

DOES IT HELP SMOKERS IF WE STIGMATIZE THEM? A TEST OF THE STIGMA-INDUCED IDENTITY THREAT MODEL AMONG U.S. AND DANISH SMOKERS

Marie Helweg-Larsen and Lia J. Sorgen
Dickinson College, Carlisle, PA

Charlotta Pisinger
Centre for Clinical Research and Prevention, Copenhagen, Denmark

Research shows that smokers feel stigmatized, but does stigmatizing smokers do more harm than good? The model of stigma-induced identity threat was used to experimentally examine how U.S. and Danish smokers respond to stigma-relevant cues. Heavy smokers (112 Americans, 112 Danes) smoked a cigarette while giving a speech that was either video (stigma-visible condition) or audio recorded (stigma-concealed condition). Smokers high in self-concept reacted to the stigma-visible (as opposed to the stigma-concealed) condition with greater physiological reactivity ($b = -2.80, p = .05$), cognitive depletion (U.S. smokers, $b = -0.06, p = .11$), self-exempting beliefs ($b = 0.32, p < .001$), and less interest in stopping smoking ($b = 0.28, p = .02$). Thus, stigmatization led smokers toward emotional, cognitive, and attitudinal reactions that might make them less likely to quit. Future research should examine when smokers respond to stigmatization by quitting rather than with resistance or indifference.

Keywords: stigma, smoking, tobacco, identity threat, smoking self-concept, stress

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Address correspondence to Marie Helweg-Larsen, Ph.D., Department of Psychology, Dickinson College, Carlisle, PA 17013. E-mail: helwegm@dickinson.edu.

Over the past century, views on smoking have transformed dramatically, moving from socially acceptable to moralized and disgusting (Brandt, 2004). The shifting tobacco landscape is evidenced in several ways, including the introduction of smoke-free air laws (Tynan, Babb, MacNeil, & Griffin, 2011), tobacco-free hiring practices (Voigt, 2012), and adding tobacco surcharges to health insurance premiums (Madison, Schmidt, & Volpp, 2013). In tandem with changing policies, social norms surrounding smoking have changed as well and contributed to the development of smoking as a marker of a stigmatized status. Now, people often stigmatize smokers, and research shows that smokers feel stigmatized (Stuber, Galea, & Link, 2008, 2009). Although smoking is the single most preventable cause of death worldwide, contributing to over 480,000 deaths per year in the United States (U.S.) alone (Centers for Disease Control, 2014), current efforts, which harness stigma to decrease smoking rates, may sustain rather than reduce these high mortality rates.

The model of stigma-induced identity threat (Major & O'Brien, 2005) provides a useful framework for examining the consequences of stigmatizing smokers. The model has been previously applied to understanding how people who hold stigmatized identities respond to identity-threatening situations with respect to weight (e.g., Blodorn, Major, Hunger, & Miller, 2016), gender (e.g., Murphy, Steele, & Gross, 2007), race (e.g., Purdie-Vaughns, Steele, Davies, Dittmann, & Crosby, 2008), and sexual identity (e.g., Hatzenbuehler, 2009), but not to smoking. The model posits that identity threat occurs when people fear that they will be devalued, rejected, or stereotyped because of their social identity. Such identity-threatening situations occur when people know that they belong to the devalued group, are aware of the stereotypes or negative evaluations of the devalued group, and do not have sufficient resources to cope with the threat. The identity-threatening situation can lead to a host of negative consequences, including volitional and non-volitional emotional, physiological, cognitive, and behavioral changes. Volitional outcomes can involve changes in attitudes to cope with stigmatization whereas non-volitional outcomes can include cognitive depletion, which occurs due to efforts allocated to coping with identity threat as well as emotional and physical stress reactivity (Inzlicht, McKay, & Aronson, 2006). These outcomes in turn make it difficult to engage in changing health behaviors (Hatzenbuehler, Phelan, & Link, 2013).

Stress is damaging to the body, and among smokers it is related to increased smoking (McKee et al., 2011). Coping with stress is also associated with reduced self-control (Muraven & Baumeister, 2000)—self-control that would be needed to undertake a successful smoking cessation program. Further, experimental studies show that when smokers were confronted with graphic cigarette warning labels (compared to text-only warnings), they had more positive cognitions about smoking (Süssenbach, Niemeier, & Glock, 2013) and minimized their smoking-related risks (Glock & Kneer, 2009). Similarly, smokers who watched a smoking-related health message (compared to a no-information control group) concluded that they were less at risk than other smokers (Myers, 2014). Research shows that pro-smoking attitudes, self-exempting beliefs, and minimization of smoking risks predict fewer quit attempts and less success in quitting smoking (Yong & Borland,

2008). In sum, smokers are likely to react to stigmatization with stress and cognitive depletion and cope by enhancing the worth of their smoking by holding more smoking-supportive attitudes and risk beliefs. According to the model of stigma-induced identity threat (Major & O'Brien, 2005), how people experience identity-threatening situations depends on the interaction among (1) situational cues such as smoking visibility, (2) personal characteristics such as smoking self-concept, and (3) collective representations such as cultural context.

STIGMA-INDUCED IDENTITY THREAT MODEL

SITUATIONAL CUES (SUCH AS SMOKING VISIBILITY)

Situational cues, the first factor in the model of stigma-induced identity threat, are stigma-relevant if they remind people that they are at risk of being devalued or mistreated because of their identity. Although smokers might be generally aware of their devalued status, specific situations or cues can highlight this status. Such cues can include being asked to reveal a concealable identity, which a person normally hides or prefers to keep hidden, which in turn can cause distress in anticipation of possible stigmatization. Consistent with this idea, one study found that overweight women experienced increased stress, increased cognitive depletion, and decreased self-esteem due to increased expectations of social rejection when their weight was visible (as opposed to hidden) in a dating situation (Blodorn et al., 2016). Smokers also fear social disapproval and may hide their smoking from family members, coworkers, health care providers, and strangers in order to avoid reproach (Helweg-Larsen, Tobias, & Cerban, 2010; Stuber & Galea, 2009). Light as well as heavy smokers may refrain from disclosing their concealable stigmatized status in everyday situations as well as in evaluation-rich contexts. Thus "outing" smokers in a job interview situation is one way to experimentally induce identity threat, the method we used in the current study.

PERSONAL CHARACTERISTICS (SUCH AS SMOKING SELF-CONCEPT)

A second factor of the stigma-induced identity threat model is personal characteristics, which can include any individual factor that changes how situations are appraised, such as rejection sensitivity (Mendoza-Denton, Downey, Purdie, Davis, & Pietrzak, 2002) or group identification (McCoy & Major, 2003), both of which are associated with greater threat reactions to stigmatizing situations. In the domain of smoking, smoking self-concept is a measure of the degree to which people identify as smokers and believe that others view them as smokers (Shadel & Mermelstein, 1996; it is also referred to as smoker/smoking identity; Tombor, Shahab, Brown, & West, 2013; van den Putte, Yzer, Willemsen, & de Bruijn, 2009). Smoking self-concept is associated with greater smoking frequency (Shadel & Cervone, 2011) and with less success in quitting (Shadel & Cervone, 2011; Shadel & Mermelstein, 1996). Further, smoking self-concept is a strong predictor of failure to make a quit

attempt, more so than other variables (e.g., age, gender, cost; Tombor et al., 2013). One's self-concept as a smoker may moderate how smokers react to stigmatizing situations. People are more likely to see stigmatizing cues as self-relevant (McCoy & Major, 2003), and greater centrality (the extent to which participants define themselves by the stigmatized identity) is correlated with greater psychological distress (Quinn et al., 2014). Thus, we expected that the more individuals identify as smokers (i.e., have a stronger smoking self-concept), the more likely they would be to appraise stigmatizing cues as identity-threatening, which would result in emotional, cognitive, and attitudinal responses that are counterproductive to smoking cessation.

COLLECTIVE REPRESENTATIONS (SUCH AS CULTURAL CONTEXT)

The final factor in the stigma-induced identity threat model is collective representations, which refer to shared meanings tied to a devalued status in society, as well as awareness of negative stereotypes surrounding a stigmatized identity (Crocker, 1999). Such cultural contexts can include socioeconomic status or culture. A comparison of the U.S. and Denmark provides a particularly good test of the effect of cultural differences in reactions to smoking stigma. First, the countries are similar in that they are both market-driven democracies with advanced economies, and they are highly individualistic (out of 53 countries, the U.S. was ranked first and Denmark ninth in individualism; Hofstede, 2001). The two countries differ in that social and welfare benefits as well as income taxes are greater in Denmark than in the U.S. In addition, smoking prevalence is higher in Denmark than in the U.S. In 2016, 16% of Americans (18% men, 14% women) smoked every day or some days (Centers for Disease Control, 2018), whereas in 2017, 22% of Danes (25% of men and 20% of women) smoked every day or some days (National Health Profile, 2018). Compared to other European countries, Denmark overall scores poorly on tobacco control measures such as price, public place bans, and advertising bans; Denmark's relative ranking declined from 2013 to 2016 (Joossens & Raw, 2017). Cultural differences in tobacco control policies (taxation, advertising, tobacco industry interference, etc.) contribute to and reflect differing smoking attitudes in complex ways (see Albæk, 2004; Brandt, 2007).

Research directly comparing smoking attitudes shows that both U.S. and Danish smokers have experienced smoking-related stigmatization, and that Danish smokers are more likely than U.S. smokers to object to the stigmatization (Helweg-Larsen et al., 2010). In this interview study, Danes reasoned that passive smoking is not that harmful and that people are already protected from unwilling exposure to cigarette smoke due to normative and legal restrictions (Helweg-Larsen et al., 2010). They felt that they were "considerate smokers," who, by following smoking restrictions, had upheld their end of a social contract and therefore did not deserve societal disapproval. These findings are consistent with other research showing that compared with U.S. smokers, Danish smokers score lower on a moralization of smoking scale (Helweg-Larsen, 2014) and minimize the risks associ-

ated with smoking (Helweg-Larsen & Nielsen, 2009). Danish (compared to U.S.) non-smokers are also more likely to believe that smoking does not expose others to discomfort, that health dangers of smoking are exaggerated, and that smoking is a private matter (Helweg-Larsen & Nielsen, 2009). Thus, while both U.S. and Danish smokers are keenly aware of their devalued status as smokers, they differ in their understanding of smoking and their reactions to the moralization and stigmatization of smokers. Thus, we expected that U.S. more so than Danish smokers would appraise stigmatizing cues as threatening.

OVERVIEW

The current study applies the model of stigma-induced identity threat to understand the effects of stigmatizing smokers. We examined how collective representations (culture) and individual characteristics (smoking self-concept) moderate smokers' reactions to the presence versus absence of a situational cue (the visibility versus concealability of their status as a smoker). We asked U.S. and Danish smokers to give a speech about why they would be good employees, while smoking, and randomly assigned them to either a stigma-visible condition, in which the speech was video recorded, or a stigma-concealed condition, in which the speech was audio recorded. Before the speech, participants completed a questionnaire about their smoking behaviors and attitudes, including a measure that assessed their smoking self-concept. Post speech, participants rated their stress emotions, had their blood pressure re-measured, completed a Stroop task measuring cognitive depletion, and reported their future risk of developing lung cancer, self-exempting beliefs, and smoking cessation intentions. We hypothesized that stigma visibility would increase self-reported stress emotions, blood pressure reactivity, cognitive depletion, and self-exempting beliefs, and decrease their risk perceptions and smoking cessation intentions. We expected this pattern to be moderated by smoking self-concept (with stronger self-concept associated with more negative reactions when the stigma was visible) and by country (with American compared to Danish smokers reacting more negatively when their stigma was visible).

METHOD

POWER ANALYSES

No previous study has experimentally manipulated smoking identity threat while examining self-concept and country as moderators. A study using a similar identity threat manipulation for weight identity threat showed small to medium effect sizes (Major, Eliezer, & Rieck, 2012). Using G*Power (version 3.1.9.2), we selected the "ANOVA: Fixed Effects" option, set the effect size at $f^2 = .20$ (medium, according to Cohen, 1988), power to .80, alpha to .05, the numerator df to 1 (testing for a 3-way interaction), and number of groups to 8, and found that we needed 199 participants total (100 per country). We set the recruitment goal in each country to

approximately 120 because we anticipated some participants would not be able to complete the study. Once our recruitment goal was reached, we stopped collecting data. We did not analyze the data during the data collection process.

PARTICIPANTS

Of the 243 smokers who agreed to participate, 19 (12 U.S., 7 Danish) were excluded from analyses because they did not meet the eligibility requirements, did not understand the speech task, refused to deliver the speech, were too ill to complete the study, or had dangerously high blood pressure readings. Thus, the final sample consisted of 112 Americans and 112 Danes. The gender composition by country was similar (U.S.: 50 women, 62 men; Denmark: 56 women, 55 men, one identified as gender-neutral; $\chi^2(2) = 1.76, p = .42$). Participants' ages were also similar and ranged from 18 to 77 (U.S.: $M = 35.23, SD = 12.32$; Denmark: $M = 36.96, SD = 16.47; t(222) = -0.89, p = .38$). American participants were mostly White (72.3% White, 18.8% Black, 0.9% Alaskan Indian, 2.7% Asian, 5.4% Hispanic), and Danish participants (who categorize themselves by national origin and not race) were also mostly of Danish (White) origin (91.1% Danish, 3.6% immigrants or descendants from other European countries, 5.4% immigrants or descendants from non-Western countries). Participants started smoking between the ages of 7 and 45 (U.S.: $M = 16.92, SD = 5.55$; Denmark: $M = 16.08, SD = 3.06; t(222) = 1.40, p = .16$) and smoked 10 to 50 cigarettes per day (U.S.: $M = 17.27, SD = 7.36$; Denmark: $M = 16.88, SD = 6.17; t(222) = 0.43, p = .67$). Nicotine cravings were higher among U.S. participants ($M = 3.13, SD = 0.90$) than Danish participants ($M = 2.88, SD = 0.62$), $t(198) = 2.44, p = .02$, and the number of quit attempts in the past 5 years was higher among U.S. participants ($M = 2.59, SD = 5.53$) than Danish participants ($M = 1.33, SD = 2.29$), $t(146) = 2.21, p = .03$. In sum, overall, the samples were generally similar in terms of gender, age, and smoking characteristics.

PROCEDURE

Translation. All materials were translated from English to Danish by the first author (who is a Danish and English bilingual speaker) and the last author (who is Danish). The translation was then independently checked by another bilingual speaker for accuracy and equivalency of meaning.

Recruitment. Participants were recruited from a small town in central Pennsylvania and in Copenhagen, Denmark, using fliers, newspaper advertisements, Facebook advertisements, and referrals. Because of this sampling strategy, we do not know how many participants might have received the information but declined to participate. In this article, "Danish/Denmark" and "American/U.S." are used as shorthand for the location of the two samples and do not imply generalizability to all Danes and Americans.

Prescreening. Researchers prescreened possible participants via phone to evaluate if they met the following eligibility requirements: were 18 years or older, lived in the United States/Denmark for a minimum of 10 years, smoked at least 10 cigarettes a day, smoked for at least 2 years, and self-identified as a smoker. Participants also had to agree to refrain from smoking 2 hours before the study and to bring their own cigarette to smoke during the study. We paid the participants \$40 to participate, and they could earn a \$10 bonus for being on time/not changing the appointment, as well as a \$10 bonus for referring someone who then participated in the study. Danish participants were paid corresponding amounts in Danish kroner.

Initial Measures. On arrival, participants reviewed and signed the informed consent document. Participants then answered a Qualtrics survey on the computer containing demographic and background measures of personal characteristics related to smoking.

Blood Pressure Measurements. After completing the survey, participants were told that their blood pressure would be measured seven times over the next 20 minutes. Researchers placed a blood pressure cuff of the correct size on participants' non-dominant arm and reminded participants to sit erect, with feet flat on the floor, and keep the palm facing up. Next, participants were told to sit quietly and relax for the next 5 minutes while their blood pressure was being measured. Their blood pressure was measured twice, once after 1 minute had passed and once after 3 minutes had passed.

Speech Task and Continued Blood Pressure Measurements. Participants were told at the beginning of the study and as a preface to the task that the task might be odd but that they should do their best. Participants were told to imagine a job similar to their current job or a dream job that they could possibly get with their qualifications. They were informed that they would need to write and deliver a speech. They were told to be as persuasive as possible because a professional would later judge the speech to evaluate how employable they were. The speech was either audio or video recorded. The participants had 3 minutes to draft their speech using prompts such as, "What qualities do good employees have?" and "What are your strengths?" The participants were then asked to light their cigarette and deliver their recorded speech while smoking. During the speech, blood pressure measurements were taken after 30 seconds and after 2 minutes. After the speech, the recording device was turned off, participants stopped smoking, and another 5-minute rest period started in which the participants' blood pressure was measured after 1 minute and after 3 minutes. The blood pressure cuff was then removed.

Stroop Test and Post-Manipulation Survey. Participants next completed a Stroop test (as a measure of cognitive depletion) followed by additional questions on the Qualtrics survey. Following the survey, participants were debriefed, paid, given an opportunity to refer others to the study, thanked, and dismissed.

MATERIALS

Smoking Self-Concept. Smoking self-concept was measured using the Smoking Self-Concept Scale (Shadel & Mermelstein, 1996). Five items assess smokers' agreement with statements that represent a smoker self-schema. An example item is, "Smoking is part of my personality" (1 = *Strongly disagree*; 5 = *Strongly agree*). Items were averaged so that higher scores indicated a stronger smoking self-concept, $\alpha_{\text{U.S.}} = .86$; $\alpha_{\text{DK}} = .74$.

Stigma Condition Manipulation. Participants were randomly assigned to give their speech while video recorded (stigma visible) or audio recorded (stigma concealed). This manipulation was modeled on a similar identity threat manipulation using weight stigma (Blodorn et al., 2016; Major et al., 2012). The video condition was intended to create a stigmatizing situation in which participants were made more aware of the potentially negative evaluations associated with their smoker status. Of note, being video recorded is not inherently more stressful than being audio recorded in situations where identity threat is not present (Major et al., 2012).

Self-Reported Stress. Stress emotions were measured with five items that assessed nervous, worried, uncomfortable, overwhelmed, and anxious affect (Major et al., 2012). Participants were asked, "How much did you feel these emotions while giving the speech?" (1 = *Not at all*; 4 = *A great deal*). Responses were averaged so that higher numbers indicated more stress, $\alpha_{\text{U.S.}} = .89$; $\alpha_{\text{DK}} = .85$.

Mean Arterial Pressure (MAP) Reactivity. Following standard procedures for assessing cardiovascular reactivity (e.g., Sherwood, Allen, Fahrenberg, Kelsey, & Lavallo, 1990), systolic blood pressure (SBP), diastolic blood pressure (DBP), and heart rate (HR) were measured using a Bluetooth-controlled blood pressure cuff (iHealth Wireless Blood Pressure Monitor BP5). Participants' blood pressure was measured a total of seven times: once as a test measurement, twice during the first rest period, twice during the speech task, and twice during the post-speech rest period. The iHealth Blood Pressure Monitor BP5 broke and a replacement cuff (Microlife BP A6 PC) was used for 10 Danish participants. No differences in cardiovascular reactivity measurement were found between participants who used the iHealth cuff ($n = 214$, $M = 11.87$, $SD = 7.60$) and participants who used the Microlife cuff ($n = 10$, $M = 9.42$, $SD = 5.11$), $t(222) = -0.64$, $p = .52$.

A total of 27 measurements were missing out of 1,568 (1.7%; U.S.: 9; Denmark: 18) due to technical errors. Mean arterial pressure reactivity was calculated by subtracting participants' baseline scores from their scores during the speech and the post-speech rest period using the formula $1/3(\text{SBP}-\text{DBP}) + \text{DBP}$. Data were analyzed for normality, and one outlier (SBP > 240 mmHg) was discarded. All analyses involving MAP reactivity included baseline MAP reactivity as a covariate. Higher numbers indicated more stress.

Cognitive Depletion. We measured cognitive depletion using the Stroop Color-Word Interference Test (see Scarpina & Tagini, 2017, for a review). Stimuli were

either presented as congruent words (e.g., the word blue was written in blue ink), incongruent words (e.g., the word blue was written in green ink), or control symbols (e.g., a line of asterisks in blue ink). We used PsychoPy2, an open-source computer software, to administer the Stroop test. Participants viewed a fixation target (a white +) for 200 ms followed by either a congruent or incongruent word or a symbol (control) in 5 practice trials, followed by 20 congruent, 20 incongruent, and 20 control trials. The visual stimuli remained on the screen until participants pressed the corresponding colored key. Participant response times (how fast they chose the correct color) were recorded in ms by the computer software.

We excluded Stroop data from one participant who had a large number of response times greater than 3000 ms (30 outliers or 50% of data for this participant). Remaining response times exceeding 3000 ms (71 outliers/0.55% of all data; U.S.: 0.63%, Denmark: 0.47%) were then deleted (Bielecki, Popiel, Zawadzki, & Sedek, 2017). Next, we winsorized the data to deal with non-normality issues inherent in data involving measures of time. Response times greater than 3 *SD* from the global mean (U.S.: $M = 939.29$ ms, $SD = 322.22$ ms; Denmark: $M = 943.20$ ms, $SD = 352.45$ ms) were recoded as 1957.01 ms (3 *SD* above the global mean). This affected 254 outliers or 2.0% of all data, which is considered an acceptable proportion (Inzlicht et al., 2006). Response times were averaged separately for congruent, incongruent, and control trials. The overall averages for each trial type were log transformed to reduce positive skew (Major et al., 2012). Congruent trial averages were subtracted from the incongruent trial averages to produce a Stroop interference score for each participant. Greater interference scores indicate greater cognitive depletion.

Perceived Lung Cancer Risk. Personal risk was measured by asking a standard question (Weinstein et al., 2007). "Imagine you in the future smoke a pack of cigarettes every day. What then is your chance of getting lung cancer in your lifetime?" (1 = *Not at all likely*; 5 = *Extremely likely*).

Self-Exempting Beliefs. We assessed cognitive dissonance-reducing beliefs regarding smoking behaviors with the Self-Exempting Beliefs Scale (Oakes, Chapman, Borland, Balmford, & Trotter, 2004). Sample items include, "Lots of doctors and nurses smoke, so it cannot be that harmful" and "You've got to die of something, so why not enjoy yourself and smoke?" (1 = *Strongly disagree*; 5 = *Strongly agree*). We averaged scores from 17 items (one item was accidentally not included) to form a composite measure of self-exempting beliefs, $\alpha_{\text{U.S.}} = .88$; $\alpha_{\text{DK}} = .88$.

Smoking Cessation Intentions. Three questions assessed intentions to quit smoking (Helweg-Larsen, 2014): "Do you have plans to quit smoking?" (1 = *Yes, within a month*; 4 = *No, I do not have plans to quit smoking*), "Do you want to stop smoking?" and "Would you like to smoke less?" (both 1 = *Not at all*; 3 = *A great deal*). The first item was reverse scored; all three items were converted to z-scores and then averaged, $\alpha_{\text{U.S.}} = .83$; $\alpha_{\text{DK}} = .76$.

RESULTS

ANALYTIC STRATEGY

A series of hierarchical multiple moderated regression analyses were conducted using the PROCESS v3.0 macro in SPSS (Hayes, 2018) to determine if smoking self-concept and country moderated the relationship between stigma visibility and self-reported stress emotions, MAP reactivity, cognitive depletion, perceived lung cancer risk, self-exempting beliefs, and smoking cessation intentions. We used Model 3 to test for all possible effects and interactions by comparing the conditional effects of the independent variable (stigma visibility) at different levels of the two moderators (country and smoking self-concept) for each dependent variable. The parameters were set to 1,000 bootstrapped bias-corrected samples with a 95% confidence interval. Products were mean centered and then multiplied to create an interaction term. The PROCESS macro executes ordinary least squares regression analyses to determine whether the interaction increases the proportion of variance in the dependent variable. In cases in which we probed significant 2-way interactions, we used Model 1, and controlled for all predictors and interactions from the 3-way model (which were not already included in the 2-way interaction that was examined). Below, we report unstandardized regression weights. The figures depict the highest order significant interaction, and we indicate on the graph the specific effects resulting from the significant interaction. In the figures, smoking self-concept is dichotomized at 1 *SD* above and below the mean, but all statistical analyses kept self-concept as a continuous variable. See Table 1 for all bivariate correlations and cross-cultural differences for study variables for the U.S. and Denmark.

Self-Reported Stress. Results indicated an effect of country, $b = -0.35, p < .01, 95\% \text{ CI } [-0.57, -0.14]$, such that Americans ($M = 2.32, SD = 0.89$) felt more stressed than did Danes ($M = 2.00, SD = 0.76$). As seen in, a significant Stigma Visibility Condition \times Country interaction, $b = 0.49, p = .03, 95\% \text{ CI } [0.06, 0.93]$, showed that Americans were more stressed in the stigma-visible than in the stigma-concealed condition, $b = -0.39, p = .01, 95\% \text{ CI } [-0.70, -0.08]$, whereas Danes were equally stressed in the two conditions, $b = 0.10, p = .51, 95\% \text{ CI } [-0.21, 0.41]$. No other significant effects or interactions emerged, $bs = -0.14$ to $0.41, ps = .15$ to $.88$.

MAP Reactivity. Results showed an effect of country, such that Danes ($M = 13.11, SD = 6.71$) exhibited greater physiological reactivity than did Americans ($M = 10.53, SD = 8.16$), $b = 2.93, p < .01, 95\% \text{ CI } [0.93, 4.92]$. Thus, Danes showed more physiological reactivity than Americans, but Americans reported feeling more stressed than Danes (as reported above). Of note, these two measures do not capture identical responses (Compas, Connor, Saltzman, Thomsen, & Wadsworth, 1999) and were not correlated in either country (see Table 1). More importantly, as seen in Figure 2, the interaction between the stigma visibility condition and smoking self-concept was significant, $b = -2.64, p = .04, 95\% \text{ CI } [-5.19, -0.09]$. When participants had low smoking self-concept, they did not react differently to the two conditions, $b = 1.71, p = .25, 95\% \text{ CI } [-1.21, 4.63]$. However, as predicted, when

TABLE 1. Bivariate Correlations Among Study Variables for the U.S. and Denmark

Measure	Denmark Mean (SD)	Smoking self- concept	Self-reported stress	MAP reactivity	Cognitive depletion	Perceived lung cancer risk	Self- exempting beliefs	Smoking cessation intentions
U.S. Mean (SD)		2.79 (0.90)	2.33 (0.89)	10.53 (8.16)	0.17 (0.14)	2.21 (0.78)	2.36 (0.64)	0.13 (0.86)
Smoking self-concept	2.99 (0.70)	—	.12	-.10	-.16	.04	.30**	-.18
Self-reported stress	2.00 (0.76)	.05	—	-.003	.09	.07	.02	-.03
MAP reactivity	13.11 (6.71)	-.05	-.12	—	.04	.12	-.11	-.05
Cognitive depletion	0.13 (0.12)	-.13	.00	-.06	—	-.05	.04	.00
Perceived lung cancer risk	2.03 (0.47)	-.09	.20*	-.02	.04	—	.30**	.06
Self-exempting beliefs	2.53 (0.57)	.30**	-.01	-.03	.05	.31**	—	.38**
Smoking cessation intentions	-0.13 (0.81)	-.04	.20*	-.09	.04	.21*	.47**	—

Note. * $p < .05$ ** $p < .01$. Correlations for American participants ($N_s = 106-112$) are presented above the diagonal and correlations for Danish participants ($N_s = 111-112$) are presented below the diagonal. For the MAP reactivity variable, we controlled for baseline MAP reactivity. T-tests showed that all means were significantly different between the U.S. and Denmark ($p < .05$), except for smoking self-concept ($p = .06$).

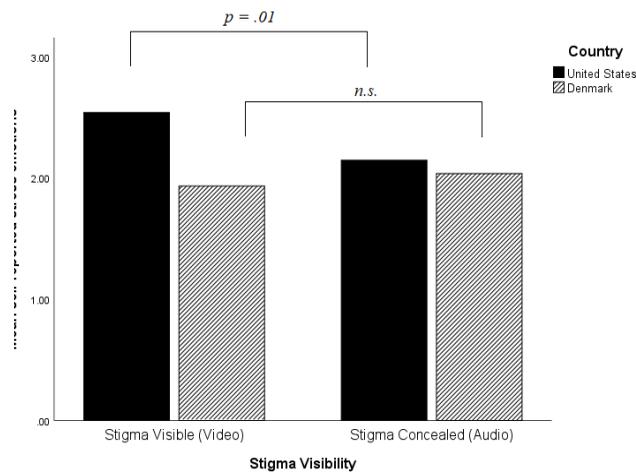


FIGURE 1. Interaction between stigma visibility condition and country predicting self-reported stress emotions.

smoking self-concept was high, participants displayed (marginally) greater MAP reactivity when their stigma was visible than when it was concealed, $b = -2.57$, $p = .07$, 95% CI [-5.39, 0.26]. No other effects or interactions were significant, $bs = -2.91$ to -0.05 , $ps = .26$ to $.95$.

Cognitive Depletion. Results showed an effect of country, $b = -0.04$, $p = .03$, 95% CI [-0.07, 0.00], such that U.S. smokers ($M = 0.17$, $SD = 0.14$) were more cognitively depleted than Danish smokers ($M = 0.13$, $SD = 0.12$). Results also showed that greater smoking self-concept was associated with less cognitive depletion, $b = -0.02$, $p = .04$, 95% CI [-0.05, 0.00]; the more participants identified as smokers, the better they performed on the Stroop task. Importantly, these effects were moderated by a significant 3-way interaction among stigma visibility, smoking self-concept, and country, $b = 0.09$, $p = .05$, 95% CI [0.00, 0.18]. As seen in Figure 3, the pattern by which stigma visibility was moderated by country was different as a function of self-concept. When smoking self-concept was low (top panel in Figure 3), stigma visibility and country did not affect cognitive depletion, $b = -0.04$, $p = .43$. However, when smoking self-concept was high (lower panel in Figure 3), stigma visibility differentially affected Americans and Danes, $b = 0.10$, $p = .04$, in that Americans were showing a trend toward being more cognitively depleted in the stigma-visible (video) condition than in the stigma-concealed (audio) condition, $b = -0.06$, $p = .11$, 95% CI [-0.12, 0.01], whereas Danes showed no differences in cognitive depletion in stigma-concealed or stigma-visible conditions, $b = 0.05$, $p = .17$, 95% CI [-0.02, 0.12]. No other significant effects emerged, $bs = 0.00$ to 0.03 , $ps = .36$ to $.99$. Thus, consistent with expectations, among Americans with high self-concept, making the stigma visible (as opposed to concealed) was associated with (marginally) greater cognitive depletion.

Perceived Lung Cancer Risk. In addition to reporting higher stress-related emotions and cognitive depletion, Americans ($M = 3.63$, $SD = 0.99$) rated their lung-

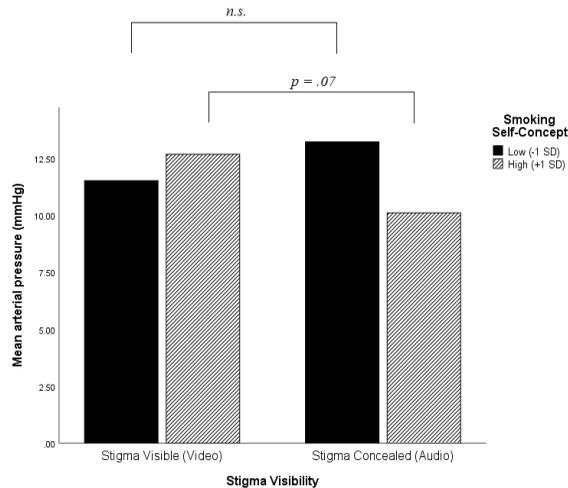


FIGURE 2. Interaction between stigma visibility condition and smoking self-concept predicting MAP reactivity.

cancer risk as greater than did Danes ($M = 2.96$, $SD = 0.88$), $b = -0.69$, $p < .01$, 95% CI [-0.94, -0.44]. This finding is consistent with previous research showing that Danish smokers demonstrate greater risk minimization than U.S. smokers (Helweg-Larsen et al., 2010; Helweg-Larsen & Nielsen, 2009; Helweg-Larsen, 2014). No other effects were significant, $bs = -0.22$ to 0.40 , $ps = .22$ to $.94$.

Self-Exempting Beliefs. Results showed a significant effect of self-concept, such that a stronger smoking self-concept was associated with greater self-exempting beliefs, $b = 0.22$, $p < .01$, 95% CI [0.13, 0.32]. As shown in Figure 4, a marginally significant interaction between stigma visibility and smoking self-concept emerged, $b = -0.19$, $p = .06$, 95% CI [-0.39, 0.01]. Probing this interaction did not reveal significant differences in self-exempting beliefs by condition in the low ($b = 0.17$, $p = .13$, 95% CI [-0.05, 0.40]) or high ($b = -0.13$, $p = .23$, 95% CI [-0.35, 0.09]) self-concept group. Instead, smoking self-concept was more strongly related to self-exempting beliefs in the stigma-visible condition, $b = 0.32$, $p < .001$, 95% CI [0.18, 0.46], than in the stigma-concealed condition, $b = 0.13$, $p = .07$, 95% CI [-0.01, 0.27]. No other effects were significant or marginally significant, $bs = -0.30$ to 0.14 , $ps = .13$ to $.88$. Thus, as expected, people with a strong smoking self-concept had stronger self-exempting beliefs in the stigma-visible condition than the stigma-concealed condition.

Smoking Cessation Intentions. The analysis revealed a significant effect of country, $b = -0.25$, $p = .03$, 95% CI [-0.47, -0.02], suggesting that the intention to quit was lower among Danes ($M = -0.13$, $SD = 0.81$) than among Americans ($M = 0.13$, $SD = 0.86$). No other significant effects were found, $bs = -0.24$ to 0.19 , $ps = .15$ to $.83$. Although the composite index of smoking intentions showed acceptable internal consistency, we wanted to examine if the three individual items ("Do you have plans to quit smoking," "Do you want to stop smoking," and "Would you like to smoke less?") revealed different patterns of results. In these exploratory analyses, we report only significant interactions that involved the stigma visibility condi-

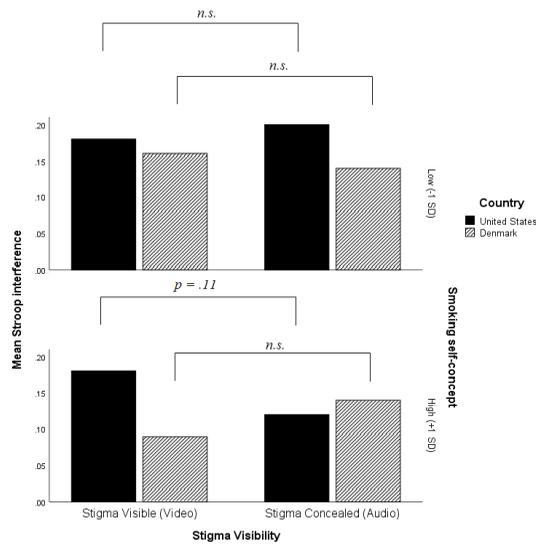


FIGURE 3. Interaction between stigma visibility condition and smoking self-concept predicting cognitive depletion by country.

tion. Results showed no significant interactions with stigma visibility when the dependent variables were *plans to quit smoking* or *wanting to smoke less*. However, for *wanting to stop smoking*, results revealed a significant Stigma Visibility \times Country interaction, $b = -0.38$, $p = .03$, 95% CI [-0.71, -0.04]. Consistent with predictions, there was a significant Stigma Visibility \times Smoking Self-Concept interaction, $b = 0.23$, $p = .04$, 95% CI [0.01-0.44]. When smoking self-concept was high, participants in the stigma-visible condition were less interested in stopping compared to those in the stigma-concealed condition, $b = 0.28$, $p = 0.02$, 95% CI [0.04, 0.51] whereas when self-concept was low, there was no difference between the two stigma conditions, $b = -0.09$, $p = 0.46$, 95% CI [-0.34, 0.15]. In addition, Americans were less interested in stopping smoking when their stigma was visible as opposed to concealed, $b = 0.28$, $p = .02$, 95% CI [0.04, 0.52], whereas stigma visibility did not impact Danes' desire to stop, $b = -0.10$, $p = .42$, 95% CI [-0.34, 0.14]. Thus, consistent with predictions, U.S. and strongly identified smokers whose stigma was made visible were less interested in stopping smoking. It is not clear why one smoking cessation item but not the other two resulted in the predicted results. Further research should explore predictive validity of measures to quit smoking (cf. Hummel et al., 2018).

DISCUSSION

This study experimentally examined the identity threat model of stigma among smokers in a smoking-prohibitive country (the U.S.) and a smoking-lenient country (Denmark). Although smoking stigmatization is well documented in the literature (Chapman & Freeman, 2008; Evans-Polce, Castaldelli-Maia, Schomerus, & Evans-Lacko, 2015), no previous research has experimentally examined the effects of stigmatizing smokers and whether it ultimately helps or hinders smok-

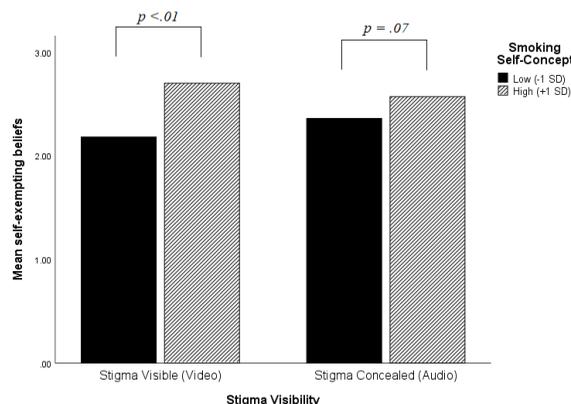


FIGURE 4. Interaction between stigma visibility condition and smoking self-concept predicting self-exempting beliefs.

ers in moving toward quitting. Consistent with the stigma-induced identity threat model (Major & O'Brien, 2005), we found that stigmatization generated a series of emotional, physiological, cognitive, and attitudinal reactions moving the smokers away from, rather than toward, quitting. These effects were particularly true for smokers with a stronger smoking self-concept and for U.S. smokers. Specifically, we found that U.S. (but not Danish) smokers reported being more stressed in the stigma-visible than in the stigma-concealed condition. Further, we found that among stronger self-concept smokers, making smoking visible (as opposed to concealed) caused them to exhibit greater physiological stress, be more cognitively depleted (only for U.S. smokers), and increase their agreement with self-exempting beliefs and a willingness to stop smoking. Thus, the predictions of the identity threat model were supported. The brief manipulation did not change perceived personal risk possibly because risk perceptions are generally difficult to change (cf. Weinstein & Klein, 1995).

The stigma-induced identity threat model posits that when people see their stigmatized social identity as integral to their sense of self, they are more likely to interpret ambiguous situations as threatening (Major & O'Brien, 2005). Consistent with this point, we found, as expected, that smokers with a stronger smoking self-concept reacted with greater affect, cognitive depletion, and attitudinal changes when their stigma was revealed. Indeed, other individual difference variables might also intensify smokers' responses to stigma-relevant experiences, such as internalized smoking stigma (Brown-Johnson et al., 2015), shame and self-efficacy (Kim, Cao, & Meczowski, 2018), or rejection sensitivity (a variable shown to matter in reactions to weight-based stigma; Brenchley & Quinn, 2016). Future research should examine these possibilities.

The model also specifies that the situational/cultural context of the stigma influences the experience of identity threat. Denmark and the U.S. were included in the present study because reactions to stigma inherently occur in cultural contexts, and it is difficult to evaluate these variables in only one (very) stigmatizing cultural context, such as the U.S. Generally consistent with previous research of representative samples comparing U.S. and Danish smokers (Helweg-Larsen,

2014), the present study showed that Danish smokers (compared with U.S. smokers) had more smoking-supportive beliefs: they rated their personal risk as lower, held more self-exempting beliefs, were less cognitively depleted, and reported being less stressed, although the physiological stress measure showed greater stress. Still, the results showed that cultural origin did not consistently affect the reactions to the manipulation. Future research should examine multiple cultural contexts, including countries that stigmatize smoking less or immigrant communities in which acculturation might influence beliefs about smoking (e.g., Helweg-Larsen & Stancioff, 2008). Understanding culture is an essential key to reducing smoking, and too little research explores how cultural context influences smoking attitudes and behaviors (Unger et al., 2003).

The present results suggest that stigmatization is detrimental to the mental and physical health outcomes for smokers, including willingness to quit. But how can these results be reconciled with longitudinal studies showing that smokers' agreement with stigmatization or moralized sentiments predicts quitting intentions (Hammond, Fong, Zanna, Thrasher, & Borland, 2006; Helweg-Larsen, 2014)? Perhaps reminders in a specific situation of one's devalued identity are associated with more stress and less interest in quitting, but coming to agree over time with stigmatizing ideas (e.g., internalizing smoking stigma) is associated with subsequent quitting. This apparent paradox is similar to research on concealable stigmas; being asked to reveal a normally hidden diagnosis of mental illness is stressful and associated with cognitive depletion (Quinn, Kahng, & Crocker, 2004), but being "out" to other people about one's concealable identity is associated with less psychological distress (Quinn et al., 2014). One key question for future research to address is when or for whom stigmatization is helpful or harmful.

The study was not without limitations. First, although smoking is generally seen as a job killer (Roulin & Bhatnagar, 2018), the experimental manipulation of smoking during a job interview was artificial, and several participants spontaneously noted that they would obviously never smoke during an interview or even smoke inside. Thus, some participants might have found the experience quite atypical. It might be better in future research to use a stigmatizing situation that smokers experience in everyday life, such as smoking-related lecturing, comments about tobacco smell, or coughing. Clearly, the specific situation matters in terms of whether smokers appraise it as threatening or motivating. Second, the sample included heavy smokers who identified as smokers. Thus, we do not know how light or occasional smokers might respond to stigmatizing messages. Light smokers might be less likely to identify as smokers and therefore may experience fewer negative effects of stigmatization. Or stigmatization may help light smokers to quit by reminding them of the costs of belonging to this devalued group.

Smokers have for some time been viewed as weak, disgusting, addicted, selfish, unattractive people (Goldstein, 1991). The present study showed that reminding smokers that they belong to a devalued group leads to stress, more smoking-favorable attitudes, and a reduction in the cognitive resources needed to quit smoking. The next step is to identify ways to help smokers respond to stigmatization by quitting rather than with resistance or indifference. Some researchers in the public

health community have suggested that stigmatization of smokers could possibly be used as a public health tool to reduce smoking (Bayer, 2008), whereas others have argued that stigmatization of smokers has negative consequences and further increases disparity in health (Bell, McCullough, Salmon, & Bell, 2010). Clearly, the task for future research is to investigate when a threat to one's spoiled identity can be motivating in a healthy direction.

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