looming Maladaptive Style Questionnaire

The Looming Maladaptive Style Questionnaire (LMSQ; Riskind, Williams, Gessner, Chrosniak, & Cortina, 2000) consist of six scenarios in which the participant is told to imagine situations in which possible negative consequences could happen. The participant is instructed to rate, on a scale of one to five, and rate the extent to which these negative consequences are growing or approaching them as time passes on. Three of these scenarios relate to appraisals of

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social threat and the other three relate to appraisals of physical threat. The LMSQ has demonstrated predictive and convergent validity (Riskind, Williams, Gessner, Chrosniak, & Cortina, 2000) as well as strong internal consistency for the physical subscale (Cronbach's α =.86), social subscale (Cronbach's α =.88), and the scale as a whole (Cronbach's α =.91; Reardon & Williams, 2007). In the present study, the LMSQ showed strong internal consistency overall (Cronbach's α =.91), as well as the Physical Subscale (Cronbach's α =.88) and the Social Subscale (Cronbach's α =.86).

Cigarette Smoking Looming Consequences Scale

The Cigarette Smoking Looming Consequences Scale (CSLCS) is a composite of twenty imagined scenarios in which possible negative consequences of smoking are introduced. Participants are asked to rate on a one to five scale the extent to which this threat is escalating or approaching them. Ratings from each scenario are added up to form a composite scale score. According to the Flesch-Kincaid readability scale, this measure is considered to be at 9.5 grade reading level. The full CSLCS measure can be found in Appendix A, but an example of a scenario of the CSLCS is included here:

Suppose that while participating in recreational activities with friends, you feel worn out quickly and need to take a break before any of your non-smoking friends. It seems as if smoking could be having a negative effect on your health.

1. In this scene, are the chances of you having difficulty with your health decreasing or increasing with each cigarette?

Chances are decreasing   1   2   3   4   5   Chances are increasing

  with each cigarette   with each cigarette

2. Is the level of threat for long-term health consequences staying fairly constant, or is it growingly rapidly larger with each passing moment?

Threat is staying   1   2   3   4   5   Threat is growing

  fairly constant   rapidly larger

3. How much do you visualize your health as becoming increasingly worse due to smoking?

Not at all   1   2   3   4   5   Very much

Semi-Structured Follow-up Interview

After completing the CSLCS, participants are asked a series of questions about the measure in order to establish how well the measure was understood as well as how the measure could be improved. These questions consisted of (1) "What was your general impression of this measure?", (2) "Were you able to understand the rating scales?", (3) "Was the measure too long?", (4) "Were you able to imagine the scenes described in this measure?", (5) "What scenes were easier to relate to? Which ones were more difficult to relate to?", (6) "How could we make these scenes more realistic/relatable?", (7) "Did you have any other thoughts or suggested improvements that we didn't cover?", and (8) "Do you feel like you're currently experiencing any emotional distress that you may have difficulty managing or that may impair your functioning?". This interview serves several functions, including ascertaining any distressful effect the questionnaire may have for those taking it, providing possible direction for future measure development, helping in the selection of how many items to ultimately include, and helping in determining what instructions may be helpful for smokers in future assessments.

Procedure

Participants who took part in the study in-person first came to American University's main campus for a period of up to one hour. During this hour, participants proceeded to complete the measures listed above with the exception of the interview. Afterwards they were asked the series of questions detailed above in the semi-structured interview. The experimenter then provided referral sources to potentially address any anxiety that may have been caused by the experiment as well as referral sources within the community that could provide access to smoking cessation services. Afterwards, the participant received twenty dollars in cash if they were not an American University student or received one research credit in a participating psychology course if they were an American University student and qualified.

Individuals taking the online version of the study were given a link that directed them to the study. Participants verified they were daily smokers, were 18 years old or older, that they were fluent in English, and were United States residents. Afterwards, participants were directed to select their answers to identical items that have been presented to in-person participants. Following the study's measures, participants were given mental health referral sources in case the study had generated any overwhelming emotional distress or impairment as well as referral sources that could provide access to smoking cessation services. Finally, participants were asked for their e-mail address to be entered in a raffle to receive a fifty dollar Amazon gift card.

Study One Results

The purpose of study one was to create a measure to assess smokers' perception that the negative consequences of smoking were looming. Part of this process included using both online and in-person participants. A total of 65 participants engaged in the in-person portion of the

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study. In terms of online participation, 89 participants endorsed that they met qualifications for

participation and gave informed consent. Of those 89 participants, 60 completed the online

version of the study including the CSCLS. Of those participants, one individual set of data was

excluded due to a significantly abnormal response style, specifically answering all 1's for most

measures. Data from the remaining 59 online participants were combined with in-person results,

yielding a composite total of 124 overall participants included in these analyses.

Table 1. Group Comparisons of In-Person vs. Online Participants Among Demographic Variables

	In-Person Group (N=65)	Online Group (N = 59)	p-value
Age	30.92 (15.83)	27.15 (11.41)	.13[a]
Gender	46% Female	56% Female	.28[b]
Ethnicity			
Hispanic or Latino	8%	8%	.91[b]
Race			.00[c]
American Indian	2%	2%	
Asian-American	3%	3%	
African-American	35%	10%	
White	52%	71%	
Native Hawaiian/Pacific Islander	0%	5%	
Other	8%	9%	
			.00[d]
Highest Level of Education			

Partial High School	3%	2%
High School or GED	28%	13%
Some College	61%	59%
Technical School/Associate's Degree	0%	7%
Bachelor's Degree	5%	17%
Graduate or Professional Degree	3%	2%
Annual Household Income			.28[d]
Less than 10,000	22%	25%
10,000 to 19,999	11%	14%
20,000 to 29,999	13%	12%
30,000 to 39,999	8%	10%
40,000 to 49,999	4%	5%
50,000 to 74,999	13%	10%
75,000 to 99,999	4%	7%
100,000+	25%	17%

[a]t-test of independent samples

[b]χ^2 analysis

[c]λ analysis

[d]γ analysis

To determine if results would be equivalent across settings for the remaining participants, a series of demographic, smoking, and threat perception variables were assessed. Among many demographic variables such as age, gender, or ethnicity there did not appear to be any sizable difference between online and in-person conditions (Table 1). One difference between these two

groups included that there was a higher percentage of African-American participants in the in-person group and a higher percentage of white participants in the online group. Also, there was a significant difference in education level between the two groups.

Smoking history, nicotine dependence and past quit attempts were also variables compared across settings. These analyses are represented in Table 2 with included p-values from t-tests of independent samples. No significant differences were found among ages of first cigarette use, years of daily smoking, minimum or maximum number of cigarettes smoked daily, average number of cigarettes smoked daily, nor nicotine dependence as measured by the Fagerstrom Test of Nicotine Dependence. The number of past quit attempts was also equivalent across settings.

Table 2. Group Comparisons of In-Person vs. Online Among Smoking Variables

	In-Person Group (N = 65)	Online Group (N = 59)	p-values
Age of First Cigarette	14.85 (2.44)	15.39 (2.74)	.25
Years of Daily Smoking	11.89 (12.34)	9.31 (10.92)	.22
Minimum Number of Cigarettes Smoked Daily	4.34 (5.12)	5.66 (5.83)	.18
Maximum Number of Cigarettes Smoked Daily	17.12 (7.65)	19.92 (12.67)	.15
Average Number of Cigarettes Smoked Daily	10.65 (6.03)	11.14 (8.47)	.71
Fagerstrom Test of Nicotine Dependence Score	3.51 (2.13)	3.56 (2.66)	.91
Number of Attempts to Quit Smoking	2.80 (6.86)	2.37 (3.57)	.69

Lastly, both settings were compared according to threat perception variables. Both settings were equivalent for perceiving the negative consequences of smoking as probable, generally perceiving threats as looming, as well as perceiving the scenarios of the Cigarette Smoking Consequences Looming Scale as vivid. One setting difference was the worry/anxiety invoked by the CSCLS scenarios, with those in-person experiencing more anxiety. This may be the result of online participants being able to take part in the survey in surroundings they are more familiar or more comfortable in.

While some differences appear to exist among these participant groups, these settings appear equivalent overall in terms of related measured variables of participant demographics, smoking behavior, and threat perception; suggesting that these two methods of assessment were comparable for participants involved. This finding was further strengthened by the fact that there was no significant difference among averaged responses to items of the CSCLS [$M_{\text{In-Person}}$ = 3.50, $SD_{\text{In-Person}}$ = .72; M_{Online} = 3.26, SD_{Online} = .72; t(122) = 1.84, p = .07].

Table 3. Group Comparisons of In-Person vs. Online Participants Among Threat Variables

	In-Person Group	Online Group	p-values
Negative Consequences Subscale of the SCQ-A[a]	5.57 (1.29)	5.39 (1.38)	.50
Looming Maladaptive Style Questionnaire	63.78 (14.32)	63.51 (15.21)	.92
Worry/Anxiety Generated by CSCLS[b]*	3.54 (1.15)	3.10 (1.24)	.05
Vividness of CSCLS[b] Scenarios	3.55 (1.09)	3.41 (1.08)	.48

[a]Smoking Consequences Questionnaire- Adult [b]Cigarette Smoking Consequences Looming Scale

*Significant at p< .05

To determine if there were any underlying, meaningful factors that may account for the observed variation in responses, a principal axis factoring analysis was conducted. This method was chosen over the method of principal component analysis as the purpose of this examination is not solely data reduction, but rather to see if smaller hypothetical constructs exist within the broader construct of perceiving smoking consequences as looming.

While the principal axis factoring method does not assume multivariate normality among included variables, normality of variables enhances the resulting factor solution (Tabachnick & Fidell, 2007). For the CSCLS, responses to scenarios 1, 3, 8, 12, and 17 yielded skewed results that exceeded the recommended standard for inclusion in factor analysis (i.e., skewness coefficient more than twice standard error of skewness; Hoyle, 1995; Kline, 2011). Therefore, these scenarios were excluded.

Fabrigar, Wegener, MacCallum, and Strahan (1999) argue that constructs of interest in the field of psychology are rarely unrelated to one another. Thus, an oblique rotation may be more appropriate for a factor analysis. In this specific case, it can be argued that types of looming perception of smoking consequences would be related to one another, such as someone more easily seeing the physical consequences of smoking as looming would also more easily see the social consequences of smoking as looming. Those that have a more broad looming cognitive style would be more likely to perceive consequences as looming across domains, and theoretically this would translate to different types of looming perception of smoking consequences as well. As such, a principal axis factoring analysis with an oblique rotation was performed.

For this analysis a Promax rotation was selected. Since the degree of rotation in oblique rotations can be altered, multiple rotations (i.e., kappa values) were investigated to determine

which factor structure best accounted for some interrelation but at the same time produced distinct constructs. Nunnally and Bernstein (1994) suggest that factor correlations should not exceed .3 as factors that are more correlated are not considered to be distinct and in fact are most likely measuring the same construct. Based on this criteria, a kappa value of less than 2 was selected due to the fact that any kappa value of 2 or greater resulted in a factor structure in which there was a correlation of .4 or greater between the first two generated factors. A kappa value of 1.5 resulted in factors correlating at values of .28 or less.

When data from online and in-person participants were combined, results suggested that this analysis was appropriate. According to the Bartlett Test of Sphericity ($\chi^2 = 762.30$, p < .01) participant responses to the measure's scenarios were significantly correlated with one another overall, meaning that there was shared variance between responses that could indicate common underlying factors. Furthermore a Kaiser-Meyer Olkin statistic, a measure of sampling adequacy, was calculated. This statistic measures the extent to which responses are related and determine the sufficiency of the included sample size for an exploratory factor analysis, relative to the number of scenarios in the CSCLS. Kaiser (1974) recommends that item responses yield a Kaiser-Meyer-Olkin statistic (KMO) of at least .5 to conduct a factor analysis. The scenario responses for the preliminary version of the CSCLS yielded a KMO statistic of .86 which is considered a very good indication that there is a high degree of interrelatedness between responses on the measure that could be explained by underlying factors and that there is a sufficient number of responses to conduct an exploratory factor analysis.
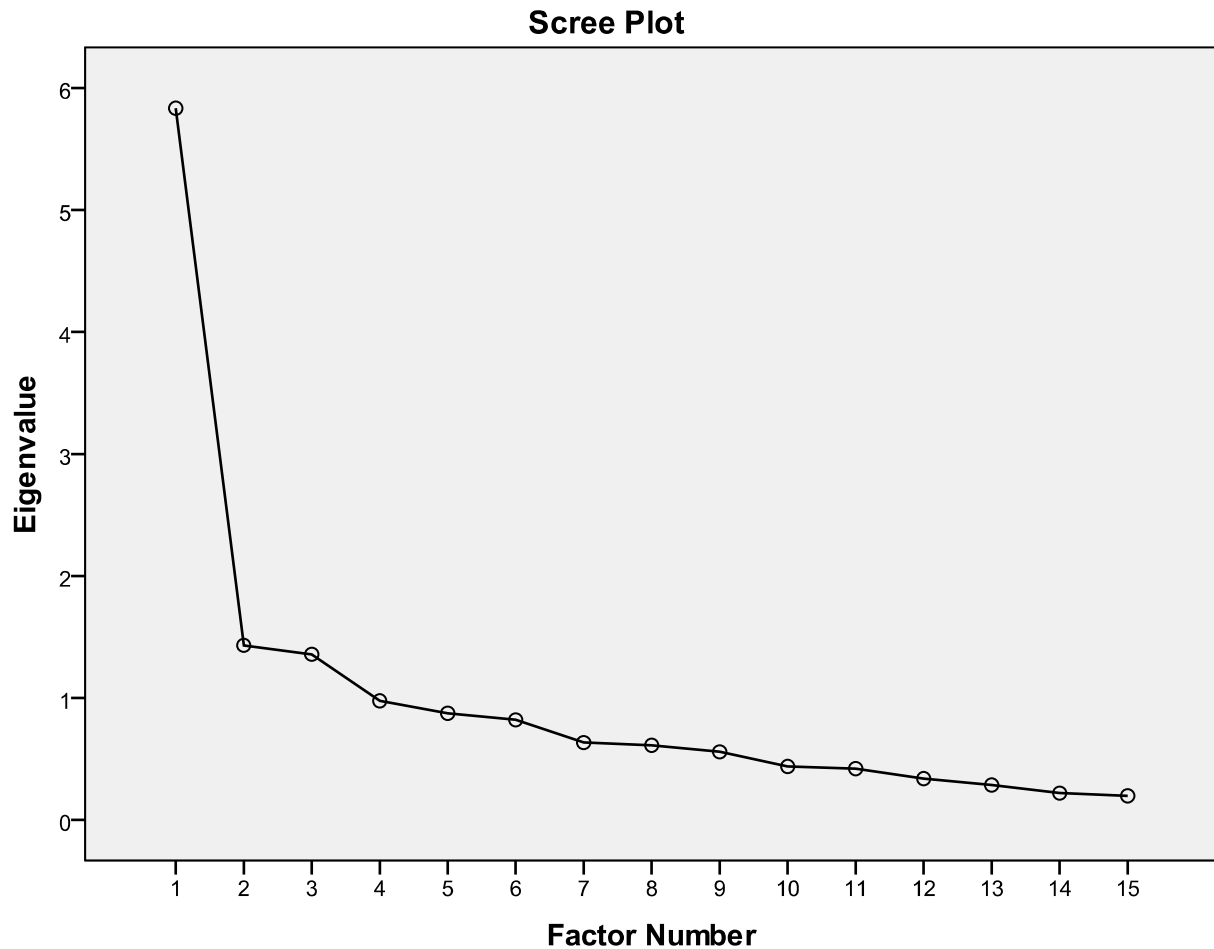
Figure 1. Scree Plot of Exploratory Factor Analysis

The initial criteria for extraction used was an eigenvalue of one or greater. The resulting analysis yielded three factors as part of the rotated factor structure, accounting for approximately 47.23% of the overall variance. In descending order, the factors individually accounted for 36.02%, 5.86%, and 5.35% of the overall variance once rotated. In addition to the criteria of eigenvalues being one or greater in determining the appropriate number of factors to extract, an examination of the scree plot also suggested that three factors is the correct number to retain.

Table 4 represents the factor structure matrix of the conducted principal axis factoring analysis with promax rotation (kappa = 1.5). The included factor loadings represent how

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individual scenarios correlate with the generated factors. In Table 4 those scenarios with factor loadings of .3 or greater on at least one of the three resultant factors were included.

To provide context for evaluating the extent of how a scenario relates to one of these generated factors, Comrey and Lee (1992) state that factor loadings greater than .71 demonstrate an excellent relationship between the variable and the factor, .63 - .71 represent a very good relationship, .55 - .63 represent a good relationship, .45 - .55 represent a fair relationship, and less than .32 represent a poor relationship.

For Factor 1, there are two scenarios (i.e., scenarios 9, 11) that show an excellent relationship with Factor 1 and a poor relationship (i.e., less than .32) with the other generated factors. Moreover, scenario 4 serves as a very good representation of Factor 1 and a poor representation of Factors 2 and 3. Lastly, scenario 15 is an excellent representation of Factor 1 and scenario 16 is a very good representation of Factor 1, both of which have less than fair relationships with Factors 2 and 3.

By qualitative analysis of the scenarios representing Factor 1, it appears that each of these scenarios relate to smoker's physical health. This factor possibly represents a particular type of looming perception for physical consequences, similar to how the Looming Maladaptive Style Questionnaire has a subscale for physical threats (Riskind, Williams, Gessner, Chrosniak, & Cortina, 2000). Scenario 10 is a very good representation of Factor 1, but also has a fair relationship with Factor 2. This scenario that loads on both factors does not share the common thread of other scenarios of Factor 1, as it relates more to looming perception of one's addiction as growing.

Table 4. Factor Loadings of Scenarios for Promax Rotation (kappa = 1.5) Structure Matrix

	Factor 1	Factor 2	Factor 3
Scenario 2	.19	.00	.65
Scenario 4	.71	.23	.31
Scenario 5	.37	.41	.28
Scenario 6	.30	.34	.74
Scenario 7	.35	.59	.33
Scenario 9	.83	.30	.31
Scenario 10	.65	.50	.17
Scenario 11	.83	.30	.31
Scenario 13	.34	.77	.18
Scenario 14	.70	.60	.28
Scenario 15	.77	.24	.42
Scenario 16	.67	.44	.26
Scenario 20	.34	.44	.21

Scenario 13 is an excellent representation of Factor 2 and a nearly poor representative of the other factors. Moreover, scenario 7 is a good representative of Factor 2 and a nearly poor representative of the other factors. Other scenarios seem to somewhat represent Factor 2, such as scenario 10 (.50, considered fair) and scenario 14 (.60, considered good) but also serve as very good representatives of other factors.

A qualitative analysis for Factor 2 demonstrates a particular trend for looming perception of negative social evaluation for smoking. Both scenarios 13 and 7, which seem to most

characterize Factor 2, relate to smokers' perception that the social consequences of smoking are looming. Due to its theoretical relevance scenario 20, that also relates to the looming social consequences of smoking, should be included as a scenario accounting for Factor 2. According to the structure matrix of this analysis, scenario 20 represents a nearly fair relationship with Factor 2 and a nearly poor relationship with the other factors.

Potentially this descending order of representation may reflect the extent to which these relationships are established. For instance, a family members featured in scenario 20 may know the smoker very well and have a fairly established relationship with the smoker, thus making fear of a negative evaluation and subsequently seeing this evaluation as evolving into the end of their relationship less feasible. On the other hand, someone the smoker just met (e.g., potential romantic interest in scenario 13) perceiving the smoker in a negative way may be more easily seen as moving towards the end of their relationship. Looming perception of social consequences could potentially also correspond to the social subscale of the Looming Maladaptive Style Questionnaire (Riskind, Williams, Gessner, Chrosniak, & Cortina, 2000). Scenario 15 also involves negative perception of others (e.g., a child asserting that what the smoker is doing is unhealthy) that do not represent any significant factor loading for Factor 2, but this may be due to a stronger focus on physical consequences which is associated with Factor 1.

In regards to Factor 3, both scenarios 2 and 6 represent an excellent or very good relationship with this factor and a nearly poor relationship with the other factors. Both of these scenarios relate to the consequences of a smoker's addiction to cigarettes getting worse, one in which a smoker sees their addiction to cigarettes growing when they are not allowed to smoke while waiting for a job interview and another perceiving the same threat when they are not allowed to smoke while visiting someone at a hospital. As a result one may consider this factor

to represent one's looming perception of their smoking addiction growing over time. However, scenarios 10 and 14 also relate to addiction to smoking but have no significant loading on Factor 3. In both scenarios 10 and 14, a smoker is noticing their urge or craving to smoke a cigarette, which may lead them to perceive this addiction as growing, but are not accompanied by outside social constraints. Perhaps having the freedom to smoke a cigarette may lessen the perceived threat of the urge to smoke, while not having that freedom may lead smokers to more clearly identify their addiction as an increasing threat in their life. On the other hand, the lack of cohesiveness among scenarios involving addiction may imply that Factor 3 does not represent a meaningful construct. Only two other scenarios represent a more than poor relationship with Factor 3 (i.e., scenario 7, 15). but they also serve as excellent or good representatives for other factors.

Since there are only two scenarios that clearly relate to Factor 3, it does not meet the criteria for an inclusion in an acceptable factor structure (Comrey & Lee, 1992; Fabrigar, Wegener, MacCallum, & Strahan, 1999). Also, Factor 3 does not represent a cohesive psychological construct as the included scenarios relate to a smokers' looming threat of addiction growing but other scenarios related to this theme (i.e., scenarios 10 and 14) have no meaningful correlation with Factor 3.

When we examine the pattern matrix of this analysis (Table 5) we can see an even clearer relationship. As opposed to the structure matrix, the pattern matrix reveals the unique correspondence of each scenario to a factor while controlling for other scenarios, instead of independent correlations.

As it can be seen in the pattern matrix, scenarios 4, 9, 11, and 15 all serve as very good or better representatives of Factor 1 and are poor factor loadings on the other factors. Moreover,

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scenario 16 is shown to be a good representative of Factor 1 and a poor representative of the other factors. These five scenarios can be interpreted to represent the looming perception of the physical consequences of smoking.

Table 5. Factor Loadings of Scenarios for Promax Rotation (kappa = 1.5) Pattern Matrix

	Factor 1	Factor 2	Factor 3
Scenario 2	.10	-.09	.64
Scenario 4	.68	.09	.17
Scenario 5	.29	.34	.20
Scenario 6	.15	.25	.69
Scenario 7	.24	.53	.24
Scenario 9	.78	.20	.10
Scenario 10	.59	.39	.03
Scenario 11	.79	.14	.15
Scenario 13	.23	.73	.08
Scenario 14	.62	.47	.12
Scenario 15	.71	.08	.27
Scenario 16	.61	.31	.12
Scenario 19	.34	-.08	-.22
Scenario 20	.27	.38	.13

Similar to the interpretation of the structure matrix, scenario 13 is an excellent representative of Factor 2 and is a poor representative of the other factors. Likewise, scenario 7 is a fair representative, but here more clearly a poor representative of the other factors. Since the

clearest interpretation of this factor based on these scenarios is again the looming perception of social consequences from smoking, scenario 20 is found to be conceptually related. As one can see in Table 5, scenario 20 has a slightly more than poor correspondence with Factor 2 but a poor relationship with the other factors, which cannot be said for scenarios 5, 10 and 14 that are not conceptually related to scenarios 7 and 13.

Here again it is observed that only scenarios 2 and 6 serve as more than poor representatives of Factor 3, thus not resulting in a viable factor.

Based on these analyses, we have identified two viable factors, one related to the looming perception of the physical consequences of smoking and one related to the looming social consequences of smoking. Those scenarios most adequately representing Factor 1 are scenarios 4, 9, 11, 15, and 16. When examining the internal consistency of these scenarios of Factor 1, it demonstrated good reliability (Cronbach's $\alpha = .88$). However, when only scenarios 4, 9, 11, and 15 were included there was a similar level of reliability (Cronbach's $\alpha = .87$). By eliminating scenario 16, the new subscale would only contain scenarios that were excellent representatives of Factor 1 and were poor representatives of other factors. An appropriate name for these scenarios representative of Factor 1 would be Physical Subscale.

Those scenarios most adequately representing Factor 2 are scenarios 7, 13, and 20. Factor 2 showed moderate reliability (Cronbach $\alpha = .68$). An appropriate name for this factor would be Social Subscale.

Overall, the composite of all the included scenarios from the Physical Subscale and the Social Subscale showed good reliability (Cronbach's $\alpha = .83$). This resulting scale signifies a new factor-derived version of the CSCLS. To distinguish this version, it will be referred to as the

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Looming Smoking Consequences Scale (LSCS), made up of the Physical Subscale (LSCS-P) and the Social Subscale (LSCS-S).

To identify how the LSCS, with only the seven scenarios included in the two identified factors, compared to the overall piloted CSCLS, a correlation between these two scales was performed. The shared variance from these two scores resulted in a significant correlation of .96 (p < .01), indicating that the factor-derived LSCS is highly representative of the overall piloted CSLCS.

Construct Validity of the Looming Smoking
Consequences Scale

The newly created LSCS is shown to be meaningfully related to other constructs that one would suspect, while demonstrating that it is not identical to these constructs. The LSCS is significantly correlated to both the worry/anxiety generated by the scenarios (.60, p< .01) as well as the vividness of the scenarios (.29, p< .01).

When LSCS scores were compared to participants' demographic variables, the only significant relationship found was between LSCS scores and age. LSCS scores positive correlated with smokers' age to small degree (r = .24, p < .01). This finding may reflect the previously identified trend that the negative effects of smoking appear to be more salient and seemingly relevant to smokers as they age (Orleans, 1994).

In terms of looming perception, the LSCS is significantly related to the overall LMSQ score of participants (.50, p< .01). Moreover, the LSCS-P is significantly correlated to the Looming Physical Subscale of LMSQ (.58, p<.01) and the LSCS-S is significantly correlated to the Looming Social Subscale of LMSQ (.29, p<.01).

The LSCS correlated positively with another type of smoking consequence threat perception (.20, p< .05), represented by the Negative Consequences subscale of the SCQ-A. The subscales of the LSCS are also significantly related to corresponding subscales of the SCQ-A. The LSCS-P is correlated with the Health Risk subscale of the SCQ-A (.33, p<.01). This Health Risk subscale is not significantly correlated with the LSCS-S, showing divergent validity. Likewise, the LSCS-S is correlated with the Negative Social Impression subscale of the SCQ-A (.32, p<.01), while demonstrating no significant correlation with the LSCS-P.

As it relates to motivation to quit smoking, the LSCS is correlated with both the Contemplation Ladder ratings (.29, p<.01) and the RFQ composite scores (.35, p< .01) of participants. As a behavioral indicator of motivation to quit, participant's quit attempt history was also related to their LSCS scores. Those 85 participants that had previously attempted to quit smoking showed a significantly higher LSCS score than those 38 participants that had not [$M_{Attempt}$ = 3.51 $SD_{Attempt}$ = .72; $M_{Non\text{-}Attempt}$ = 2.94 SD $_{Non\text{-}Attempt}$ = .81; t(121) = 3.91, p < .01]. Moreover, LSCS also showed a small positive correlation with number of past quit attempts (r = .19, p < .05).

In addition, the LSCS subscales correspond to the Reason for Quitting subscales. The LSCS-P is shown to be significantly correlated with the Health Concerns subscale of the RFQ (.36, p<.01). Also, the Social Pressure subscale of the RFQ, which measures how social pressure from others impacts one's motivation to quit smoking, was found to be significantly correlated with the LSCS-S (.27, p<.01), while the LSCS-P is not.

From the results of study one of this project, factor analysis has derived two significant subfactors that can compose a newly devised pilot measure, the LSCS. These factors and the resulting composite scale represent constructs that demonstrate some internal strength and

meaningful relationships to what would be theoretically related constructs for which there are

already established measures.

CHAPTER 3

STUDY TWO: ANALYSIS OF ANXIETY VULNERABILITY MODELS' RELATION TO

SMOKING MOTIVATION AND APPRAISAL OF SMOKING-RELATED THREAT

The second study sought to determine the relationship between the anxiety vulnerability

models of interest (i.e., anxiety sensitivity, looming cognitive style) and negative affect reduction

(NAR) smoking as well as motivation to quit smoking. Study two also evaluated how cognitive

appraisals of smoking-related consequences potentially mediate the relationship between AVFs

and motivation to quit smoking. Several hypotheses have been generated for this study:

Hypothesis 1

Looming cognitive style and anxiety sensitivity were both hypothesized to predict NAR

smoking. As anxiety is a type of negative affect, it was postulated that smokers that experience

increased looming cognitive style and anxiety sensitivity will utilize smoking more as a coping

mechanism to manage this negative emotion. Anxiety sensitivity has already shown an

established relationship with NAR smoking (Comeau, Stewart, & Loba, 2001; Gonzalez,

Zvolensky, Vujanovic, Leyro, & Marshall, 2008; Leyro, Zvolensky, Vujanovic, & Bernstein,

2008); however, these AVFs have never been examined as predictors of this smoking motivation

in combination. NAR smoking in this study was measured by the NAR subscale of the Reasons

for Smoking Scale (RSS). Looming Maladaptive Style Questionnaire (LMSQ) scores and

Anxiety Sensitive Index (ASI) scores were theorized as predictors of negative affect smoking

according to the negative affect reduction score. It was postulated that these AVFs would

correlate with NAR smoking and would predict NAR smoking in a regression model, both in

combination (overall regression model) and as individual factors. Overall, these AVFs are

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believed to contribute to negative affect and thus will share variance accounting for NAR smoking. However, as anxiety sensitivity and looming cognitive style are unique constructs and differ both in their range of focus and process of contributing to negative affect (e.g., anxiety sensitivity being more related to panic disorder and depression symptoms than looming cognitive style; Reardon & Williams, 2007), thus it is likely they would have unique contributions to NAR smoking. Distinguishing their independent ability to predict NAR has not been examined in previous work and may identify specific risk factors for utilizing smoking as a coping mechanism. Identifying their unique connections may also indicate if interventions specific to AVF's are warranted (e.g., addressing anxious symptoms associated with nicotine withdrawal).

Hypothesis 2

Looming cognitive style and anxiety sensitivity were hypothesized to predict both static and dynamic appraisals of smoking-related threatening consequences. These cognitive trends of responding to potential threats were postulated to be related to more specific types of threat appraisals associated with smoking. Threat appraisals of smoking-related consequences were measured by the Negative Consequences subscale of the Smoking Consequences Questionnaire-Adult Version (SCQ-A) as well as the Looming Smoking Consequences Scale (LSCS) scores. Correlational and linear regression analyses were conducted to determine these relationships. The experimenter predicted that looming cognitive style and anxiety sensitivity would predict smoking threat appraisal scores in combination, as well as independently. It is postulated that both looming cognitive style and anxiety sensitivity, as types of cognitive-based trends of increased sensitivity to stimuli with shared features, will have some overlap in their ability to predict threat appraisal specific to smoking. However, since looming cognitive style and anxiety

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sensitivity are also unique constructs, they also are likely to have distinct abilities to predict smoking consequence threat appraisal. Making these distinctions has not been accomplished in previous work and adds to our increased understanding of how non-specific trends of threat appraisal relate to content of a specific domain (i.e., smoking). Distinguishing these AVFs contribution to smoking consequence appraisal may also provide insight as to how looming cognitive style and anxiety sensitivity relates to motivation to quit smoking or how these AVFs indicate what estimations of smoking consequence appraisal should be addressed in smoking cessation treatment.

<u>Hypothesis 3</u>

Threat appraisals of smoking-related consequences, both dynamic and static, were hypothesized to be related to motivation to quit smoking. The perception that the negative consequences of smoking endangers one's self contributes to one's motivation to quit. In the current study, threat appraisals of smoking-related consequences were measured by the Negative Consequences subscale of the Smoking Consequences Questionnaire- Adult Version (SCQ-A) as well as the Looming Smoking Consequences Scale (LSCS) scores. Motivation to quit smoking in this study was measured by the Motivational Aspects of Smoking Cessation Questionnaire (MASC) and the Reasons for Quitting Scale (RFQ).

Correlational and regression analyses were conducted to examine these relationships. It was predicted that smoking consequence threat appraisal processes would predict motivation to quit overall and as individual processes. While both types of smoking consequence appraisals would theoretically relate to motivation to quit smoking, they also present unique pathways of understanding smoking consequences and would likely contribute to motivation to quit in

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distinct way from one another. Identifying these unique connections can offer insight as to how campaigns, materials (e.g., pamphlets), and smoking cessation treatment can utilize these differing forms of smoking consequence appraisal in their approaches to promote smoking abstinence.

<center>Hypothesis 4</center>

Looming cognitive style and anxiety sensitivity were both hypothesized to also predict motivation to quit smoking. Both of these traits are associated with a trend of enhanced threat perception. As such, it is likely that smokers that are high in these traits perceive smoking-related threats as greater than smokers that report low anxiety sensitivity or looming cognitive style. Anxiety sensitivity has demonstrated this relationship as it has been found to be correlated with motivation to quit smoking and even predictive of this motivation when controlling for the factors of nicotine dependence, number of daily cigarettes, or age of initial smoking (Zvolensky, Baker, Leen-Feldner, Bonn-Miller, Feldner, & Brown, 2004; Zvolensky, Vujanovic, Miller, Bernstein, Yartz, Gregor, et al., 2007). As looming cognitive style is a pattern of enhanced threat perception, it was hypothesized that smokers will perceive smoking-related consequences as more threatening and thus will be more motivated to quit smoking. Motivation to quit smoking in this study was measured by the Motivational Aspects of Smoking Cessation Questionnaire (MASC) and the Reasons for Quitting Scale (RFQ).

Correlational and regression analyses were conducted to examine these relationships. It was predicted that looming cognitive style and anxiety sensitivity would predict motivation to quit overall and as individual factors. Anxiety sensitivity has already shown a connection with motivation to quit smoking but it is unclear if this association is specific, or may show overlap

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with another cognitive based AVF which shares overlapping features. Identifying unique contributions to motivation to quit can suggest if different mediating factors explain these relationships. Also, distinguishing their unique contributions to motivation to quit smoking will indicate the usefulness of identifying specifically anxiety sensitivity or looming cognitive style in smoking cessation treatment.

<u>Hypothesis 5</u>

Finally, it was hypothesized that smoking-specific threat appraisal may serve to explain the relationship between smokers' nonsmoking reactivity to threats (i.e., looming cognitive style, anxiety sensitivity) and motivation to quit. Looming perception and likelihood estimates of negative smoking consequences were examined as mediators in this set of analyses.

Mediational analysis was conducted according to the process outlined by Preacher and Hayes (2004). In the case of Preacher and Hayes' method of mediational analysis, a nonparametric resampling procedure is used to determine this indirect effect. This method involves repeatedly sampling from the data set and estimating the indirect effect in each resampled data set, a form of bootstrapping. Utilizing the Preacher and Hayes process is considered to be superior to the traditional Baron and Kenny (1986) method of mediational analysis in that it does not assume that the indirect effect will yield a normal distribution and it can be used to examine the influence of multiple mediators. The Preacher and Hayes method also utilizes a bootstrapping method that makes it possible to use with smaller samples (Preacher & Hayes, 2004; Preacher & Hayes, 2008).

The effect of the included AVFs on motivation to quit smoking was evaluated, considering the possible mediation of smoking-related threat perception (i.e., likelihood, looming

nature). The Negative Consequences subscale of the SCQ-A and the LSCS were entered as proposed mediators (Figure 2). Four single step multiple mediator analyses were performed to evaluate the mediational relationships for both AVFs (analyzed separately) on each measure of motivation to quit smoking (RFQ, MASC). It was hypothesized that the total indirect effect for each of these relationships would be significant. Moreover, it was hypothesized that each type of smoking-related threat perception will yield its own significant indirect effect; as each AVF is theorized to be related to both types of smoking threat appraisal, which are theorized to uniquely contribute to motivation to quit smoking.
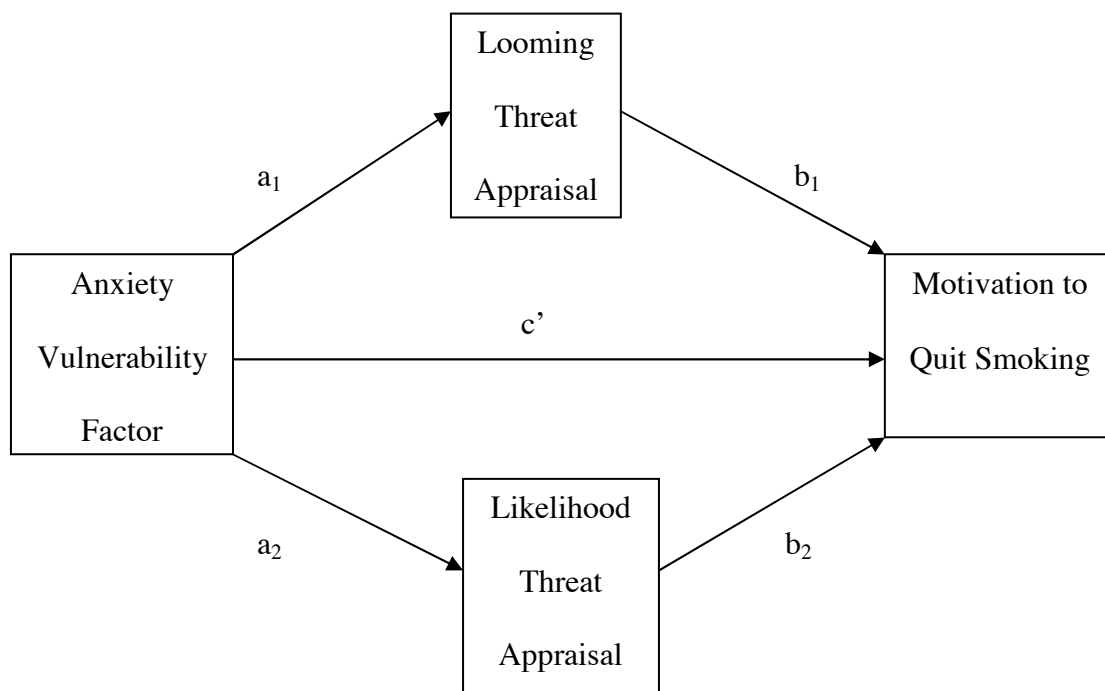

Figure 2. Multiple Mediator Analysis for the Current Study

Participants

Participants were recruited from online advertisements including American University Today. There were 200 individuals who responded to the study two online survey. Of these, 161 individuals endorsed that they were daily smokers, were United States residents, were 18 years or older, and were fluent in English. Of these 161 individuals, 143 went on to fill out the survey after demonstrating informed consent. Demographic variables among study two participants were initially analyzed. This sample appears to be primarily represented by those who are male, white, educated, in early adulthood and who live in households with raised income (Table 6).

Table 6. Study 2 Participant Demographic Variables

Age	30.52 (5.94)
Gender	25% Female
Ethnicity	
Hispanic or Latino	4%
Race	
American Indian	7%
Asian-American	5%
African-American	11%
White	76%
Native Hawaiian/Pacific Islander	0%
Other	1%
Highest Level of Education	

Partial High School	1%
High School or GED	10%
Some College	30%
Technical School/Associate's Degree	16%
Bachelor's Degree	30%
Graduate or Professional Degree	13%
Annual Household Income	
Less than 10,000	3%
10,000 to 19,999	3%
20,000 to 29,999	3%
30,000 to 39,999	3%
40,000 to 49,999	4%
50,000 to 74,999	7%
75,000 to 99,999	30%
100,000+	48%

Smoking history variables among study 2 participants were also examined. These variables are represented in Table 7.

Table 7. Smoking History Variables Among Study 2 Participants

Age of First Cigarette	18.21 (3.84)
Years of Daily Smoking	8.70 (5.09)
Minimum Number of Cigarettes Smoked Daily	5.66 (6.15)

Maximum Number of Cigarettes Smoked Daily	18.97 (9.20)
Average Number of Cigarettes Smoked Daily	11.88 (6.38)
Fagerstrom Test of Nicotine Dependence Score	5.55 (1.99)

Standard deviations in parentheses

Measures

The Demographics Questionnaire, Smoking History Questionnaire, Fagerstrom Test of Nicotine Dependence (FTND), Looming Maladaptive Style Questionnaire (LMSQ), were previously used in study one of this work.

Anxiety Sensitivity Index

The Anxiety Sensitivity Index (ASI; Reiss, Peterson, Gursky, & McNally, 1986) is a 16-item measure in which respondents use a 5-point Likert scale, from 0 = "very little" to 4 = "very much", to rate their concern about possible negative consequences associated with anxiety symptoms. The ASI has shown high internal consistency (Cronbach's α = .79 to .90) and adequate retest reliability (r = .70 across a three year period; Peterson & Reiss, 1992). In the present study, the ASI demonstrated strong internal consistency (Cronbach's α = .89). The Smoking Consequences Questionnaire – Adult Version was administered in study one.

Looming Smoking Consequences Scale

The Looming Smoking Consequences Scale (LSCS) is a composite of seven scenarios in which possible negative consequences of smoking are introduced. Participants are asked to rate on a one to five scale the extent to which this threat is escalating or approaching them. The LSCS is made up of two component subscales, the Looming Smoking Consequences Scale – Physical Subscale (LSCS-P) and the Looming Smoking Consequences Scale – Social Subscale (LSCS-S).

The LSCS had shown good reliability in study 1 (Cronbach's α = .83) and continued to do so in study 2 (Cronbach's α = .89). The LSCS-P also showed good internal consistency (Cronbach's α = .87) as did the LSCS-S (Cronbach's α = .81).

Reasons for Smoking Scale

The Reasons for Smoking Scale (RSS; Ikard, Green, & Horn, 1969) is a 23-item self-report measure in which smokers rate on a five-point Likert scale (1 = "Never", 5 = "Always") different reasons for smoking. The questionnaire is composed of six scales: (1) negative affect reduction, (2) addiction, (3) habit, (4) pleasurable relaxation, (5) stimulation, and (6) sensorimotor manipulation (Ikard, Green, & Horn, 1969). The RSS has demonstrated moderate retest reliability (α = .60-.83; Tate, Schmitz, & Stanton, 1991). In this study, the negative affect reduction subscale showed decent internal consistency (Cronbach's α = .67)

Motivational Aspects of Smoking
Cessation Questionnaire

The Motivational Aspects of Smoking Cessation Questionnaire (MASC; Rundmo, Smedslund, & Gotestam, 1997) is a 10-item self-report measure in which participants rate on a zero to four Likert scale (0 = "no, not at all motivated", 4 = "yes, very motivated") their level of motivation regarding varying aspects of smoking cessation (e.g., "I wish to try nicotine gum because I want to stop smoking."). The MASC has demonstrated strong internal consistency previously (Cronbach's α = .95; Rundmo, Smedslund, & Gotestam, 1997) as well as in study 2 of this work (Cronbach's α = .88).

The Reasons for Quitting Scale (RQS) was also used in study one.

Procedure

Participants took part in an online study at surveymonkey.com. Participants verified their age as 18 years or older, that they were daily smokers, that they were fluent in English, and were United States residents. Following the study's measures, participants were given mental health referral sources in case the study had generated any overwhelming emotional distress or impairment as well as referral sources that could provide access to smoking cessation services. Finally, participants were sent a claim code so that they could receive a $10.00 Amazon gift card.

Study Two Results

Study two data was examined to confirm the viability of the LSCS as a measure of smokers' dynamic appraisal of smoking-related threats. The overall LSCS was also found to correlate with the anxiety produced by the included scenarios (r = .61, p < .01) and the vividness in which participants perceived these scenarios (r = .47, p < .01).

Similar to study one, the LSCS and its subscales were shown to be related to other forms of threat perception. Participants' ratings of looming perception were correlated with participants' overall tendency to perceive threats dynamically, as represented by the LMSQ (r = .76, p < .01). The LSCS subscales also corresponded with the subscales of the LMSQ. Individuals' tendency to see general physical consequences as growing (LMSQ Physical subscale) corresponded to their perception that physical consequences of smoking are dynamically growing according to the LSCS-P (r = .61, p < .01). The same trend was seen for participants' general tendency to perceive social consequences as growing and their LSCS-S scores (r = .59, p < .01).

When compared to other forms of smoking-related threat perception, participants' LSCS scores also demonstrated an expected relationship. Overall LSCS scores were significantly correlated with perception that the negative consequences of smoking were likely ($r = .62$, $p < .01$). Moreover, the Social Subscale of the LSCS was significantly correlated with the Negative Social Impression Subscale of the SCQ-A ($r = .51$, $p < .01$). Also the physical subscale of the LSCS was correlated with both the Negative Physical Feelings Subscale ($r = .49$, $p < .01$) and the Health Risk Subscale ($r = .45$, $p < .01$).

As expected, participants' looming threat appraisal of smoking-related consequences was related to motivation to quit smoking. LSCS scores were correlated with both the MASC scores ($r = .59$, $p < .01$) and the overall RFQ scale scores ($r = .57$, $p < .01$). Furthermore, the Health Concerns subscale of the RFQ was significantly correlated with the Physical Subscale of the LSCS ($r = .41$, $p < .01$) and the Social Pressure subscale of the RFQ was shown to be related to the Social Subscale of the LSCS ($r = .54$, $p < .01$). These replicated relationships indicate that the LSCS has reliability and has construct validity as a measure of looming appraisal of smoking-related consequences.

To assess the validity of proposed hypotheses, the LSCS along with measures of AVFs (i.e., LMSQ, ASI), motivation to smoke to reduce negative affect (i.e., Negative Affect Reduction subscale of the RFS), likelihood estimates of negative smoking consequences (i.e., Negative Consequences subscale of the SCQ-A), and of motivation to quit smoking (i.e., MASC, RFQ) were assessed. Table 8 shows bivariate correlations among these variables.

As hypothesized and seen in Table 8, both types of AVFs are significantly correlated with motivation for NAR smoking. Moreover, these AVFs were shown to be correlated with both measures of motivation to quit smoking and both types of smoking-related threat appraisal.

Finally, both types of smoking-related threat appraisal are found to be correlated with measures of motivation to quit smoking as expected.

Hypothesis 1: Anxiety Vulnerability Factors
Relationship with Smoking Motivation

A small correlation is shown among both types of AVFs and motivation to smoke for NAR (Table 8). This significant relationship is consistent with the proposed hypothesis. However, neither AVF correlates with negative affect reduction smoking independent of the other. Anxiety sensitivity did not significantly correlate with the Negative Affect Reduction Subscale of the RSS when controlling for LMSQ scores (r = .06, p =.48). Likewise, LMSQ scores are no longer significantly related to NAR smoking when controlling for ASI scores (r = .12, p = .16).

The relationship between AVFs and NAR motivation was also analyzed using a linear regression model. The AVFs of looming cognitive style and anxiety sensitivity were examined as predictors of NAR smoking. Subsequently, it was found that the overall regression model was predictive of NAR smoking [$F(2,139) = 3.88$, p = .02]. The adjusted R^2 in this analysis was .04, thus only explaining a small percentage of the variance associated with motivation to smoke for this reason. However, this result suggests that the AVF participant scores overall were related to one's motivation to smoke to reduce negative emotion. Consistent with the partial correlation analyses, neither looming cognitive style nor anxiety sensitivity independently predict motivation to reduce negative affect [Standardized β for LMSQ total score = .16, $t(141) = 1.43$, $pr^2 = .01$, p = .16; Standardized β for ASI total score = .09, $t(141) = .75$, $pr^2 = .00$, p = .46].

Hypothesis 2: Anxiety Vulnerability Factors relationship
with Smoking-Related Threat Appraisal

Consistent with the proposed hypothesis, both looming cognitive style and anxiety

sensitivity demonstrate a strong correlation with both types of smoking-specific threat appraisal

measures (Table 8). Participants' degree of looming cognitive style correlated with likelihood

estimates (Negative Consequences subscale of SCQ-A; $r = .65$, $p < .01$) and dynamic appraisal

(LSCS; $r = .76$, $p < .01$) of negative smoking consequences. Likewise participants' degree of

anxiety sensitivity was positively correlated with both likelihood appraisal ($r = .74$, $p < .01$) and

dynamic appraisal ($r = .62$, $p < .01$) of smoking-related consequences.

Partial correlations, were examined as well to appraise unique relationships between

examined AVFs and smoking-specific threat appraisal. When controlling for participants'

anxiety sensitivity, LMSQ scores were still strongly correlated with LSCS scores ($r = .58$, $p <$

.01) and moderately correlated with likelihood appraisal of smoking-related consequences ($r =$

.29, $p < .01$). Moreover, when controlling for looming cognitive style, anxiety sensitivity

remained strongly correlated with likelihood estimates of smoking-related consequences ($r = .53$,

$p < .01$) and demonstrated a small correlation with LSCS scores ($r = .21$, $p = .01$).

To further determine if these AVFs are related to more specific smoking-related threat

appraisal, linear regression models were examined as well. A linear regression model, created

with LMSQ and ASI scores entered as predictors and the Negative Consequences subscale of the

SCQ-A as the dependent variable, was shown to be significant [$F(2,139) = 96.40$, $p < .01$].

Moreover, this model appeared to account for much of the variance of the Negative

Consequences subscale (adjusted $R^2 = .58$).

When examining the independent contributions of these AVFs, both were significant and independent predictors of participants' estimation of the negative consequences of smoking to be likely [Standardized β for ASI total score = .55, t(140) = 7.29, pr^2 = .28, p < .01; Standardized β for LMSQ total score = .27, t(140) = 3.55, pr^2 = .08, p < .01]. In this case anxiety sensitivity was a more meaningful predictor of likelihood estimates of smoking-related consequences.

Table 8. Correlations Among Examined Study 2 Variables

	LMSQ	ASI	RFS-NAR	LSCS	SCQ-A Neg Con	RFQ	MASC
LMSQ[a]	.85						
ASI[b]	.69**	.89					
RFS-NAR[c]	.22*	.20*	.67				
LSCS[d]	.76**	.62**	.16	.89			
SCQ-A Neg Con[e]	.65**	.74**	.36**	.62**	.88		
RFQ[f]	.51**	.72**	.23*	.57**	.73**	.91	
MASC[g]	.51**	.74**	.13	.59**	.60**	.78**	.88

Diagonal squares represent Cronbach α values; *p < .05, **p < .01

[a]Looming Maladaptive Style Questionnaire Score

[b]Anxiety Sensitivity Index

[c]Reasons for Smoking Scale Negative Affect Reduction Subscale

[d]Looming Smoking Consequences Scale

[e]Smoking Consequences Questionnaire – Adult Version Negative Consequences Subscale

Additionally, a linear regression model was generated with AVFs as predictors and participants' LSCS scores entered as the dependent variable. As was the case with the static appraisal of smoking-related consequences, the linear regression model was found to be predictive of LSCS scores [$F(2,139) = 101.41$, $p < .01$], predicting much of its associated variance (adjusted $R^2 = .59$). As before, both types of AVFs predicted participants' LSCS scores [Standardized β for ASI total score = .19, $t(140) = 2.54$, $pr^2 = .04$, $p = .01$; Standardized β for LMSQ total score = .63, $t(140) = 8.41$, $pr^2 = .34$, $p < .01$]. When predicting dynamic threat appraisal of smoking consequences, LMSQ scores served as a more meaningful predictor than participant's anxiety sensitivity.

AVFs predicted smoking-specific threats appraisal overall and independently. For likelihood estimates of smoking-related threats, anxiety sensitivity was a stronger predictor than was looming cognitive style. In the case of dynamic appraisal of smoking-related threats, looming cognitive style was a stronger predictor than anxiety sensitivity.

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Hypothesis 3: Smoking-related Threat Appraisal and Motivation to Quit Smoking

</div>

The relationships between smoking-specific threat appraisals and motivation to quit smoking were as predicted, showing strong positive correlations (Table 9). The Negative Consequences subscale of the SCQ-A was correlated with both participant MASC ($r = .60$, $p < .01$) and RFQ scores ($r = .73$, $p < .01$). Likewise participant LSCS scores were correlated with MASC scores ($r = .59$, $p < .01$) and overall reported RFQ scores ($r = .57$, $p < .01$).

Linear regression models were also examined. For the first analysis, participant Negative Consequences subscale scores of the SCQ-A and the LSCS scores were entered as predictors with participant MASC scores as the dependent variable. Overall, the linear regression model was predictive MASC scores [$F(2,139) = 52.55$, $p < .01$], accounting for a fair amount of motivation to quit smoking according to this measure (adjusted $R^2 = .42$).

Moreover, both smoking threat appraisals were predictive of their motivation to quit smoking according to the MASC and equivalent in strength of prediction [Standardized β for Negative Consequences of the SCQ-A = .39, $t(140) = 4.77$, $pr^2 = .14$, $p < .01$; Standardized β for LSCS total score = .34, $t(140) = 4.21$, $pr^2 = .11$, $p < .01$].

A linear regression model was also created with the smoking-related threat appraisals as predictors and RFQ scores entered as the dependent variable. The overall model was significant [$F(2,139) = 86.26$, $p < .01$] and accounted for over half of the variation in RFQ scores (adjusted $R^2 = .55$). Furthermore, both types of smoking-related threat appraisal independently accounted for motivation to quit smoking according to RFQ scores [Standardized β for Negative Consequences of the SCQ-A = .62, $t(140) = 8.61$, $pr^2 = .35$, $p < .01$; Standardized β for LSCS total score = .18, $t(140) = 2.52$, $pr^2 = .04$, $p = .01$]. As opposed to the prior analysis, smokers' estimation of the likelihood of smoking-related consequences served as a stronger predictor of motivation to quit than dynamic appraisal.

Smoking consequence threat appraisal is evidently related to motivation to quit smoking, with each type of threat appraisal having a unique and significant relationship to this motivation. However, while both types of smoking-related threat appraisal predict motivation to quit smoking according to the MASC equivalently, participants' likelihood estimates appeared to be a stronger predictor of motivation to quit according to overall RFQ scores.

Hypothesis 4: Anxiety Vulnerability Factors relationship
with Motivation to Quit Smoking

As seen in Table 9, there is a strong correlation between each of the AVFs and the

measures of motivation to quit smoking, consistent with the proposed hypothesis. When

examining partial correlations, it was found that participants' anxiety sensitivity remained

strongly correlated with motivation to quit smoking according to both the RFQ (r = .60, p < .01)

and the MASC (r = .62, p < .01) when controlling for the LMSQ. However, the reverse was not

found to be true. Participants' general tendency to perceive threats as dynamically increasing was

no longer significantly correlated with motivation to quit based on either the RFQ (r = .03, p =

.16) or the MASC (r = .01, p = .93) when controlling for ASI scores.

When both AVFs were entered as predictors, it was found that an overall regression

model was predictive of motivation to quit smoking according to the MASC [F(2,140) = 83.22, p

< .01]. The determined adjusted R^2 was .54, explaining a large amount of the variation in MASC

scores. When determining how these factors contributed independently, only participants'

anxiety sensitivity was predictive of their motivation to quit smoking [Standardized β for ASI

total score = .73, t(140) = 9.29, pr^2 = .38, p < .01; Standardized β for LMSQ total score = .01,

t(140) = .09, pr^2 = .00, p = .93].

A similar regression model was created to examine the relationship between included

AVFs and motivation to quit smoking, according to the RFQ overall score. The overall linear

regression model was significant [F(2,139) = 75.91, p < .01], and explained a large degree of

motivation to quit smoking according to the RFQ (adjusted R^2 = .52). Consistent with the prior

analysis, when determining how AVFs contributed independently only participants' anxiety

sensitivity was predictive of their motivation to quit smoking [Standardized β for ASI total score

$= .70, t(140) = 8.68, pr^2 = .35, p < .01$; Standardized β for LMSQ total score $= .03, t(140) = .36$, $pr^2 = .00, p = .72$].

The examined AVFs are found to be related to motivation to quit smoking. Participants' anxiety sensitivity showed a unique ability to account for variance in motivation to quit smoking. Conversely, one's general tendency to appraise threats dynamically does not uniquely predict motivation to quit smoking beyond reported anxiety sensitivity.
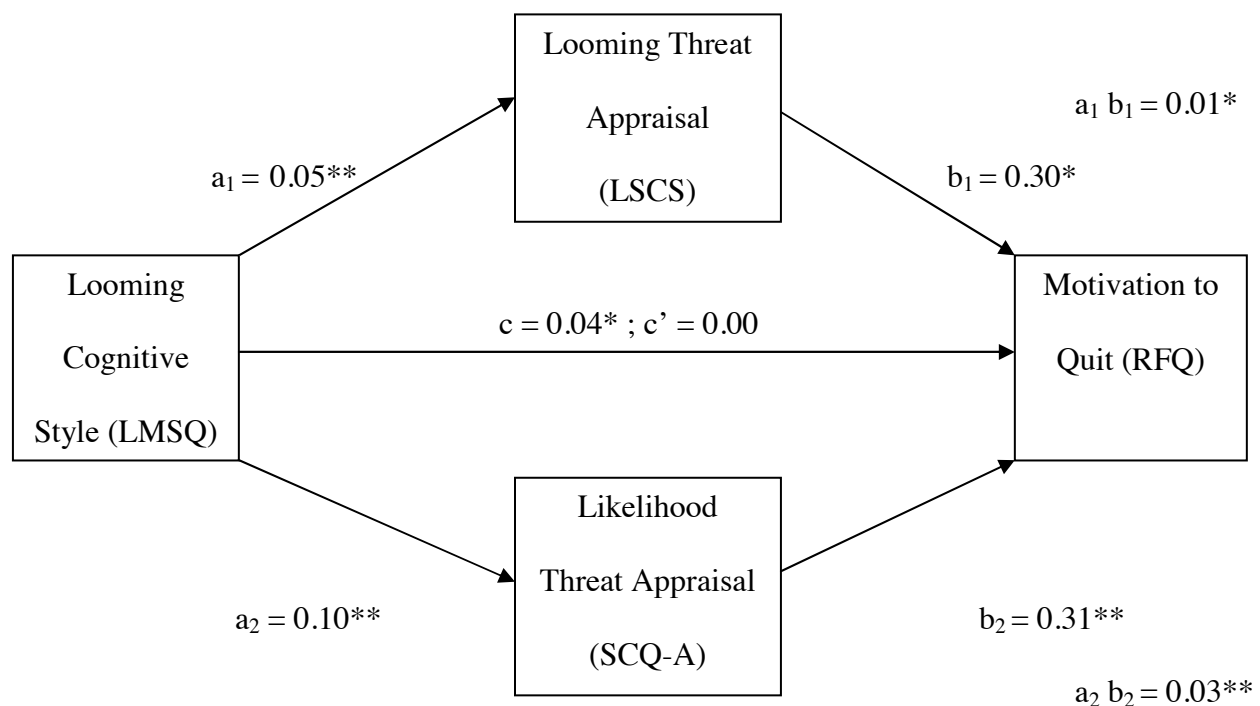
Hypothesis 5: Mediation of Smoking-Related Threat Appraisals

To determine how the relationship between AVFs and motivation to quit smoking was mediated by threat appraisals of smoking-related consequences, four Preacher and Hayes mediational analyses were conducted. AVFs were represented by LMSQ and ASI scores. Motivation to quit smoking was represented by RFQ and MASC scores. Moreover, smoking-specific threat appraisal processes were represented by participant scores on the Negative Consequences subscale of the SCQ-A and LSCS scores.

The first of these analyses (represented in Figure 3) focused on how smoking-related threat appraisal mediated the relationship between looming cognitive style and motivation to quit smoking according to their RFQ scores. Overall the created model accounted for participants' motivation to quit smoking [$F(3, 136) = 58.63, p < .01$; adjusted $R^2 = .55$]. When examining how LMSQ scores accounted for variation in motivation to quit smoking (RFQ), without accounting for mediators, it was shown that it significantly did so [$t(139) = 7.04, p < .01$].

Consistent with hypothesis 5, threat appraisal of smoking consequences mediated the relationship between LMSQ and RFQ scores, giving an effect size of 0.04 (95% Confidence Interval 0.02 to 0.07; $z = 6.93, p < .01$). Both threat appraisals served as independent mediators

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between looming cognitive style and their motivation to quit smoking. The effect size of indirect mediation of LMSQ scores through Negative Consequences of SCQ-A was found to be 0.03 (95% Confidence Interval 0.02 to 0.04; z = 6.47, p < .01) and this mediation for LSCS scores was 0.01 (95% Confidence Interval 0.00 to 0.03; z = 2.73, p = .01]. When this mediation is accounted for, LMSQ scores showed no direct effect on motivation to quit smoking according to participant RFQ scores [$\beta c' = 0.00$, t(139) = -0.99, p = .33].
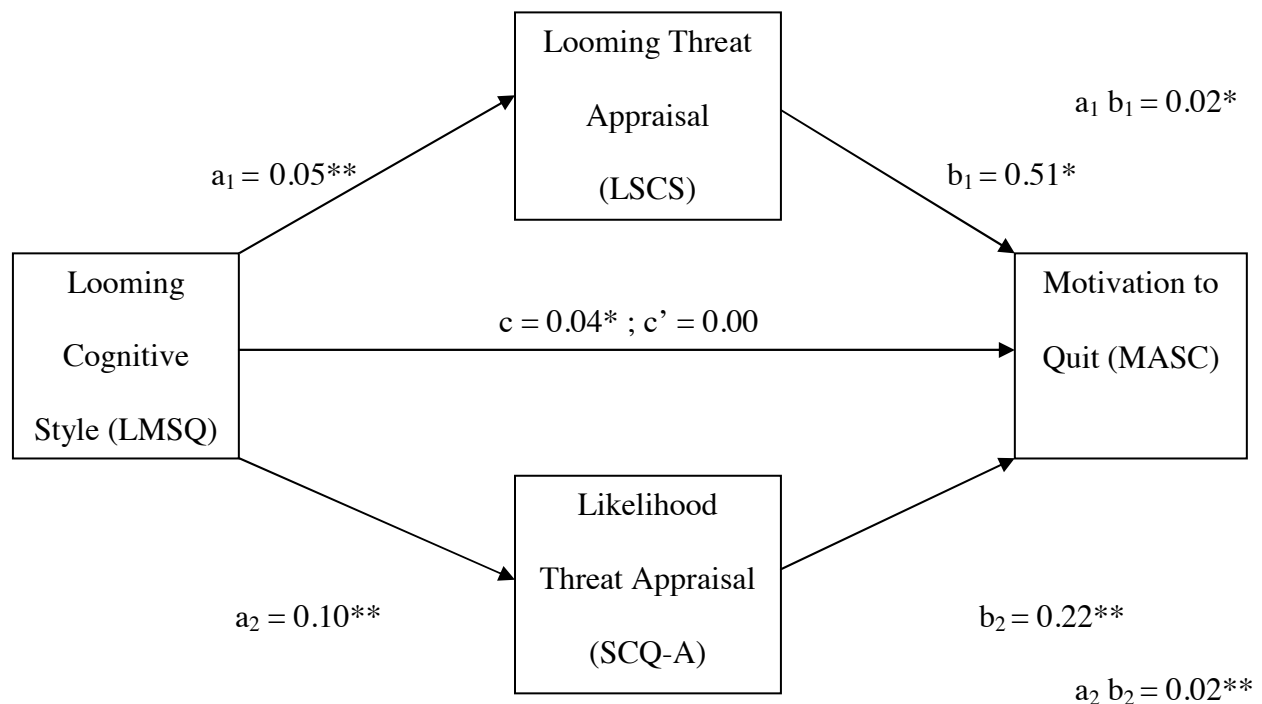

*p = 0.1, **p < .01

Figure 3. Representation of Mediational Analysis between LMSQ and RFQ Scores

      This analysis demonstrates that there is a significant mediation of smoking-related threat appraisal, though small in size, and that this is true for both types of smoking-related threat appraisal.

The second of these analyses (represented in Figure 4) focused on how smoking-related threat appraisal mediated the relationship between participants' overall tendency to view threats as dynamically growing and their motivation to quit smoking according to their MASC scores. Overall the created model was found to account for participants' motivation to quit smoking [$F(3, 136) = 35.51$, $p < .01$; adjusted $R^2 = .43$]. As was the case for RFQ scores, when examining how LMSQ scores accounted for variation in motivation to quit smoking (MASC), without accounting for mediators, a significant direct effect was shown [$t(139) = 7.02$, $p < .01$].

$*p = 0.1$, $**p < .01$

Figure 4. Representation of Mediational Analysis between LMSQ and MASC Scores

Consistent with the experimenter's hypothesis, smoking consequence threat appraisals mediated the relationship between LMSQ and MASC scores, giving an effect size of 0.04 (95% Confidence Interval 0.02 to 0.07; $z = 5.83$, $p < .01$). Both consequence appraisals mediated an indirect effect of participants' looming cognitive style on motivation to quit smoking. The effect

size of indirect mediation of LMSQ scores through Negative Consequences of SCQ-A was found

to be 0.02 (95% Confidence Interval 0.01 to 0.04; $z = 4.12$, $p < .01$) and this mediation for LSCS

scores was 0.02 (95% Confidence Interval 0.00 to 0.04; $z = 3.50$, $p < .01$]. When this mediation

is accounted for, LMSQ scores again demonstrated no direct effect on motivation to quit

smoking according to participant MASC scores [$\beta c' = 0.00$, $t(139) = -.18$, $p = .86$].

It can be determined from this analysis that there is a significant mediation of smoking-

related threat appraisal between general dynamic appraisals of threat and motivation to quit

smoking according to MASC scores, though small in size, and that this is independently true for

both types of smoking-related threat appraisal.

The third of these analyses (represented in Figure 5) focused on how smoking-related

threat appraisal mediated the relationship between participants' anxiety sensitivity and their

motivation to quit smoking according to RFQ scores. Overall the created model accounted for

participants' motivation to quit smoking [$F(3, 136) = 72.88$, $p < .01$; adjusted $R^2 = .61$]. When

examining how ASI scores accounted for variation in motivation to quit smoking (RFQ), without

accounting for mediators, it demonstrated a significant direct effect [$t(139) = 12.33$, $p < .01$].

Consistent with the experimenter's hypothesis, smoking consequence appraisal mediated

the relationship between ASI and RFQ scores, giving an effect size of 0.36 (95% Confidence

Interval 0.17 to 0.58; $z = 5.26$, $p < .01$). Moreover, only likelihood estimates of smoking

consequences demonstrated an independent indirect effect of participants' anxiety sensitivity on

their motivation to quit smoking. The effect size of indirect mediation of ASI scores through

Negative Consequences of SCQ-A was 0.30 (95% Confidence Interval 0.15 to 0.51; $z = 4.65$, $p <$

.01). In contrast the indirect effect of LSCS scores was shown to be non-significant (Effect size =

0.06; 95% Confidence Interval   -0.05 to 0.21; $z = 1.33$, $p = .18$]. As opposed to the previous

analysis, when the total mediation of these smoking related threat appraisal were accounted for, ASI scores still showed a significant direct effect on motivation to quit smoking according to participant RFQ scores [$\beta c' = 0.37$, $t(139) = 4.44$, $p < .01$].
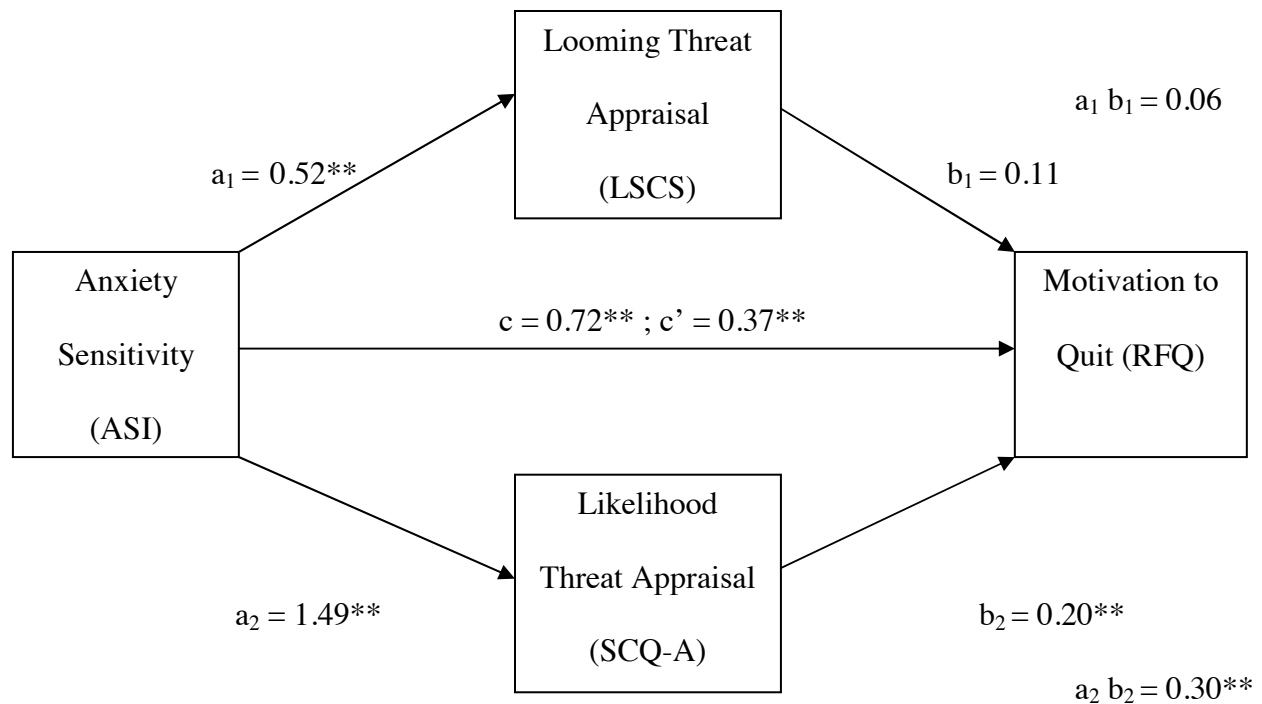
*p = 0.1, **p < .01

Figure 5. Representation of Mediational Analysis between ASI and RFQ Scores

Smoking-related threat appraisals evidently are partial mediators in the relationship between anxiety sensitivity and motivation to quit smoking (RFQ scores). Moreover, only likelihood estimates of smoking-related consequences uniquely mediated this relationship.

In the final Preacher and Hayes mediational analysis (represented in Figure 6), smoking-related threat appraisals were assessed as mediators in the relationship between participants' anxiety sensitivity and their motivation to quit smoking according to their MASC scores. Overall the created model accounted for much of participants' motivation to quit smoking [$F(3, 136) = 61.64$, $p < .01$; adjusted $R^2 = .57$]. The direct effect of participants' anxiety sensitivity on
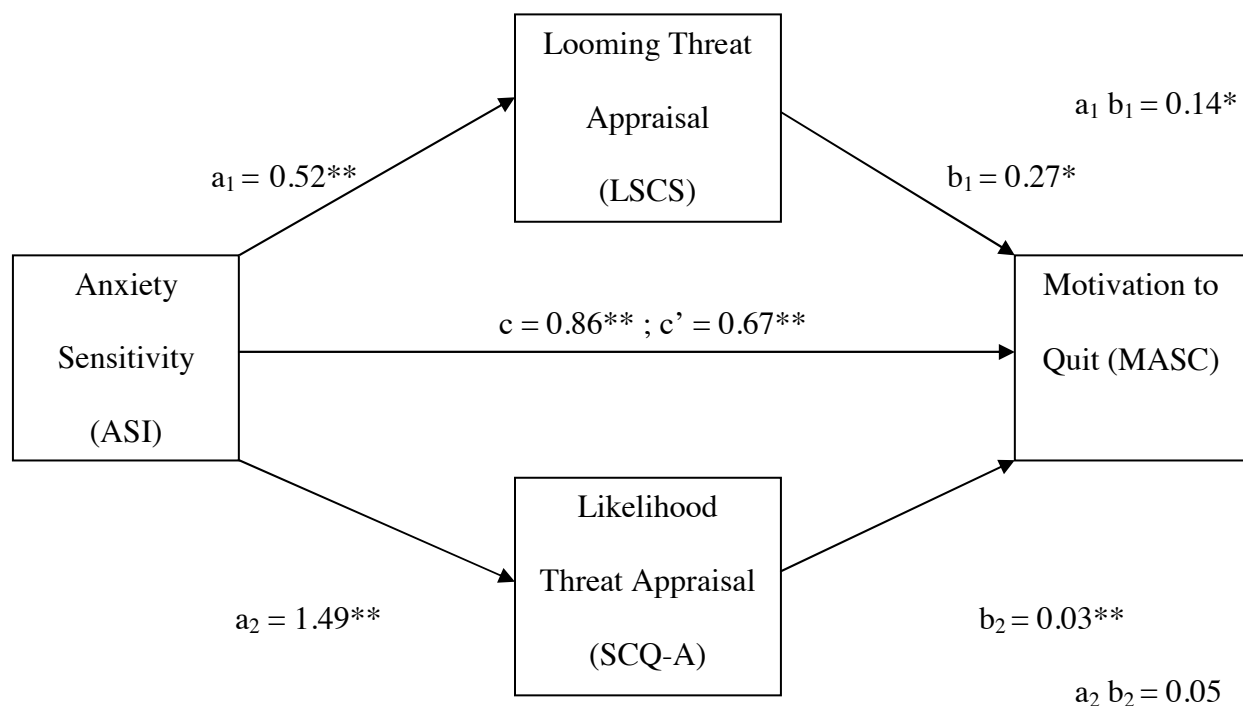
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motivation to quit smoking (MASC), without accounting for mediators was shown to be significant [$t(139) = 12.92$, $p < .01$].

Consistent with the experimenter's hypothesis, smoking consequence appraisals partially mediated the relationship between ASI and MASC scores, giving an effect size of 0.19 (95% Confidence Interval 0.00 to 0.44; $z = 2.47$, $p = .01$). As before, both types of smoking-specific threat appraisal did not significantly mediate the relationship between ASI and motivation to quit. Only participants' looming perception of smoking-related threats showed an indirect effect for anxiety sensitivity's relationship with motivation to quit (MASC scores). The effect size of mediation of ASI scores through LSCS scores was found to be 0.14 (95% Confidence Interval 0.01 to 0.33; $z = 2.58$, $p = .01$). On the other hand, the indirect effect of participants' likelihood estimates of smoking consequences was non-significant (Effect size = 0.05; 95% Confidence Interval -0.15 to 0.20; $z = .64$, $p = .52$]. When the total mediation of these smoking related threat appraisal processes were accounted for, ASI scores still showed a significant direct effect on motivation to quit smoking according to participant MASC scores [$\beta c' = 0.67$, $t(139) = 6.63$, $p < .01$].

This last analysis demonstrates that overall smoking-related threat appraisal partially mediates the relationship between anxiety sensitivity and motivation to quit smoking according to participant MASC scores. However, it was found that only dynamic appraisals of smoking-related consequences uniquely accounted for this partial mediation.

Consistent with the proposed hypothesis, all four of these analyses have shown that the examined AVFs relate to motivation to quit smoking and that this relationship is significantly mediated by smoking-specific threat appraisal. Both types of smoking threat appraisal independently mediated looming cognitive style's effect on motivation to quit smoking as

predicted, though this effect was small. In both analyses the relationship between anxiety sensitivity and motivation to quit smoking was shown to be partially mediated by smoking-specific threat appraisal overall and by at least one type independently. The type of smoking threat appraisal that mediated this relationship differed based on the measure of motivation to quit smoking, LSCS scores in the case of motivation being measured by the MASC and the Negative Consequences subscale of the SCQ-A in the case of motivation being measured by the RFQ.

```
                    ┌─────────────────┐
                    │  Looming Threat │
                    │    Appraisal    │        a₁ b₁ = 0.14*
          a₁ = 0.52**│     (LSCS)     │  b₁ = 0.27*
                    └─────────────────┘
┌──────────────┐                          ┌──────────────┐
│   Anxiety    │   c = 0.86** ; c' = 0.67**│ Motivation to│
│ Sensitivity  │─────────────────────────→│  Quit (MASC) │
│    (ASI)     │                          │              │
└──────────────┘                          └──────────────┘
                    ┌─────────────────┐
                    │   Likelihood    │
                    │ Threat Appraisal│
          a₂ = 1.49**│    (SCQ-A)     │  b₂ = 0.03**
                    └─────────────────┘        a₂ b₂ = 0.05
```

$a_1 b_1 = 0.14*$

$a_1 = 0.52**$ $b_1 = 0.27*$

$c = 0.86**$; $c' = 0.67**$

$a_2 = 1.49**$ $b_2 = 0.03**$

$a_2 b_2 = 0.05$

*p = 0.1, **p < .01

Figure 6. Representation of Mediational Analysis between ASI and MASC Scores

CHAPTER 4

DISCUSSION

Looming Perception of Smoking Consequences

A pilot measure of smokers' looming appraisal of smoking consequences (LSCS) was

developed in the current work. The resulting measure was created through an exploratory factor

analysis which also identified two component subscales. The Looming Smoking Consequences

Scale (LSCS), and its subscales, the LSCS – Physical Subscale (LSCS-P) and the LSCS – Social

Subscale (LSCS-S), demonstrated good internal consistency which was replicated in another

sample. The validity of a measure assessing a specific type of looming perception is also

bolstered by the development of two other similar measures (Tolin, Worhunsky, & Maltby,

2004; Levin, Riskind, & Li, 2007).

As expected, the LSCS was meaningfully related to smokers' anxiety associated with

LSCS scenarios, general tendency to perceive threats as increasing, perception of smoking-

related consequences as likely, motivation to quit smoking, and quit attempts. Moreover, the

included LSCS subscales showed expected relationships with other theoretically-related factors.

Specifically the LSCS-P subscale was positively correlated with the Physical Subscale of the

LMSQ, physically-related subscales of the SCQ-A (i.e., Health Risk subscale, Negative Physical

Feelings subscale), and the Health Concerns subscale of the RFQ. Also, the LSCS-S subscale

was significantly related to the Social Subscale of the LMSQ, the Negative Social Impression

subscale of the SCQ-A, and motivation to quit smoking related to social consequences (i.e.,

Social Pressure subscale of the RFQ). These features were replicated in a second sample and are

consistent with prior work (McDonald, O'Brien, Farr & Haaga, 2010), suggesting that this pilot

measure represents a viable construct.

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A potential limitation for the development of this measure was that it used data from both in-person and online participants. This theoretically may result in data composed of two qualitatively different groups. In study one of this work, both online and in-person participants were self-selected for participation in this study and were administered measurements with the exact same wording. In both the in-person and online versions of the study, all participants reported that they understood the rating scales used in this measure suggesting that the modality of assessment did not distort smokers' ability to respond accurately. Moreover, online assessments have shown strong similarity with in-person methods of studying psychological constructs and smoking behavior (Cronk & West, 2002; Klein, Thomas, & Sutter, 2007, Ramo, Hall, & Prochaska, 2011).

Furthermore, smokers responded equivocally on both measures of smoking history and threat perception. The single exception in this trend was a significant difference in anxiety generated from the measures' scenarios. This difference may be attributed to online participants' ability to participate in more comfortable surroundings.

Moreover, of the 89 participants that began study one only 60 completed it. To determine if there was any difference between completers and non-completers among these participants, their available data was compared. No significant differences were found for demographic variables (e.g., age, gender), smoking history variables, current smoking and nicotine dependence, nor motivation to quit thus suggesting equivalence.

Finally, the initially piloted measure had a Flesch-Kincaid readability scale of a 9.5 grade reading level. The participants of study one predominantly had a high school degree or general equivalency degree (over 97%) and reported that they were able to understand the piloted measure in the semi-structured interview. However, the use of the LSCS may not be appropriate

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for those that do not have 10th grade reading level. Through the elimination of scenarios in the

first study of this work made for easier reading, prospective studies may seek to develop a

measure that it more easily read both by individuals with a lower education level or perhaps by

those whose primary language is not English.

Future studies can establish retest reliability by administering this measure on multiple

occasions and comparing stability of participants' scores over time. Moreover, predictive validity

can be determined by comparing participants' scores to future quit attempts or treatment seeking.

Further work may also explore if looming perception of smoking consequences can differentiate

between smokers and non-smokers as was found for likelihood estimates of smoking

consequences (Copeland, Brandon, & Quinn, 1995).

While the current LSCS is a pilot measure, it offers a type of assessment that was

previously unavailable. This work serves a need in a growing literature as it provides future

opportunity to measure how smokers perceive smoking consequences as growing. Such a

measure can be useful in more clearly determining how motivation to quit smoking is promoted

as well as how other health behaviors may be changed for an individual's benefit. Establishing

this new construct can further allow smoking cessation programs and media campaigns to create

interventions that incorporate this specific type of threat appraisal. Having a new approach may

allow for such programs to positively influence individuals in ways that had not previously been

explored, and to reach populations that have been resistant to other interventions.

<u>Anxiety Vulnerability Factors and Motivation for</u>
<u>Negative Affect Reduction Smoking</u>

As predicted, included AVFs were related to motivation for NAR smoking. Direct

correlations were found, though small in strength ($r = .20 - .22$). This finding is consistent with

the direct relationship between anxiety sensitivity and NAR smoking that has been validated in

past studies (Comeau, Stewart, & Loba, 2001; Gonzalez, Zvolensky, Vujanovic, Leyro, & Marshall, 2008; Leyro, Zvolensky, Vujanovic, Bernstein, 2008), especially among the ASI subcomponents of Physical and Mental Incapacitation Concerns (Zvolensky, Bonn-Miller, Feldner, Leen-Feldner, McLeish, & Gregor, 2006). However, contrary to prediction these AVFs did not independently predict motivation to smoke to reduce negative emotion.

One explanation for why these factors did not independently predict motivation for NAR smoking is that they could share a common link with NAR smoking. A possible link may be individuals' belief that smoking will effectively serve as a coping mechanism for emotional distress. In support of this explanation, Johnson, Farris, Schmidt, and Zvolensky (2012) found that anxiety sensitivity was related to both motivation for NAR smoking and smokers' belief that negative affect reduction would be a likely outcome of smoking. This expectancy outcome and type of smoking motivation were found to correspond with smokers' anxiety sensitivity; however, no analysis was conducted to explore how this outcome expectancy could mediate the connection between anxiety sensitivity and NAR smoking motivation.

To test this explanation, data from the present study was used to create a stepwise regression model. The Negative Affect Reduction subscale of the RSS was entered as the dependent variable, the Negative Affect Reduction subscale of the SCQ-A (i.e., likelihood of smoking reducing negative affect) was entered as the first step of a the model, and anxiety sensitivity as well as looming cognitive style were entered as the second step of the model. It was found that anxiety sensitivity and looming cognitive style no longer significantly contributed to the regression model ($\Delta R^2 = .00$; $p = .84$). This suggests that cognitive processes likely mediate the relationship between these factors and NAR smoking motivation.

Another explanation for the observed results is that anxiety fully explains the relationship between NAR smoking motivation and the studied AVF's. While both anxiety sensitivity and looming cognitive style serve as predictors for greater anxiety, anxiety itself may not fully account for this relationship. In prior work, anxiety sensitivity has been found to correspond with NAR smoking motivation beyond reported negative affectivity, difficulty regulating emotion, and number of cigarettes smoked per day (Gonzalez, Zvolensky, Vujanovic, Leyro, & Marshall, 2008) as well as beyond Axis I psychopathology and distress tolerance (Leyro, Zvolensky, Vujanovic & Bernstein, 2008).

Future work to confirm how cognitive processes serve as a link between these AVFs and NAR smoking motivation could inform smoking cessation treatment. Specifically, this information could be useful in determining what helpful interventions may reduce motivation to smoke among those high in anxiety sensitivity or looming cognitive style. For example, it may be helpful in smoking cessation treatment or in media campaigns to lessen beliefs that smoking is effective in alleviating emotional distress. Psychoeducation (e.g., to address how tolerance can limit the effectiveness of smoking as a coping mechanism) could reduce desire for smoking or possibly prevent future smokers from pursuing smoking as a coping mechanism.

Further investigation may also be warranted to determine potential interaction effects of anxiety sensitivity and looming cognitive style as their interaction has been found to affect stress generation in a previous study (Riskind, Black, & Shahar, 2010).

Moreover, the results of the present study suggest that further research in needed to examine the link between anxiety sensitivity and other forms of motivation to smoke, such as habitual smoking, addictive smoking, sensorimotor smoking, and stimulation smoking which has yet to be explained (Gonzalez, Zvolensky, Vujanovic, Leyro, & Marshall, 2008).

Looming Cognitive Style and Anxiety Sensitivity's Association With
Threat Appraisal of Smoking Consequences

As predicted, both anxiety sensitivity and looming cognitive style independently predicted both types of smoking-specific threat appraisal. Anxiety sensitivity was a stronger predictor of smoking consequence likelihood estimates and looming cognitive style was a stronger predictor of looming perception of smoking consequences.

The association between looming cognitive style and looming perception of smoking consequences is expected as this specific type of looming perception can be seen as an extension of a general trend. This connection between looming cognitive style and specialized forms of dynamic threat appraisal is bolstered by the similar finding that looming cognitive style was related to looming perception of the threat of cancer (Levin, Riskind, & Li, 2007).

The demonstrated association between looming cognitive style and likelihood estimates of negative outcomes has been shown in prior research (Adler & Strunk, 2010), though this relationship has never been examined in combination with anxiety sensitivity.

The association between anxiety sensitivity and one's belief that negative consequences of smoking are likely has also been shown in previous work (Zvolensky, Feldner, Leen-Feldner, Bonn-Miller, McLeish, & Gregor, 2004). In Zvolensky, Feldner, Leen-Feldner, Bonn-Miller, McLeish, & Gregor (2004) Physical Concerns and Mental Incapacitation Concerns, subfactors of the ASI, were shown to predict likelihood estimates of smoking negative consequences, though Social Concerns were not. These findings offer insight as to how anxiety sensitivity relates to this outcome expectancy.

In terms of Physical Concerns, health anxiety may serve to clarify how anxiety sensitivity corresponds with the belief that negative consequences of smoking are more likely to occur. It has been shown that anxiety sensitivity corresponds with health anxiety (Asmundson, 1999) and

that those high in anxiety sensitivity experience greater worry about negative health outcomes and about contracting disease (Furer, Walker, & Freeston, 2001). Those high in anxiety sensitivity may be more likely to be alarmed that many of the similar symptoms associated with nicotine use or withdrawal are associated with physical disease (e.g., heart disease, chronic obstructive pulmonary disease). Making this connection may make smokers high in anxiety sensitivity more likely to estimate that these consequences will occur for them. This theory is bolstered by the findings that anxiety sensitivity is associated with the expectation that negative physical effects will occur if one smokes (Brown, Kahler, Zvolensky, Lejuez, & Ramsey, 2001).

Brown, Kahler, Zvolensky, Lejuez, and Ramsey (2001) also demonstrate that anxiety sensitivity corresponds with expectations of negative psychological effects. This association may serve to explain the relationship between Mental Incapacitation Concerns and expectancy of negative smoking consequences. It is possible that those that have an inclination to perceive anxious symptoms as a sign of loss control of themselves may also fear the loss of control of themselves in terms of their craving or addiction to smoking. This association may be most heightened when noticing overlapping symptoms of anxiety and those of nicotine use or withdrawal.

An alternative explanation as to why anxiety sensitivity may serve to explain the Negative Consequences subscale of the SCQ-A beyond the LMSQ is due to content. The LMSQ does not have content related to losing control of one's psychological state or impulse control which is a shared trait between the ASI and the Negative Consequences subscale of the SCQ-A. However, this interpretation is not supported by a follow-up analysis in which ASI and LMSQ were entered as predictors of the Negative Consequences subscale of the SCQ-A (without craving/addiction items). The results were nearly identical to original analysis, showing anxiety

sensitivity as a stronger predictor of likelihood estimates of smoking consequences [Standardized

β for ASI = .55, t(140) = 7.31, pr^2 = .28, p < .01; Standardized β for LMSQ total score = .27,

t(140) = 3.64, pr^2 = .09, p < .01].

Finally, anxiety sensitivity shows a smaller capacity to predict looming perception of

smoking consequences beyond general looming cognitive style. This correspondence may be

explained by interpretation of anxious symptoms and sensations associated with smoking. Those

that have a tendency to perceive physical sensations or other symptoms of anxiety as leading to

progressively worse outcomes may also perceive smoking-related immediate cues (e.g.

coughing, restlessness associated with withdrawal) as signals that consequences of smoking are

getting progressively worse (e.g., cough being a sign of advancing towards lung cancer).

<u>Smoking-Related Threat Appraisal and
Motivation to Quit Smoking</u>

As hypothesized, both types of smoking-related threat appraisal served as predictors of

motivation to quit in combination and independently. In the case of motivation to quit smoking

according to RFQ scores, smokers' likelihood estimates of smoking consequences appeared to be

a stronger predictor than was looming perception of smoking consequences.

The current findings are consistent with a common component of health behavior models,

that the perception that one is susceptible to the consequences of a behavior is related to

motivation to change that behavior. The concept of perceived susceptibility has been integrated

as a component in Protection Motivation Theory (Rogers & Prentice-Dunn, 1997) and the Health

Belief Model (Stretcher, Champion, & Rosenstock, 1997). Moreover, perceived susceptibility

has been empirically linked to an increased progression through Prochaska's Stages of Change

(Prokhorov, Warneke, de Moor, Emmons, Jones, Rosenblum, et al., 2003).

A specific finding was that likelihood estimates of smoking consequences was a greater predictor of motivation to quit according to the RFQ than were LSCS scores. This relationship is likely due to the fact that the RFQ shares a common process with the SCQ-A. The RFQ is composed of items in which smokers estimate the level of truth of an outcome (e.g., "smoking will shorten my life") in relation to their motivation to quit, which can be considered a likelihood estimate as well. Therefore these scores may be related due to a general tendency of over or under estimating likelihood, specifically related to smoking.

The range of content in the smoking consequences scales may offer another explanation for why likelihood estimates had a larger predictive value of RFQ scores. The Negative Consequences subscale includes items that refer to craving/addiction, specifically how likely it was that cigarette smoking would lead to increased craving/addiction. The RFQ also includes items relating to self-control reasons for quitting. This overlap in content is not shared with the LSCS. However, this interpretation is not supported by a follow-up analysis in which LSCS and the Negative Consequences subscale of the SCQ-A (without craving/addiction items) were entered as predictors of RFQ scores. The results were similar to the original analysis, showing likelihood estimates of smoking consequences as a stronger predictor of RFQ scores [Standardized β for Negative Consequences of the SCQ-A = .61, t(140) = 8.37, pr^2 = .34, p < .01; Standardized β for LSCS total score = .18, t(140) = 2.51, pr^2 = .04, p = .01].

In contrast, motivation to quit smoking according to the MASC was equivalently predicted by both included forms of smoking threat appraisal. The MASC, unlike the RFQ, does not ask about the level of truth of a statement, but rather how motivated one is to engage in an element of smoking cessation (e.g., "I wish to take part in a smoking-cessation group to be able

to quit smoking."). As such, it may not correspond to the specific type of appraisal represented by the RFQ and the SCQ-A.

One may conclude that both forms of smoking-related threat appraisal showed a significant and unique association with motivation to quit. Consequently this implies that both types of smoking consequences appraisal should be considered in smoking cessation efforts. In terms of cultivating motivation to quit, addressing likelihood estimates of negative consequences of smoking has already shown an effect on motivation to quit and smoking behavior at a later follow-up (Copeland & Brandon, 2000). Looming perception of smoking consequences impact on motivation to quit smoking was also suggested in McDonald, O'Brien, Farr, and Haaga (2010). However, in both of these cases, this effect was only studied for the negative health consequences of smoking and not other types (e.g., negative social impression).

Future work may want to further examine the impact that both of these types of smoking-related threat appraisal impact motivation to quit. A follow-up study in which these appraisal processes are addressed and motivation to quit was measured, before and after this intervention, would establish a causal relationship.

Implications for the present findings suggest that promoting a sense of perceived susceptibility by enhancing likelihood and dynamic threat appraisal of negative smoking consequences may lead to greater motivation to quit if used in smoking cessation treatment or media campaigns. By further substantiating this finding in replication and treatment studies, clinicians and media campaigns may have a more clarified understanding of how to promote motivation to quit smoking and potentially other forms of health behavior.

Motivation to Quit Smoking's Relationship with Anxiety Sensitivity
and Looming Cognitive Style

Both looming cognitive style and anxiety sensitivity showed a direct correlation with motivation to quit and these factors were found to predict motivation to quit smoking overall in a regression model. However when examining their unique contributions only anxiety sensitivity predicted motivation to quit independently as hypothesized.

In contrast to prediction, motivation to quit was not independently predicted by looming cognitive style beyond smokers' reported anxiety sensitivity. No prior study has attempted to examine the relationship between looming cognitive style and motivation to quit smoking. Though it was only a small effect, the present work has shown that the relationship between looming cognitive style and motivation to quit appears to be completely mediated by threat appraisal of smoking consequences. This mediation was found for both likelihood estimates and dynamic appraisal of smoking consequences. If this relationship is completely mediated by smoking-related threat appraisal, which is a shared mediator of anxiety sensitivity, then this would explain why looming cognitive style would not independently predict motivation to quit.

Looming cognitive style's association with motivation to quit smoking appears to be entirely accounted for by smoking negative consequence appraisal in two forms. This finding is supported by previous work which has demonstrated looming cognitive style's association with both specific forms of dynamic and static appraisals of threat (Adler & Strunk, 2010; Levin, Riskind, & Li, 2007; Riskind, Williams, Gessner, Chrosniak, & Cortina, 2000).

Furthermore, the association between anxiety sensitivity and motivation to quit has been found in prior research (Zvolensky, Baker, Leen-Feldner, Bonn-Miller, Feldner, & Brown, 2004; Zvolensky, Vujanovic, Miller, Bernstein, Yartz, Gregor et al. 2007) and is replicated in the

present study. As predicted, smoking-related threat appraisal overall partially mediated the relationship between anxiety sensitivity and motivation to quit.

The explanation that cognitive processes serve the role as a mediator is substantiated in previous work. Alternatively, smoking variables are not likely mediators as anxiety sensitivity is not associated with nicotine dependence and number of cigarettes smoked per day (Brown, Kahler, Zvolensky, Lejuez, & Ramsey, 2001). Furthermore, the relationship between anxiety sensitivity and motivation to quit smoking goes beyond factors such as gender, age, and psychopathology (Zvolensky, Feldner, Leen-Feldner, Bonn-Miller, McLeish, & Gregor, 2004). As shown in the present study, cognitive processes such as estimations of smoking consequences may help serve to partially explain the relationship between anxiety sensitivity and motivation to quit beyond what is accounted for by demographic, smoking history, or Axis I diagnoses.

Contrary to prediction both types of smoking threat appraisal did not represent independent mediators between anxiety sensitivity and motivation to quit. In the case of anxiety sensitivity's correspondence with RFQ scores, only participants' perception of negative consequences of smoking as likely mediates this relationship independently. Conversely, when the relationship between anxiety sensitivity and motivation to quit smoking according to MASC scores was examined, only participants' perception that the consequences of smoking were dynamically increasing mediated this relationship.

The difference in mediator relationships with motivation to quit can be explained by how anxiety sensitivity relates to the included smoking consequence appraisals and how motivation to quit is measured. First, the case of how anxiety sensitivity relates to motivation to quit according to the RFQ will be examined. It appears that a considerable amount of anxiety sensitivity's effect on motivation to quit is accounted for by cognitive appraisal of smoking-related consequences,

with likelihood estimates serving as a significant mediator. Taken in combination with other research, a plausible explanation for this effect would be that sensitivity and alarm to experiences that share some overlap between anxiety and smoking (e.g., raised heart rate) would contribute to raised expectations that resulting negative consequences will occur. This may be particularly the case for sensations related to physical illness and losing control (e.g., addiction) as subfactors of Physical Concerns and Mental Incapacitation Concerns of the ASI have been shown to be significantly related to motivation to quit in past work (Zvolensky, Feldner, Leen-Feldner, Bonn-Miller, McLeish, & Gregor, 2004). These resulting raised expectations, or heightened likelihood estimates of smoking consequences, affect smokers' motivation to quit as they perceive themselves to be more susceptible to these smoking consequences.

The likelihood estimates of the SCQ-A have a particular ability to partially mediate anxiety sensitivity's relationship with motivation to quit according to the RFQ. Both the RFQ and the SCQ-A are forms of likelihood appraisal and therefore this similar process of evaluation may further account for this observed mediation. It is likely that if smokers' anxiety sensitivity predisposes them to be sensitive to cues that would result in a high estimation of likelihood of experiencing negative consequences of smoking, that these consequences would be more likely, or truer, reasons for quitting. This similar static type of appraisal represents a distinct process from looming perception of smoking consequences, even if there is some correlation, which would result in the LSCS being less likely to mediate the observed relationship.

In contrast, anxiety sensitivity's association with MASC scores appears to be partially mediated as well, but only with looming perception of smoking consequences serving as a significant mediator. In this case, the MASC asks smokers about their motivation level to engage in aspects of smoking cessation treatment. Earlier in this work both types of smoking

consequence appraisal were shown to influence motivation to engage in smoking cessation treatment. Specifically as it relates to how anxiety sensitivity corresponds with motivation to quit smoking, looming perception appears to be a more relevant pathway for this relationship.

Smokers' anxiety sensitivity may correspond to their reactivity to immediate smoking cues, especially those that overlap with anxious symptoms (e.g., shortness of breath), and perception that these cues are signs of harmful consequences. This effect may promote a greater estimation of negative smoking consequences as likely and as increasing over time. However, in this case, only one's perception that these immediate cues are part of an active and evolving process, looming (e.g., shortness of breath leading to more severe breathing problems), will lead to a greater motivation for immediate treatment.

In contrast, sensitivity to immediate cues and an accompanying estimation of these cues as an indication that negative consequences of smoking are likely, though not specifying when or how enduring the consequences will persist, may not have the immediate effect of motivating smokers to change at the time. For instance, an immediate cue of smoking-related negative consequence being perceived as something far off in the future, even as likely, may not lead to active immediate change.

While the present work offers further explanation as to how cognitive factors relate to smoking motivation, there are several limitations to consider. First, the measures in both studies were self-report. Self-report measures may be prone to bias on inaccurate reporting of included smoking behavior variables. However, there have been documented high concordance rates between reported smoking status and biochemical markers such as carbon monoxide, carboxyhemoglobin, and thiocyanate levels (Patrick, Cheade, Thompson, Diehr, Koepsell, &

Kinne, 1994). Moreover, since the present study focused primarily on cognitive variables, self-report would be the primary means of assessing these variables.

Second, the use of online study has potential limitations such as nonstandardized testing environments, inability to verify if individuals are who they claim, and the possibility of repeated involvement in the study. For the current work, IP addresses for participants were recorded and there was no inclusion for multiple users of the same IP address in this study. Moreover, online assessment have shown strong interrcorrelation with in-person assessment (Cronk & West, 2002; Klein, Thomas, & Sutter, 2007). Online data collection has been used successfully in the past to study health beliefs (Hewson & Charlton, 2005), smoking prevalence nationwide (Berg, Klatt, Thomas, Ahluwalia, & An, 2009), motivation to quit smoking (Zhou, Nonnemaker, Sherrill, Gilsenan, Coste, & West, 2009), and particularly to study threat appraisals' relation to smoking behavior (Nosen & Woody, 2009).

Third, the current work includes daily smokers but many of these individuals would not be considered heavy smokers. On average, participants in study one smoked 10.88 cigarettes a day and participants in study two smoked 11.88 cigarettes per day. This is less than the average 15.1 cigarettes per day smoked by the typical United States adult smoker (Centers for Disease Control and Prevention, 2011). Future work may seek to examine how the found results of the current work are replicated heavier smokers.

Fourth, the included participants were predominantly male, white, young adults with raised household income. Future work with a greater percentage of female participants may serve to provide further information about what factors contribute to NAR smoking, which is more common in women than men (Fidler & West, 2009; Pulvers, Catley, Okuyemi, Scheibmeir, McCarter, Jeffries et al., 2004; Reynoso, Susabda & Cepeda-Benito, 2005; Vidrine, Anderson,

Pollak & Wetter, 2006). Moreover findings related to NAR smoking of the current work may not generalize well to other ethnicities as smoking is used as a means to reduce emotional distress more among Caucasians than African-American or Hispanic smokers (Kiviniemi, Orom, & Giovino, 2011), though some research has indicated that this is not the case (Sanchez-Johnsen, Ahluwalia, Fitzgibbon, & Spring, 2006).

Prior work has also found that anxiety sensitivity differs across ethnicities. African-Americans report greater anxiety sensitivity and a greater focus on Physical Concerns than the other subfactors that were generated in primarily European-American samples (Hunter, Keough, Timpano, & Schmidt, 2012). Subfactors of ASI have been shown to poorly correspond with both Hispanic and African-American populations (Carter, Miller, Sbrocco, Suchday & Lewis, 1999; Cintron, Carter, Suchday, Sbrocco, & Gray, 2005).

In terms of smoking consequence appraisal past findings suggest that the correspondence of smokers elevated expectancies of negative smoking consequences and greater readiness to quit have been shown in European-American and African-American smokers (Pulver, Catley, Okuyemi, Scheibmeir, McCarter, Jeffries & Ahluwlia, 2004). However, from an intervention standpoint, the way information is presented should be considered as culturally specific messages produce greater personal risk perceptions and intentions to quit (Webb, Baker & Rodriguez de Ybarra, 2010).

While the current work was primarily composed of participants of raised socioeconomic status, these findings may generalize well as types of motivation to quit are shown to be similar across socioeconomic levels (Niederdeppe, Kuang, Crock, & Skelton, 2008). However, smokers at a lower socioeconomic level are a population with a greater need for finding ways to promote motivation to quit as this group reports greater prevalence of smoking (Barbeau, Krieger, &

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Soobader, 2004) is less likely to make quit attempts (Niederdeppe, Kuang, Crock, & Skelton, 2008).

Fifth, the present studies may not have had the statistical power to detect relatively small effects. There were several indicators of adequate sampling size in study one and those effects found in study two were for the most part highly significant, often with p-values of less than .01 or equal to .01. However, future work may seek to use larger samples to more fully determine if potential relationships were missed.

Finally, both studies included represented a cross-sectional design. This approach offers insight into how measured constructs are related to one another. However, a cross-sectional design does not allow for definitive determination of causal relationships (e.g., likelihood estimates of smoking consequences lead to greater motivation to quit). There is some evidence to suggest that motivation to quit smoking may in fact result in a heightened perception of negative smoking consequences. In Copeland, Brandon, and Quinn (1995) it was found that smokers that had selected to engage in smoking cessation treatment and ex-smokers, arguably those demonstrating greater motivation to quit, rated negative smoking consequences as more likely than smokers not engaging in smoking cessation treatment. However, even if motivation to quit does contribute to changes in smoking consequence appraisal somewhat, the impact of smoking consequence appraisal on motivation to quit has been repeatedly shown in theory and validated in past work (Rogers & Prentice-Dunn, 1997; Stretcher, Champion, & Rosenstock, 1997; Prokhorov, Warneke, de Moor, Emmons, Jones, Rosenblum, et al., 2003).

As it pertains to the type of smoking consequence appraisal in the included work, Copeland and Brandon (2000) showed that by experimentally manipulating likelihood estimates of negative health consequences of smoking led to an increase in motivation to quit and

subsequent reduced smoking 3 months later. McDonald, O'Brien, Farr, and Haaga (2010) also showed that experimentally manipulating looming perception of the negative health consequences of smoking led to reduced smoking one month later. These findings suggest the validity of a causal relationship in which smoking consequence appraisal affect smoker's motivation to quit.

To further establish the proposed causal relationship of this work an experimental causal chain design may be adopted in future work (Spencer, Zanna, & Fong, 2005). According to this design, a initial study can be conducted in which the proposed independent variable (e.g., anxiety sensitivity) can be manipulated and tested to see if it has an impact on the proposed mediator (e.g., smoking consequence). Subsequently, according to this design another study would examine if a manipulation of the mediator will have an impact on the proposed dependent variable (e.g., motivation to quit). While prior work and predominant theory suggest that this design would further validate this causal relationship, these experimental studies would make these conclusions more definitive.

The current work furthers our understanding of how two cognitive-based vulnerability factors relate to motivation to smoke for negative affect reduction. It has previously been held that anxiety sensitivity is an explanatory factor for this type of smoking motivation. However, we see in this current work that this explanatory power does not extend beyond looming cognitive style, another trend of threat perception, when studied in combination. Furthermore, this work for the first time explored how outcome expectancy may account for both of these constructs' association with negative affect reduction smoking. These findings suggest that a more efficient approach for addressing motivation to smoke to reduce emotional distress may not be to focus on these more removed tendencies, as is the case currently, but rather addressing the specific

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appraisal process of smokers' perception that smoking will reduce distress. Negative affect reduction smoking motivation may not be specifically related to one's reactivity to anxiety but rather any type of nonsmoking-related tendency to perceive stimuli as leading to harmful consequences.

Moreover, the present work also more clearly outlines the relationship between looming cognitive style and motivation to quit smoking. At initial glance of bivariate correlations, one would see that looming cognitive style was strongly related to motivation to quit smoking. However, based on the results of the current study we see that this relationship is fully accounted for by appraisal processes of smoking-related consequences. As such, effective measures to promote motivation to quit (e.g., group therapy, television spots) most likely would not need to account for a smoker's looming cognitive style but rather simply promote greater appraisal of smoking-related threats for smokers to benefit.

The correspondence between anxiety sensitivity and motivation to quit was also further clarified. The relationship between anxiety sensitivity and motivation to quit has been replicated several times but previously the nature of this connection has been unclear. It was found that anxiety sensitivity accounts for motivation to quit, even beyond looming cognitive style. These findings suggest that reactivity to immediate cues of negative consequences, especially those that overlap between smoking and anxiety, can serve as a powerful impetus to change smoking behavior and that this trait uniquely relates to motivation to quit beyond a general pattern to perceive negative consequences. Furthermore, in this work it can be seen that cognitive appraisals of smoking-related consequences at least partially explain this connection. As such we have a greater understanding of a growing literature and this explanation can aid in smoking cessation treatment that account for anxiety sensitivity in promoting motivation to quit.

Specifically, the mediational analyses showed that different cognitive appraisals of smoking consequences related anxiety sensitivity to motivation to quit in different ways. While likelihood appraisals may serve to increase smokers' recognition that the reasons for quitting are true and valid, looming perception of these threats had a greater mediating effect between anxiety sensitivity and motivation to take practical steps to change smoking behavior. Currently there are no known smoking cessation treatments that specifically address how individuals perceive smoking consequences as growing or approaching in time. Based on this present work and that of McDonald, O'Brien, Farr and Haaga (2010) there is evidence to substantiate that this may be a helpful approach for promoting motivation to quit, particularly among those who are more aware of immediate cues of negative consequences.

APPENDIX A

CIGARETTE SMOKING LOOMING CONSEQUENCES SCALE*

In these questions, we are interested in your immediate thoughts and reactions to a number of different scenes related to your smoking behavior. Put down your ratings in response to each of these scenes immediately, rather than thinking about your answer for a long time.

After you read each scene, try to **vividly** imagine it. What comes to mind as you bring that scene to mind and think about it? Concentrate on it and imagine it in as much vivid detail as possible.

After you have finished concentrating on the scene, answer the questions about what you were imagining was happening. Please do not leave out any questions if possible.

To summarize:

1) Vividly imagine yourself in each scene.

2) Answer all the questions about your own immediate thoughts and feelings.

*The resulting Looming Smoking Consequences Scale was composed of scenarios 4, 7, 9, 11, 13, 15, and 20

I. Suppose that you are having a conversation with a co-worker during your smoke break and begin experiencing a series of several uncontrollable coughs. Your eyes begin to water as you try to control the coughing and it seems as if your smoking could be leading to lung cancer.

1. In this scene do you imagine your chances of developing lung cancer as decreasing or increasing with each cigarette?

Chances are decreasing   1   2   3   4   5   Chances are increasing
    with each cigarette   with each cigarette

2. Is the level of threat for lung cancer staying fairly constant or is it growingly rapidly larger with each passing moment?

Threat is staying   1   2   3   4   5   Threat is growing
    fairly constant   rapidly larger

3. How much do you visualize your risk of contracting lung cancer as becoming increasingly worse?

Not at all   1   2   3   4   5   Very much

II. Suppose that you are waiting for a job interview to begin and you are feeling stressed about the interview. You would really like a cigarette right now but you do not have much time before the interview starts. It seems that you may not be able to resist the urge to smoke.

1. In this scene do you imagine that your difficulty resisting the urge to smoke is decreasing or increasing with each moment?

Difficulty is decreasing   1   2   3   4   5   Difficulty is increasing

2. Is your difficulty controlling your urge to smoke staying fairly constant, or is it growingly rapidly larger with each passing moment?

Difficulty is staying   1   2   3   4   5   Difficulty is growing
    fairly constant   rapidly larger

3. How much do you visualize your problem with resisting the urge to smoke as becoming increasingly worse?

Not at all   1   2   3   4   5   Very much

III. Suppose that during your first cigarette of the morning you begin to experience pain and tightness in your chest like you have never felt before. Is seems that your smoking could be leading to heart disease.

1. In this scene do you imagine your chances of developing heart disease as decreasing or increasing with each cigarette?

Chances are decreasing   1   2   3   4   5   Chances are increasing
   with each cigarette   with each cigarette

2. Is the level of threat for heart disease staying fairly constant, or is it growingly rapidly larger with each passing moment?

Threat is staying   1   2   3   4   5   Threat is growing
   fairly constant   rapidly larger

3. How much do you visualize your risk of developing heart disease as becoming increasingly worse?

Not at all   1   2   3   4   5   Very much

IV. Suppose that while smoking and catching up with an old friend, your voice begins to sound hoarse. You remember that over the last several days you have been developing pain in your throat. It seems that your smoking could be leading to throat cancer.

1. In this scene do you imagine your chances of developing throat cancer as decreasing or increasing with each cigarette?

Chances are decreasing   1   2   3   4   5   Chances are increasing
   with each cigarette   with each cigarette

2. Is the level of threat for throat cancer staying fairly constant or is it growingly rapidly larger with each passing moment?

Threat is staying   1   2   3   4   5   Threat is growing
   fairly constant   rapidly larger

3. How much do you visualize your risk of contracting throat cancer as becoming increasingly worse?

Not at all   1   2   3   4   5   Very much

V.

The clock above is counting down the seconds until you could potentially contract a smoking-related illness.

1. As you continue to smoke is the clock's counting down fairly constant, or is it counting down faster and faster?

| Countdown is staying fairly constant | 1 | 2 | 3 | 4 | 5 | Countdown is going increasingly faster |

VI. Suppose you are visiting a close relative in the hospital. You want to stay by their side, but the hospital does not allow smoking inside. You are also feeling overwhelmed with concern for this relative and would like a cigarette to relax. It seems that you may not be able to control your urge to smoke.

1. In this scene is your difficulty controlling your urge to smoke decreasing or increasing with each moment?

| Difficulty is decreasing | 1 | 2 | 3 | 4 | 5 | Difficulty is increasing |

2. Is your difficulty resisting the urge to smoke staying fairly constant, or is it growingly rapidly larger with each passing moment?

| Difficulty is staying fairly constant | 1 | 2 | 3 | 4 | 5 | Difficulty is growing rapidly larger |

3. How much do you visualize your problem with resisting the urge to smoke as becoming increasingly worse?

| Not at all | 1 | 2 | 3 | 4 | 5 | Very much |

VII. Suppose that you are smoking outside of your work and a co-worker that did not know you smoked sees you as they are walking into the building. It seems as if the co-worker could be forming a worse view of you.

1. In this scene are the chances of your coworker perceiving you poorly decreasing, or increasing with each moment?

Chances are decreasing   1   2   3   4   5   Chances are expanding
     with time

2. Is the negative impact of your smoking on your coworker's view of you staying fairly constant, or is it growingly rapidly larger with each passing moment?

Impact is staying   1   2   3   4   5   Impact is growing
  fairly constant   rapidly larger

3. How much do you visualize your coworker's view of you as becoming worse over time?

Not at all   1   2   3   4   5   Very much

VIII. Suppose that you notice blood in your urine. You think back over your years of cigarette smoking. You then begin to wonder if your smoking could be leading to cancer.

1. In this scene do you imagine that your chances of developing cancer are decreasing or increasing with each cigarette?

Chances are decreasing   1   2   3   4   5   Chances are increasing
  with each cigarette   with each cigarette

2. Is the level of threat for cancer staying fairly constant, or is it growingly rapidly larger with each passing moment?

Threat is staying   1   2   3   4   5   Threat is growing
  fairly constant   rapidly larger

3. How much do you visualize your risk of contracting cancer as becoming increasingly worse?

Not at all   1   2   3   4   5   Very much

IX. Suppose that while smoking in your home and watching television, you see a public service announcement about the health consequences of smoking. Based on the medical findings you see on television your smoking could be taking years off of your life.

1. In this scene do you imagine that your chances of having health difficulties are decreasing or increasing with each cigarette?

Chances are decreasing   1   2   3   4   5   Chances are increasing
  with each cigarette   with each cigarette

2. Is the level of threat of having years taken off your life staying fairly constant, or is it growingly rapidly larger with each passing moment?

Threat is staying   1   2   3   4   5   Threat is growing
  fairly constant   rapidly larger

3. How much do you visualize your health as in the act of becoming progressively worse?

Not at all   1   2   3   4   5   Very much

X. Suppose that you begin craving a cigarette as soon as you wake up one morning. You have never craved a cigarette this early in the morning before and you could be becoming more addicted to cigarettes.

1. In this scene do you imagine that your addiction to smoking is decreasing or increasing with each cigarette?

Your addiction is decreasing 1   2   3   4   5   Your addiction is increasing
  with each cigarette   with each cigarette

2. Is your level of addiction staying fairly constant, or is it growingly rapidly larger with each passing moment?

Threat is staying   1   2   3   4   5   Threat is growing
  fairly constant   rapidly larger

3. How much do you visualize your addiction as becoming progressively worse?

Not at all   1   2   3   4   5   Very much

XI. Suppose that you are in the doctor's office for a check-up. The doctor is telling you about the health risks of smoking. As you are listening to his reasons you think that your smoking behavior could be hazardous to your health.

1. In this scene do you imagine that your chances of having difficulties with your health are decreasing or increasing with each cigarette?

Chances are decreasing   1   2   3   4   5   Chances are increasing
    with each cigarette   with each cigarette

2. Is the level of threat to your health from smoking staying fairly constant, or is it growingly rapidly larger with each passing moment?

Threat is staying   1   2   3   4   5   Threat is growing
    fairly constant   rapidly larger

3. How much do you visualize your health as in the act of becoming progressively worse?

Not at all   1   2   3   4   5   Very much

XII.

The hourglass above represents the time you have left before your smoking leads to long-term health consequences.

1. Do you perceive the sand as running out at an increasingly faster pace or at a fairly constant pace?

Sand running out is   1   2   3   4   5   Sand running out at an
    fairly constant   increasingly faster pace

XIII. Suppose you are at a party and speaking with a person you are interested in romantically. During the conversation you pull out a cigarette to smoke and the other person stops talking and looks disinterested. You want to continue talking with this person but it seems that your smoking could be stopping a romantic relationship from forming.

1. In this scene, are the chances of you having a difficulty with the relationship decreasing, or increasing and expanding with each moment?

Chances are decreasing   1   2   3   4   5   Chances are expanding
     with time

2. Is the level of threat for losing your relationship staying fairly constant, or is it growingly rapidly larger with each passing moment?

Threat is staying   1   2   3   4   5   Threat is growing
  fairly constant   rapidly larger

3. How much do you visualize your relationship as increasingly falling apart?

Not at all   1   2   3   4   5   Very much

XIV. Suppose that you notice an urge to smoke; however it has not been very long since you finished smoking a cigarette. It seems as if your addiction to smoking could be getting stronger.

1. In this scene, are the chances of you having a difficulty with addiction decreasing, or increasing with each moment?

Chances are decreasing   1   2   3   4   5   Chances are expanding
     with time

2. Is the level of threat of addiction staying fairly constant, or is it growingly rapidly larger with each passing moment?

Threat is staying   1   2   3   4   5   Threat is growing
  fairly constant   rapidly larger

3. How much do you visualize your level of addiction as becoming increasingly worse?

Not at all   1   2   3   4   5   Very much

XV. Suppose that while smoking outside of grocery store, a young child walks up to you and says that smoking is going to kill you. You begin to think about the warnings your doctor has been telling you during your years of smoking. It seems that your smoking could be shortening your life.

1. In this scene do you imagine that your chances of having difficulty with your health are decreasing or increasing with each cigarette?

Chances are decreasing   1   2   3   4   5   Chances are increasing
  with each cigarette   with each cigarette

2. Is the level of threat of having your life shortened staying fairly constant, or is it growingly rapidly larger with each passing moment?

Threat is staying   1   2   3   4   5   Threat is growing
  fairly constant   rapidly larger

3. How much do you visualize your health as becoming increasingly worse?

Not at all   1   2   3   4   5   Very much

XVI. Suppose that while participating in recreational activities with friends, you feel worn out quickly and need to take a break before any of your non-smoking friends. It seems as if smoking could be having a negative effect on your health.

1. In this scene, are the chances of you having difficulty with your health decreasing or increasing with each cigarette?

Chances are decreasing   1   2   3   4   5   Chances are increasing
  with each cigarette   with each cigarette

2. Is the level of threat for long-term health consequences staying fairly constant, or is it growingly rapidly larger with each passing moment?

Threat is staying   1   2   3   4   5   Threat is growing
  fairly constant   rapidly larger

3. How much do you visualize your health as becoming increasingly worse due to smoking?

Not at all   1   2   3   4   5   Very much

XVII. Suppose you go to the doctor for a pain in your stomach that you have never felt before. Smoking causes cancer in several of the organs near this pain and it seems that your smoking could be causing a severe health issue.

1. In this scene do you imagine that your chances of developing cancer are decreasing or increasing with each cigarette?

Chances are decreasing   1   2   3   4   5   Chances are increasing
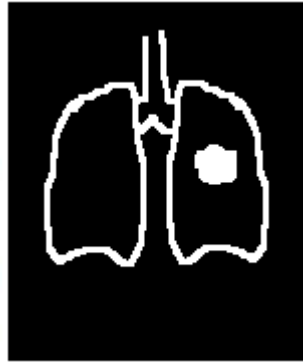   with each cigarette   with each cigarette

2. Is the level of threat for developing cancer staying fairly constant, or is it growingly rapidly larger with each passing moment?

Threat is staying   1   2   3   4   5   Threat is growing
    fairly constant   rapidly larger

3. How much do you visualize your risk of developing cancer as becoming increasingly worse?

Not at all   1   2   3   4   5   Very much

XVIII.

- More Control

- Current Level of Control

- Less Control

Above is a bar that represents your ability to control your smoking habit. This control represents your ability to resist smoking in places it is not allowed or your ability to go without smoking for an extended period of time if you choose to. As you continue to smoke, do you see your ability to control your habit as increasing, decreasing, or staying the same? (Circle one of the numbers below)

Decreasing		Staying the Same		Increasing
1	2	3	4	5

XIX.

Suppose you were in a hospital examining room because of a long-term cough you've been experiencing. A doctor is in the hallway holding an x-ray of a lung that has a cancerous spot on it. The doctor will be delivering the diagnosis of lung cancer to a patient.

1. When imagining this scenario do you see the doctor as moving? (circle Yes or No)

      Yes (If Yes, continue to the next number)   No (If No, then go to the last scene)

2. If yes to number 1, do you see the doctor as coming towards you or another patient? (circle Yourself or Another Patient)

         Yourself   Another Patient (If Another Patient, go to question 4)

3. If you answered "Yourself" to number 2, how fast or slow do you see the doctor coming towards you? (After circling a number below, go to the next scene)

      Slowly   Quickly
       1   2   3   4   5

4. If you answered "Another Patient" to number 2, how fast or slow do you see the doctor coming towards the other patient?

      Slowly   Quickly
       1   2   3   4   5

XX. Suppose you are catching up with relatives at a family reunion. You pull out a cigarette to smoke and several relatives stand up and walk away. You want to spend more time with your family but it seems as if your smoking could be distancing you from your relatives.

1. In this scene, are the chances of you having difficulty with family relationships decreasing, or increasing and expanding with each moment?

Chances are decreasing   1   2   3   4   5   Chances are expanding
       with time

2. Do you see your smoking's impact on these relationships as staying fairly constant or becoming larger over time?

Impact is staying   1   2   3   4   5   Impact is growing
   fairly constant   rapidly larger

3. How much do you visualize your family relationships as becoming progressively more distant?

Not at all   1   2   3   4   5   Very much

How worried or anxious does imagining these scenes make you feel?

Not at all   1   2   3   4   5   Very much

How much did you feel you like you were part of these scenes?

Not at all   1   2   3   4   5   Very much

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