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How do cancer risk perception, benefit perception of quitting, and cancer worry influence quitting intention among current smokers: A study using the 2013 HINTS

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ABSTRACT

We proposed a conceptual model to explain current smokers' quitting intentions based on theories from cognitive perspectives and theories that recognize the impact of affect. The model was tested by participants of the 2013 Health Information National Trends Survey (HINTS 4) who identified themselves as current smokers (N = 481). Structural equation modeling (SEM) analyses were conducted. Findings suggest that intention to quit smoking is directly predicted by benefit perception of quitting, but not by cancer risk perception or cancer worry; cancer worry has a positive influence on both cancer risk perception and benefit perception of quitting; the indirect path from cancer worry to quitting intention through benefit perception of quitting is significant. Theoretical and practical implications of findings were discussed.

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Benefit perception; risk perception; quitting intention; smoking; worry

Introduction

Cigarette smoking remains the leading cause of preventable disease and death in the United States, claiming more than 480,000 lives every year [US Department of Health and Human Services (US DHHS), 2014]. Despite a decline in smoking rates in recent years, there are 42.1 million U.S. adults smoking cigarettes, comprising 17.8% of the total U.S. population (CDC, 2014). Thus, the exploration of protective factors that can motivate smokers to quit remains a challenging task for scholars in public health and substance use. Previous researchers on smoking cessation largely focused on perceived risks of smoking while overlooking perceived benefits of quitting (e.g., Kaufman et al., 2011; Song et al., 2014). Also, researchers have just begun to explore the role of affect (e.g., worry) in the context of smoking cessation (e.g., Janssen et al., 2014; Yong et al., 2014).

Smoking can cause many diseases/health conditions including cancer (e.g., lung, colorectal, and liver), coronary heart disease, and chronic obstructive pulmonary disease (COPD) (US DHHS, 2014). Getting cancer is generally considered a very serious health consequence of smoking. The idea that "smoking causes cancer" has been widely publicized in antismoking campaigns (e.g., the "16 cancers" campaign) (Quit Victoria, 2016). Thus, we focus on cancer risk perception and cancer worry in this study. The aims of the present investigation were twofold. First, we sought to examine the unique effects of cancer risk perception, benefit perception of quitting, and cancer worry on quitting intention. Our second aim was to test whether cancer risk perception and benefit perception of quitting serve as psychological pathways linking cancer worry to quitting intention.

Literature

Cancer risk perception, benefit perception of quitting, and cancer worry predict quitting intention

According to the health belief model (HBM), individuals' perceptions of a threat posed by a health problem and perceptions of benefits of a preventive action will influence their intentions to take a preventive health behavior (Rosenstock, 1974). Consistent with the HBM, there is ample evidence suggesting that one of the proximal predictors of smokers' quitting intention is perception of the risks associated with smoking. For example, Song et al. (2014) identified perceived risk of smoking as a cognitive path to quit smoking among college smokers. Dunlop and Romer (2010) found young smokers (aged 14–22 years) who perceived their smoking as a personal health risk were more likely to have strong quitting intentions than those who did not. Kaufman et al. (2011) demonstrated that, among a national sample of current smokers, those who showed greater comprehension of the health risks of smoking were more likely than others to indicate intentions to quit. Although these studies are informative, they overlooked the role of perceived benefit associated with quitting.

There is a paucity of studies that have explored how perceived benefits of quitting influence intentions to quit. One example is the study of McKee et al. (2005), which found perceived benefits of smoking cessation were positively associated with motivation to quit. However, their study did not explore the role of perceived risks of continued smoking (e.g., cancer risk perception). It remains unclear if benefit perception of quitting is an explanatory factor of quitting intention in addition to cancer risk perception.

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In traditional cognitive models of health behaviors (e.g., HBM), the role of affect is not specified. By contrast, the risk-as-feelings hypothesis posits that affect (i.e., feelings) can diverge from cognitive evaluations and has a direct influence on behaviors or decision making (Loewenstein et al., 2001). In recent years, affect has received increasing attention in health/risky behavior research (e.g., Chen & Feeley, 2015; Janssen et al., 2014).

In the context of smoking, negative affect (e.g., worry) associated with the consequences of smoking has been found to motivate smokers to quit. Worry, a kind of negative affect, refers to perception of inability to control or obtain desired outcomes (Barlow, 1988). In a longitudinal cohort study conducted in four countries (including the United States), Yong et al. (2014) found that increased worry about smoking harms (i.e., damage to one's health and lowering of one's quality of life) predicted stronger intention to quit smoking. Janssen et al. (2014) also found higher worry about getting lung cancer was associated with stronger smoking-cessation intentions and appeared to be a more important predictor than cancer-related risk perception. It is worth noting that none of these studies considered perceived benefit of quitting. It is unclear whether cancer risk perception, benefit perception of quitting, and cancer worry each independently predict quitting intention. As such, we propose the following hypothesis:

H1: Quitting intention is positively predicted by **(a)** cancer risk perception, **(b)** benefit perception of quitting, and **(c)** cancer worry in smokers.

Cancer worry predicts cancer risk perception and benefit perception of quitting

Affect plays an important role in risk/benefit perceptions or judgments. Individuals form their risk/benefit perceptions of objects, events, and behaviors based "not only on what they think about it but also how they feel about it" (Slovic et al., 2004, p. 315). According to the affect heuristic model, individuals derive their risk and benefit judgments by referring to an overall affective evaluation of different kinds of information (i.e., stimuli) (Finucane et al., 2000). In other words, if people have favorable feelings (e.g., happiness) toward an activity/behavior, they tend to judge the risks as low and the benefits as high; if they have unfavorable feelings (e.g., worry), they tend to judge the risks as high and the benefits as low.

The association between *worry about a health condition* and *risk perception of that condition* in the affect heuristic model has found support in empirical studies. In a telephone-based survey of 1,959 healthy adults, Senay et al. (2013) reported that participants' perceived risk of a specific health condition was predicted by their worry over that condition (e.g., lung cancer, skin cancer, colon cancer). Similarly, in a sample of 2,524 women from a managed care organization, Peipins et al. (2015) showed that worry about ovarian cancer had a moderate influence on perceived risk of getting ovarian cancer. Participants in those studies were healthy and were not asked about possible risky behaviors, such as smoking. Compared to non-smokers, smokers are at a higher risk of developing cancer in their lifetime, and they should be an important target population for reducing the cancer burden of society. It is unclear if cancer worry influences perceived risk of getting cancer in smokers.

One question left unanswered by the affect heuristic model is whether individuals' worry about getting a health condition (e.g., cancer) can influence their benefit perception of a protective approach. Few researchers have explored this association. One example is Cameron and Reeve (2006), who demonstrated that cancer worry was positively related to beliefs about benefits of genetic testing. Another example is Ferrer et al. (2013), who showed that worry about one's overall health was positively related to perceived benefits of fruit and vegetable consumption. Relying on the affect heuristic model and empirical evidence from other health behavior contexts, we pose the following hypothesis:

H2: Cancer worry positively predicts **(a)** cancer risk perception and **(b)** benefit perception of quitting in smokers.

Taken together, the above literature review suggests it is possible that cancer worry increases smokers' intentions to quit through increasing their cancer risk perception and benefit perception of quitting. To our knowledge, no researcher has systematically tested this mechanism, As such, we pose the following research question:

RQ1: Is the effect of higher cancer worry on higher quitting intention mediated by **(a)** higher cancer risk perception and **(b)** higher benefit perception of quitting in smokers?

Figure 1 shows the hypothesized model outlining relationships among major variables.

Method

To test the hypothesized model, we used the dataset of the 2013 Health Information National Trends Survey 4 (HINTS 4), a national survey of the American public's use of cancer-related information (National Cancer Institute (NCI), 2013).

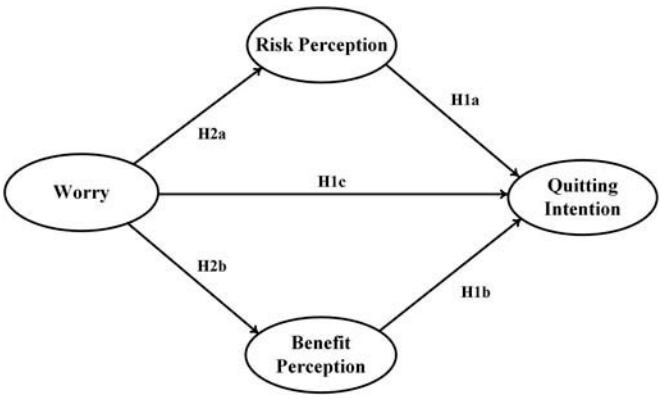

Figure 1. Hypothesized model. *Note*: The correlation between risk perception and benefit perception was omitted to improve the visibility of the model.

We chose the third cycle of HINTS 4, conducted from September through December 2013, because it was the latest data available that measured smokers' quitting intention.[1] We incorporated sample weights to statistically correct for demographic differences, as well as non-response and non-coverage biases.

Participants

Our analyses used a subset of HINTS 4 Cycle 3, which contained 481 respondents who identified themselves as current smokers. A total of 74.3% of the participants smoked everyday, while the others smoked some days. Demographics of participants are presented in Table 1.

Measures

Quitting intention

Quitting intention was measured by one question: "Are you seriously considering quitting smoking in the next six months?" The responses included 0 = *No* and 1 = *Yes*. 68.2% of the participants intended to quit smoking.

Cancer risk perception

Cancer risk perception was measured by three items. Sample items include "How likely are you to get cancer in your lifetime?" with responses ranging from 1 = *Very unlikely* to 5 = *Very likely*.[2] These three items showed adequate reliability (Cronbach's α = 0.76).

Benefit perception of quitting

Benefit perception of quitting was measured by one question: "How much do you think quitting cigarette smoking can help reduce the harmful effects of smoking?" The responses, ranging from 1 = *a lot* to 4 = *not at all*, were recoded so that higher values indicate higher perceived benefits of quitting smoking.

Cancer worry

Cancer worry was measured by one question, asking "How worried are you about getting cancer?" The responses ranged from 1 = *not at all* to 5 = *extremely*.

Results

Overview of analyses

Descriptive statistics and Pearson correlations for all variables were reported in Table 2. The proposed model was evaluated by structural equation modeling (SEM) using Mplus 7.0.[3] Given the dichotomous outcome variable, probit regression was used with Theta parameterization. Based on the model fit criteria,[4] the model did not show a close fit to the data, as χ^2 (5) = 20.16 ($p < 0.01$), χ^2/df = 4.03, and RMSEA = 0.079 (90% CI: 0.045, 0.117), although CFI= 0.99, TLI= 0.98, and WRMR= 0.41. Given the nonsignificant path from worry to quitting intention (β = 0.06, p >0.05), we removed this path and obtained a modified model (see Figure 2), which provided a close fit to the data: χ^2 (6) = 9.11 ($p > 0.05$), χ^2/df = 1.52, RMSEA = 0.033 (90% CI: 0.000, 0.073), CFI = 1.00, TLI = 1.00, and WRMR = 0.425.

Hypotheses testing

Figure 2 shows standardized path coefficients and statistical significance for individual paths in the *modified* model. Participants' intention to quit smoking was positively predicted by benefit perception of quitting (β = 0.26, p <0.001), but not by cancer risk perception (β = 0.01, $p > 0.05$). **H1b** was supported, but **H1a** and **H1c** were not. Cancer worry had a positive influence on both cancer risk perception (β = 0.85, $p < 0.001$) and benefit perception of quitting (β = 0.25, $p <$ 0.001). Thus, **H2a** and **H2b** were both supported.

Indirect effects

To answer RQ1a and RQ1b, bootstrapping was implemented to obtain bias-corrected 95% confidence intervals for statistical inferences about the specific indirect effects (Preacher & Hayes, 2008). The number of replications was set to 1,000 to ensure the precision of bias-corrected confidence intervals (MacKinnon et al., 2004). Results showed the indirect effect of cancer worry on quitting intention through cancer risk perception was 0.011 and not statistically significant (95% CI = −.020, 0.021). Results also showed the indirect effect of cancer worry on quitting intention via benefit perception of quitting was 0.066 and statistically significant (95% CI = 0.061, 0.069).[5]

Table 1. Demographics of participants.

Demographical variables	Percentage	Minimum	Maximum	Mean	*SD*
Age		18	86	50.04	13.76
Gender	54.3% were female				
Ethnicity	65.9% were White				
Self-rated health status		1 = poor	5 = excellent	3.08	0.94
Marital status	40.5% were married or living as married				
Annual household income		1 = less than $20,000	5 = $75,000 or more	2.45	1.5
Education	Less than high school (13.9%); High school (30.4%); Some college (33.7%); Bachelor's degree or higher (22.0%)				

Table 2. Descriptive statistics and zero-order correlation matrix of study variables (based on the unweighted sample).

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Age	—	−0.064	0.003	−0.106*	−.142**	−.183**	−0.066	−0.069	−0.068	−0.087	−0.087
2. Gender		—	0.023	0.050	−.171**	0.045	−0.047	0.127*	0.129**	0.127**	0.077
3. Ethnicity			—	−0.066	−.199**	0.227**	−0.029	−0.068	−.222**	−.019	−0.013
4. Education				—	0.352**	0.069	0.220**	−0.006	0.011	.226**	0.118*
5. Income					—	−.200**	0.299**	0.010	0.076	.091	0.005
6. Marital						—	0.015	−0.114*	−0.101*	.038	0.057
7. Health							—	−0.128*	−.170**	.103*	0.012
8. Worry								—	0.556**	.091	0.120*
9. Risk Perception									—	.085	0.068
10. Benefit Perception										—	0.360**
11. Intention											—
Mean	50.04	1.56	1.27	4.04	2.45	3.04	3.08	2.64	3.00	3.52	0.68
SD	13.76	0.50	0.45	1.54	1.50	1.94	0.94	1.22	0.73	0.80	0.47

Note: Marital = Marital Status; Health = Self-Rated Health Status; Intention = Intention to Quit Smoking.
*$p < 0.05$, **$p < 0.01$.

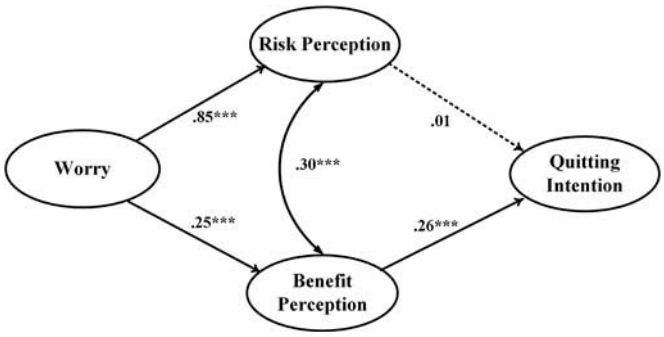

Figure 2. Final model with standardized path coefficients.
Note: *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

Discussion

In this study, we proposed a conceptual model to explain current smokers' quitting intentions. We tested the model with a sample of participants who identified themselves as current smokers (N = 481) in the 2013 HINTS dataset. A structural equation modeling (SEM) analysis was conducted, and the final model fit the data well. Findings suggest that intention to quit smoking is directly predicted by benefit perception of quitting, but not by cancer risk perception or cancer worry. Cancer worry has a positive influence on both cancer risk perception and benefit perception of quitting. Only the indirect path from cancer worry to quitting intention through benefit perception of quitting is significant. Implications of findings are discussed below.

An interesting finding of this study is that only benefit perception of quitting has a direct effect on quitting intention; neither cancer risk perception nor cancer worry is directly associated with quitting intention. This finding is inconsistent with previous studies that documented risk perception as a cognitive mechanism for quitting behavior/intention (e.g., Kaufman et al., 2011; Song et al., 2014) and with previous studies that showed that greater worry directly predicts stronger intention to quit smoking (e.g., Janssen et al., 2014; Yong et al., 2014). This inconsistency may be due to the fact that those previous studies did not examine benefit perception of quitting, which appears to outperform cancer risk perception and cancer worry in terms of predicting quitting intention. This finding may also result from the measures of risk perception and benefit perception in this study: risk perception was assessed in the context of getting cancer, which may be considered as a future negative consequence of smoking; by contrast, benefit perception was assessed in the context of reducing the harmful effects of smoking by quitting, which may be considered as a short-term positive consequence. Compared to long-term consequences (e.g., getting cancer), short-term benefits may be more salient, relevant, and comprehensible and thus may have a stronger effect on motivating individuals to take actions or make decisions (Gerend & Cullen, 2008), according to the temporal discounting paradigm (Green et al., 1996).

The finding that risk perception is not related to quitting intention underscores the complexities of risk communication efforts. That is, higher risk perception of getting cancer does not necessarily translate into a protective decision-making response, such as intention to quit smoking. Even though people are capable of forming high-risk perception toward potential future consequences of a risky behavior, they simply may not intend to stop that risky behavior to reduce the threat, especially when the threat (e.g., getting cancer) is perceived as distant.

As hypothesized by the proposed model, cancer worry positively predicts cancer risk perception and benefit perception of quitting. Although worry has been recognized as a kind of negative effect (Barlow, 1988), cancer worry can have positive effects in the context of smoking. Specifically, worry about getting cancer can keep the issue salient in smokers' minds, motivating them to engage in cognitive effort such as assessment of cancer risks and quitting benefits. The finding that cancer worry positively predicts cancer risk perception lends support to the affect heuristic model (Finucane et al., 2000), which suggests the predictive role of affect in cognition. That *affect influences cognition* has been supported by empirical studies (e.g., Peipins et al., 2014; Senay et al., 2013), but there is also evidence that suggests that *cognition influences affect* (e.g., Gibbons & Groarke, 2015). Based on the current finding, it appears that, in the context of smoking cessation, negative affect (e.g., cancer worry) does prompt the formation of cancer risk perception. That is, when smokers start to worry about getting cancer, they tend to evaluate their cancer

risks as high. In the affect-heuristic model, only the association between *affect* (i.e., feelings) toward a behavior and perceived risk/benefit of that behavior is specified (Finucane et al., 2000). The finding that cancer worry positively predicts benefit perception of quitting indicates that worry about a threat also facilitates the formation of perceived benefit of a protective approach to reduce the threat. Perhaps when smokers are worried about getting cancer, they are more likely to visualize the potential beneficial effects resulting from smoking cessation.

The finding that benefit perception of quitting mediates the effect of cancer worry on quitting intention suggests that the decision to quit smoking is more likely the result of a rational reasoning process. During the process of deciding between quitting and continuing to smoke, benefit perception of quitting emerges as a proximal factor and cancer worry as a distal factor of quitting intention. This finding is in line with the reasoned action approach (Fishbein & Ajzen, 2010), which posits an indirect impact of *affect* on *behavioral intention* through *rational beliefs*. Perhaps for smokers, quitting smoking is a big decision, implying a complete lifestyle change, and thus is more likely to be driven directly by cognitive effort than by affect.

Theoretical and practical implications

This study has two important implications for theoretical development. First, this study suggests that cognitive models of health behaviors (e.g., HBM) are insufficient to explain a protective health behavior, as those models do not recognize the role played by *affect*. Including *affect* in those models may improve their power in predicting health protective behaviors. Second, the conceptual model outlined in this study suggests that worry does carry an influence on quitting intention, but the influence is indirect, which is not in line with the risk-as-feelings hypothesis (Loewenstein et al., 2001). Thus, perhaps in the context of smoking cessation, a mediating-effect model of *affect* may be more appropriate to explain quitting intentions, rather than the direct-effect model argued by the risk-as-feelings hypothesis.

In practice, this study points to the direction of intervention effort. Specifically, intervention approaches may need to emphasize the benefits of quitting rather than the risks of continuing to smoke. Intervention programs that underline smoking-related cancer risk may have little or limited influence on quitting intention among smokers, because the ubiquity of the "smoking causes cancer" message can result in message fatigue, a sense of boredom with repetitive risk-reduction messages (Thomas et al., 2012). Another possible intervention strategy is trying to stimulate in smokers a reasonable amount of cancer worry, which may facilitate a formation of high benefit perception of quitting.

Limitations

Several limitations of this study should be noted. First, some variables (e.g., cancer worry) in this study were measured with a single item. Single-item measures are common in national surveys, as they are easy to administer and can reduce fatigue in participants; however, they are more likely to incur measurement errors (Chen & Feeley, 2014). Second, we examined smokers' quitting intention as the outcome variable. Although intention is often used as a proxy of actual behavior (e.g., Chen & Yang, 2015; Dunlop & Romer, 2010 there is generally a gap between intention and the actual performance of a behavior. Third, although we identified benefit perception as a potential mediator between worry and quitting intention, some other possible mediators, such as perceived barrier and self-efficacy, were not examined due to the constraints of the 2013 HINTS dataset. Finally, despite a good fit of the final model with the data and its better fit to the data than other alternative models, the causal directions in this study should be interpreted with caution, due to its cross-sectional design.

Conclusion

Notwithstanding the above limitations, we have contributed to the substance use literature by demonstrating a possible psychological mechanism regarding the influence of worry on quitting intention. Also, we revealed the proximal effect of benefit perception of quitting on quitting intention and suggested quitting smoking is more likely a process based on rational evaluations. Another contribution of this study is the recognition of worry's indirect role in motivating attempts to quit, which is in line with the reasoned action approach (Fishbein & Ajzen, 2010). Future researchers may want to use multiple-item measures, examine actual quitting behavior, explore other potential mediators, and use a longitudinal panel design when studying relationships among worry, risk/benefit perceptions, and smoking.

Notes

1. The sample was recruited through a two-step process. First, a stratified sample was selected from a database of residential addresses used by Marketing Systems Group (MSG). Then, one adult was selected within each sample household using the Next Birthday Method (NCI, 2013). The sample tracked closely the U.S. population on age, race, Hispanic ethnicity, geographical region, employment status, and other demographic elements.
2. Another two items measuring cancer risk perception are: (1) "I feel like I could easily get cancer in my lifetime." with five responses as follows: 1 = *I feel very strongly that this will NOT happen*; 2 = *I feel somewhat strongly that this will NOT happen*; 3 = *I feel I am just as likely to get cancer as I am to not get cancer*; 4 = *I feel somewhat strongly that this WILL happen*; 5 = *I feel very strongly that this WILL happen*. (2) "Compared to other people your age, how likely are you to get cancer in your lifetime?" with responses ranging from 1 = *Much less likely* to 5 = *Much more likely*.
3. An examination of the bivariate correlation matrix did not reveal any problems related to multicollinearity, because the maximum correlation coefficient between any two predicting variables was 0.56, which is below the 0.7 collinearity threshold (Dormann et al., 2013). Also, preliminary examinations revealed that all assumptions of structural equation modeling (linearity, multivariate normality, homoscedasticity) were met.
4. Several fit indices were applied to examine the goodness of fit of the hypothesized model. For an SEM model with a continuous or a categorical outcome, values greater than 0.90 for comparative fit index (CFI) and Tucker-Lewis index (TLI) indicate a good fit of the model to the data (McDonald & Ho, 2002); values smaller than 0.05 for root mean square error of approximation (RMSEA) suggest a close fit, while values between 0.05 and 0.08 are considered a reasonable fit (McDonald & Ho, 2002). For an SEM

model with a categorical outcome, Schreiber et al. (2006) suggested that weighted root mean square residual (WRMR) smaller than 0.90 showed a good fit.

5. Although the model tested in this study was proposed based on existing theoretical frameworks and empirical studies, some other models can serve as alternative explanations for the outcome variable (quitting intention). We also tested two such models, including that worry, risk perception, and benefit perception each independently predict quitting intention, and that risk and benefit perceptions lead to worry and then quitting intention. Results of fit statistics indicated that these two alternative models did not provide a better fit to the data than the original proposed model.

References

Barlow, D. H. (1988). *Anxiety and its Disorders: The Nature and Treatment of Anxiety and Panic*. New York, NY, US: Guilford Press.

Cameron, L. D., & Reeve, J. (2006). Risk perceptions, worry, and attitudes about genetic testing for breast cancer susceptibility. *Psychology & Health*, 21(2), 211–230.

CDC. (2014). Morbidity and mortality weekly report (MMWR), current cigarette smoking among adults—United States, 2005–2013. Available from http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6347a4.htm?s_cid=mm6347a4_w

Chen, Y., & Feeley, T. H. (2014). Numeracy, information-seeking and self-efficacy in managing health: An analysis using the 2007 Health Information National Trends Survey (HINTS). *Health Communication*, 29(9), 843–853.

Chen, Y., & Feeley, T. H. (2015). Predicting binge drinking in college students: Rational beliefs, stress, or loneliness? *Journal of Drug Education*, 45(3–4), 133–155.

Chen, Y., & Yang, Z. J. (2015). Message formats, numeracy, risk perceptions of alcohol-attributable cancer, and intentions for binge drinking among college students. *Journal of Drug Education*, 45(1), 37–55.

Dormann, C. F., Elith, J., Bacher, S., Buchmann, C., Carl, G., Carré, G., … Lautenbach, S. (2013). Collinearity: A review of methods to deal with it and a simulation study evaluating their performance. *Ecography*, 36(1), 27–46.

Dunlop, S. M., & Romer, D. (2010). Relation between newspaper coverage of 'light' cigarette litigation and beliefs about 'lights' among American adolescents and young adults: The impact on risk perceptions and quitting intentions. *Tobacco Control: An International Journal*, 19(4), 267–273.

Ferrer, R. A., Bergman, H. E., & Klein, W. M. P. (2013). Worry as a predictor of nutrition behaviors: Results from a nationally representative survey. *Health Education & Behavior*, 40(1), 88–96.

Finucane, M. L., Alhakami, A., Slovic, P., & Johnson, S. M. (2000). The affect heuristic in judgments of risks and benefits. *Journal of Behavioral Decision Making*, 13(1), 1–17.

Fishbein, M., & Ajzen, I. (2010). *Predicting and Changing Behavior: The Reasoned Action Approach*. New York: Psychology Press.

Gerend, M. A., & Cullen, M. (2008). Effects of message framing and temporal context on college student drinking behavior. *Journal of Experimental Social Psychology*, 44(4), 1167–1173.

Gibbons, A., & Groarke, A. (2015). Can risk and illness perceptions predict breast cancer worry in healthy women? *Journal of Health Psychology*, Epub ahead of print 23 Feb 2015.

Green, L., Myerson, J., Lichtman, D., Rosen, S., & Fry, A. (1996). Temporal discounting in choice between delayed rewards: The role of age and income. *Psychology and Aging*, 11(1), 79–84.

Janssen, E., Waters, E. A., van Osch, L., Lechner, L., & de Vries, H. (2014). The importance of affectively-laden beliefs about health risks: The case of tobacco use and sun protection. *Journal of Behavioral Medicine*, 37, 11–21.

Kaufman, A. R., Waters, E. A., Parascandola, M., Augustson, E. M., Bansal-Travers, M., Hyland, A., & Cummings, K. M. (2011). Food and Drug Administration evaluation and cigarette smoking risk perceptions. *American Journal of Health Behavior*, 35(6), 766–776.

Loewenstein, G. F., Weber, E. U., Hsee, C. K., & Welch, N. (2001). Risk as feelings. *Psychological Bulletin*, 127(2), 267–286.

MacKinnon, D. P., Lockwood, C. M., & Williams, J. (2004). Confidence limits for the indirect effect: Distribution of the product and resampling methods. *Multivariate Behavioral Research*, 39(1), 99–128.

McDonald, R. P., & Ho, M.-H. R. (2002). Principles and practice in reporting structural equation analyses. *Psychological Methods*, 7(1), 64–82.

McKee, S. A., O'Malley, S. S., Salovey, P., Krishnan-Sarin, S., & Mazure, C. M. (2005). Perceived risks and benefits of smoking cessation: Gender-specific predictors of motivation and treatment outcome. *Addictive Behaviors*, 30(3), 423–435.

National Cancer Institute. (2013). *Health Information National Trends Survey (HINTS) 2013 Dataset* [Data file, code book, and user's directions]. Retrieved from http://hints.cancer.gov/

Peipins, L. A., McCarty, F., Hawkins, N. A., Rodriguez, J. L., Scholl, L. E., & Leadbetter, S. (2015). Cognitive and affective influences on perceived risk of ovarian cancer. *Psycho-Oncology* 24(3), 279–286.

Preacher, K. J., & Hayes, A. F. (2008). Contemporary approaches to assessing mediation in communication research. In A. F. Hayes, M. D. Slater & L. B. Snyder (Eds.), *The Sage Sourcebook of Advanced Data Analysis Methods for Communication Research* (pp. 13–54). Thousand Oaks, CA: Sage.

Quit Victoria (2016). Smoking causes 16 types of cancer. Retrieved from http://www.quit.org.au/reasons-to-quit/health-risks-of-smoking/16-cancers

Rosenstock, I. M. (1974). Historical origins of the health belief model. *Health Education Monographs*, 2, 328–335.

Schreiber, J. B., Nora, A., Stage, F. K., Barlow, E. A., & King, J. (2006). Reporting structural equation modeling and confirmatory factor analysis results: A review. *Journal of Educational Research*, 99(6), 323–337.

Senay, I., Hensley-Alford, S., & Kaphingst, K. A. (2013). Judging risk for multiple diseases: The role of disease worry. *Journal of Health Psychology*, 18(4), 554–560.

Slovic, P., Finucane, M. L., Peters, E., & MacGregor, D. G. (2004). Risk as analysis and risk as feelings: Some thoughts about affect, reason, risk, and rationality. *Risk Analysis*, 24(2), 311–322.

Song, H., Kim, J., & Kim, S.-Y. (2014). Smoker identity among social smokers: Theory-based approaches for anti-smoking interventions. *Journal of Substance Use*, *19*(5), 346–350.

Thomas, B., Mimiaga, M. J., Mayer, K. H., Closson, E. F., Johnson, C. V., Menon, S., … Safren, S. A. (2012). Ensuring it works: A community-based approach to HIV prevention intervention development for men who have sex with men in Chennai, India. *AIDS Education and Prevention*, 24(6), 483–499.

US Department of Health and Human Services (US DHHS), (2014). The health consequences of smoking—50 years of progress: a report of the Surgeon General. Atlanta, GA.

Yong, H.-H., Borland, R., Thrasher, J. F., Thompson, M. E., Nagelhout, G. E., Fong, G. T., … Cummings, K. M. (2014). Mediational pathways of the impact of cigarette warning labels on quit attempts. *Health Psychology*, 33(11), 1410–1420.