Understanding Public Attitudes Toward Tobacco Harm Reduction: The Role of Attitude Structure[1]

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The present research examines whether and to what extent the underlying structure of attitudes toward harm reduction and specific reduced-exposure products contributes to an understanding of public attitudes toward harm reduction. Past research has focused on the extent to which some attitude objects are primarily affective or cognitive. Using survey data from a 5-state Upper Midwest sample, we tested the relevance of 4 pertinent properties of attitudes for predicting overall attitudes toward tobacco harm reduction: affective and cognitive bases of attitudes; knowledge; experience with smoking and reduced-harm products; and affective/cognitive consistency. We found that feelings about harm reduction are most predictive of overall attitudes toward harm reduction and specific reduced-harm products. Theoretical and policy implications are discussed.

Research on the psychology of attitudes has examined the relationship between attitudes and their structural components, focusing on the cognitive and affective bases of attitudes, among other models (Eagly & Chaiken, 1993). The *cognitive* component of an attitude refers to a person's thoughts and beliefs about an attitude object, whereas the *affective* component reflects a person's feelings about that attitude object. Past research has focused specifically on several issues related to this construct: how these components might be differentially weighted in different attitude objects (Crites, Fabrigar, & Petty, 1994), how these components relate to behavior (Millar & Tesser, 1989), and how these components may interact with types of persuasion appeals to result in attitude change (Edwards, 1990; Millar & Millar, 1990).

Crites et al. (1994) asked whether and to what extent some attitude objects are primarily affective or cognitive, in that most people hold affective or cognitive attitudes toward various objects. Using several different measures of affective- and cognitive-based attitudes—such as semantic-differential

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checklists and thought listings—and several different attitude objects (e.g., snakes, literature, math, capital punishment, birth control, church), they found that people held affective-based attitudes toward some objects (e.g., snakes) and cognitive-based attitudes toward others (e.g., capital punishment). However, other attitude objects were related to both cognitive and affective bases.

Haddock and Zanna (1998) examined in more depth the attitudes toward the issue domain of capital punishment. Attitudes toward capital punishment were predicted by both feelings and thoughts about capital punishment, but the affective component emerged as a stronger predictor. However, individual differences were also found, such that people differed in whether their attitudes toward capital punishment were more strongly correlated with their thoughts or their feelings.

Simons and Carey (1998) extended this work into the realm of drug and alcohol use. Their interest was in whether understanding the relation of the affective and cognitive components to one's overall evaluation of marijuana or alcohol could predict one's level of use of these substances. They found that for alcohol use, the affective component was most related to the overall evaluation for heavy users, and not differentially related to evaluation from the cognitive component for lighter users. Marijuana attitudes were best predicted by the affective component for users and nonusers alike. This work suggests that understanding how the affective and cognitive bases of an attitude relate to the overall evaluation may have strong implications for behavior.

Earlier work in this area has also focused on the relationship between these cognitive or affective components of attitudes and behavior. Millar and Tesser (1989) manipulated cognitive and affective views with different types of behaviors to examine the role of consistency between behavior and attitude base. Consistency between how a task is viewed (as either primarily affective or cognitive) and emotions or thoughts about a task did, indeed, influence behavior. Also, studies of persuasion (Edwards, 1990; Fabrigar & Petty, 1999; Millar & Millar, 1990; Drolet & Aaker, 2002) have shown that considering the cognitive or affective base of an attitude is important in effectively changing that attitude.

In general, the studies described previously have not tested competing properties of attitudes to determine the relative influence of cognition or affect versus other properties (e.g., knowledge, experience). It could be the case that other factors interact with cognitive and affective structural bases in predicting a person's overall attitude. Zanna and Rempel (1988) proposed, for example, that people can draw on many different sources of information when determining their overall evaluation of an attitude object. A person's experience with the subject matter or their overall knowledge about the subject may also play a role in determining their attitudes.

Research on political participation has shown that better informed citizens have more numerous politically related attitudes that are more stable over time and more durable. In addition, these attitudes of the better informed are more internally consistent with one another (Della Carpini & Keeter, 1996). Clearly, knowledge about an attitude object plays a role in the formation of attitudes about that attitude object. In addition, Simons and Carey (1998) showed that experience with using a drug was related to the relationship of affective and cognitive components to the overall evaluation of that drug. Thus, experience or knowledge may interact with the cognitive and affective distinctions in influencing a final attitude.

Last, the consistency of the cognitive and affective components may play a role in understanding overall attitudes toward an attitude object. Chaiken and Yates (1985) found that participants with high consistency between the cognitive and affective components of their attitudes were more likely to show greater polarization of attitudes after writing an essay about the attitude object, indicating a well developed knowledge structure related to that attitude. They also found that high-consistency participants were more likely to discredit discrepant information than to consider it, as compared to low-consistency participants. Therefore, people may vary in how well developed their attitudes are, as shown by the consistency of the affective and cognitive components. This consistency may influence how they process information about that attitude object.

The purpose of the present research is to contrast affective and cognitive components, knowledge, experience, and cognitive–affective consistency in terms of predicting overall attitudes. Moreover, the present research examines the robustness of prior empirical findings in an entirely new issue domain (tobacco harm reduction) and with a random probability sample of the public drawn from the five-state Upper Midwest region.

The idea of *harm reduction* as applied to tobacco use (for a broader review of the psychology of harm reduction, see MacCoun, 1998) refers to lessening the focus on smoking cessation, and instead examining ways to reduce the harm of smoking (see Borgida, Kim, Stark, & Miller, 2008). The concept of harm reduction was applied during the 1980s as an approach to addressing the risks that illicit drugs pose to public health in the United States. This approach has been especially pertinent to the development and implementation of various harm-reduction interventions in the context of drug control (e.g., needle and syringe exchanges, low-threshold methadone maintenance). Similar concerns can be applied to the problem of how to reduce the harm from tobacco use.

Recent years have seen an increase in the development of products meant to reduce the harm of smoking, such as nicotine-replacement products (nicotine gum or patches), alternative cigarettes (e.g., Omni™) that may

reduce exposure to carcinogens, or other types of products (e.g., nicotine lozenges, oral tobacco). The Institute of Medicine (2001) groups these products under the term *potentially reduced-exposure products* (PREPs). PREPs are tobacco products that have been modified or designed in some way to reduce users' exposure to tobacco toxins.

An Institute of Medicine report (Stratton, Shetty, Wallace, & Bondurant, 2001) focused on the possible role of harm-reduction products in public health, but the National Cancer Institute (2001) responded with a report emphasizing the primary role of cessation, rather than harm reduction, in improving the health of tobacco users. More and more reduced-exposure products are being advertised and marketed by both pharmaceutical companies and tobacco companies. Some companies also use claims of reduced risk of cancer or other health conditions as a marketing tactic (Hatsukami & Hecht, 2005). Public health experts express concern over the growing types of PREPs, and the marketing claims that accompany advertising and information about these products, as it may be the case that smokers who do not want to (or cannot) quit smoking may turn to using PREPs instead of quitting in the future, and nonsmokers may initiate use of PREPs because they believe they are a safer alternative to traditional cigarettes (e.g., Hatsukami & Zeller, 2004; Warner, 2002). In response to some of these concerns, the U.S. Congress is also considering legislation that would give the Food and Drug Administration control over regulating these products and claims made in advertising for these products (Martin, 2007).

However, it is unclear how the public actually perceives reduced-exposure products. If these products are perceived as completely safe, then they may become a gateway through which more people become addicted to nicotine, which is contrary to the goal of smoking cessation. A balance must be struck between communicating to smokers that these products are a feasible alternative to their regular smoking habits on the one hand, and not communicating to nonsmokers that these products have been found to be safe, or that smoking a small amount does not pose a health threat on the other hand. This dilemma is why Gertner (2005) suggested that

> A popular reduced-exposure cigarette is the kind of earthquake that many in the public health field have anticipated, like a team of worried geologists, for several years. According to a number of scientists and tobacco policy makers, PREPs are the single most ethically agonizing and professionally confusing issue they have ever encountered. (p. 46)

With no scientific knowledge of the public's attitudes toward tobacco harm reduction in this issue domain, or the psychological processes associ-

ated with such attitudes, it is difficult to predict how people will respond to reduced-exposure products, and to the advertising and health communications regarding these products. What is clear is that an understanding of the public's attitudes toward these products is needed, and that theory and research on the psychology of attitudes provides a strong scientific foundation for generating important insights into the fundamental nature of these attitudes. The present study, therefore, is aimed at addressing this gap in the research literature.

What predicts attitudes toward tobacco harm reduction and reduced-exposure products? Are such attitudes predominantly cognition-based or affect-based and, if so, what are the implications of the extent to which one component or the other is more predictive of the public's overall evaluation of reduced-exposure products? Other studies in other domains seem to suggest that the issue domain matters as to which component is more influential, but previous work on the cognitive–affective distinction has not included other predictors of attitudes. For the issue domain of tobacco harm reduction, knowledge about tobacco products also may play a role in determining these attitudes. In addition, experience with smoking or tobacco products may influence the overall evaluation of harm reduction, or moderate the relationship of the affective or cognitive components of that attitude.

To address these questions, we examine participants' experience with and objective knowledge about tobacco harm reduction, as well the cognitive and affective components of their attitudes toward harm reduction. This approach allows us to understand better the nature of their attitudes in this area, and to advance our understanding of possible moderators of the relationship between cognitive and affective components and overall attitudes.

In the current research, we develop an assessment of cognitive and affective components of attitudes toward harm reduction, and then we use these, as well as measures of knowledge, experience with smoking, and attitudinal consistency to predict attitudes toward tobacco harm reduction and toward specific reduced-exposure products. The concept of tobacco harm reduction may be a new one to many people. However, people may be more familiar with certain specific reduced-harm products (e.g., nicotine gum) than others. Therefore, we include general measures of attitudes toward the concept of tobacco harm reduction—as well as measures of attitudes toward specific reduced-exposure products—to examine if attitudes and attitude predictors are consistent.

Also, we include a measure of attitudes toward smoking to determine if attitudes toward tobacco harm reduction are merely an extension of a person's attitude toward smoking, or if they differ from attitudes toward smoking. Based on past research, we hypothesize that the structural model based on the affective and cognitive components of attitudes toward tobacco

harm reduction will emerge as the strongest predictor of these attitudes. In this particular domain, we expect that overall attitudes toward tobacco harm reduction will be driven primarily by the affective component of these attitudes. We also expect, based on past research, that experience will moderate the predictive power of the affective component. We believe that the affective component will predict overall attitudes toward harm reduction most strongly for users of tobacco, as compared to nonusers.

Method

Participants

We worked with the Minnesota Center for Survey Research to administer a survey to be sent to 1,300 households in the five-state Upper Midwest region (Minnesota, Iowa, North Dakota, South Dakota, and Wisconsin; 260 surveys were sent to each state). Guided by the Dillman (1978) method, all survey recipients received four reminder postcards over the course of 3 months, resulting in an overall return rate of 36% (37% of Minnesota recipients, 33% of Iowa recipients, 36% of North Dakota recipients, 36% of South Dakota recipients, and 36% of Wisconsin recipients returned completed surveys). These response rates are in line with non-incentive mail and telephone survey response rates (see Curtin, Presser, & Singer, 2002; Keeter, Miller, Kohut, Groves, & Presser, 2000). A final tally of 438 adult participants from these randomly selected households returned the survey.

Participants were instructed to have a smoker in the household over the age of 18 complete the survey. If there was not a smoker in the household, then a nonsmoker over the age of 18 was asked to complete the survey. Table 1 presents a description of the sample.[2]

Survey Instrument

Harm reduction. All participants were provided with the following definition of *harm reduction*, as provided by the Institute of Medicine (Stratton et al., 2001), to ensure that they understood the term. Participants were asked to read the following definition carefully before completing the survey.

[2]Comparison of the characteristics of our five-state survey sample to data from the 2000 U.S. Census from the same five-state Upper Midwest region reveals that the proportion of our survey respondents in terms of gender and ethnicity is consistent with the Census data.

Table 1

Demographic Profile of Sample

	M	*SD*	*N*	%
Age (in years)	54.2	16.7		
Gender				
Male			258	58.9
Female			162	37.0
Ethnicity				
Caucasian			419	95.7
Other			14	3.2
Education				
No degree			31	7.1
High school diploma			151	34.5
Associate's degree			61	13.9
Bachelor's degree			103	23.5
Graduate or professional degree			68	15.5

Harm reduction is a policy, strategy, or a specific method that places priority on reducing the overall health, social, and economic consequences of tobacco use, rather than focusing on eliminating tobacco use entirely. Harm reduction allows for continued use of tobacco products, but at a level that minimizes the total harm caused. One potential method to reduce harm is by reducing exposure to toxic ingredients in tobacco; that is, through the use of *reduced-exposure products*. Examples of reduced-exposure products are cigarettes that are changed to reduce some toxins or that are heated rather than burned to reduce toxins from burning (Omni™ and Eclipse™), and oral tobacco products, such as moist snuff or chewing tobacco (Copenhagen™, Skoal™, Red Man™, Hawkens™)or Ariva™ (a tobacco lozenge), that eliminate toxins from burning tobacco.

Creating affective and cognitive scales. In order to create cognitive and affective items, we first conducted several focus groups and open-ended

surveys with 114 adult smokers and nonsmokers participating in studies at the Transdisciplinary Tobacco Use Research Center at the University of Minnesota. We chose the most frequently mentioned statements of both thoughts and feelings about tobacco harm reduction, and presented those statements to 14 undergraduate and graduate student raters. Statements were rated on a 3-point scale as to whether each statement was *primarily cognitive*, *primarily affective*, or *both/neither*. Only statements that more than 90% of the raters agreed were primarily cognitive or primarily affective were retained. These statements were then given to a new sample of 74 undergraduates, who were asked to indicate on a 7-point Likert-type scale the extent of their agreement with each item.

To assess whether these items could be collapsed into reliable scales, a cognitive scale score and an affective scale score was created for each participant by taking the mean of their responses to the items. Scale reliability tests show that the affective scale had an alpha of .73, and the cognitive scale had an alpha of .66.

In order to refine the cognitive and affective scales for use in the current study, we then examined the inter-item correlations for each scale. For the affective scale, we removed one item with a low inter-item correlation, which raised the overall alpha to .76. For the cognitive scale, we removed two items with low inter-item correlations, which raised the overall alpha to .71. The remaining items (14 addressing cognitions about harm reduction and 14 addressing feelings about harm reduction) were used in the current study. These items are presented in the Appendix.

Knowledge scale. Measures of participants' objective knowledge about tobacco products and reduced-exposure products were included. Participants used a 7-point scale ranging from 1 (*strongly agree*) to 7 (*strongly disagree*) to rate how much they agreed with 11 statements such as "Nicotine is the most harmful ingredient in tobacco products" and "Low nicotine means less addictive cigarettes." Most of the knowledge statements were adopted from previous work by Cummings, Bansal, Hyland Giovino, Hastrup & Yost (2002).[3]

Attitude measurements. Semantic-differential measures were used to assess participants' overall attitudes toward harm reduction, smoking, and the individual reduced-harm products, including nicotine-replacement products, reduced-exposure cigarettes, and oral tobacco. All ratings were made on 7-point scales, with explicitly labeled adjectives as endpoints of each scale. Each attitude was rated using four 7-point scales with the following anchors: *risky/safe*, *not enjoyable/enjoyable*, *dislike/like*, and *bad/good*.

[3]The items of the knowledge scale, as well as the rationale for scoring, are available from the first author upon request.

Tobacco-use experience. Measures of participants' subjective experience with smoking, quitting, and using reduced-exposure products were included. Participants were asked if they had heard of, tried, intended to try, or had friends who used nicotine-replacement products, reduced-exposure cigarettes, and oral tobacco. Participants were also asked if they had ever smoked; if they had smoked in the last 30 days; how regularly they smoked; and their intentions and experience with quitting, including number of times they had attempted to quit smoking.

Results

Scale Dimensions

Cognitive and affective scales. First, in order to verify that the cognitive and affective items tapped two distinct factors, a confirmatory factor analysis (CFA) was performed by loading the cognitive and affective items onto a Cognition or Affect factor, respectively. We examined the significance of the regression weights for the relation between each scale item and its factor, and identified three items (two cognitive and one affective) that did not load significantly onto their respective factor. The CFA was performed after removing these three items, and showed good fit statistics (comparative fit index = .938, relative fit index = .913), confirming that our cognitive and affective items did, indeed, tap distinct underlying factors.

We created a cognitive scale and an affective scale by taking the mean of the remaining cognitive and affective items (for a total of 12 cognitive items and 13 affective items). Some items were recoded that so higher scores equal more positive thoughts or feelings. These scales had high reliability (cognitive scale, $\alpha = .74$; affective scale, $\alpha = .81$). The Appendix presents the full wording of each item included in the cognitive and affective scales. The overall mean for the cognitive score was 4.00 ($SD = 0.85$), and the overall mean for the affective scale was 4.10 ($SD = 0.98$).

Knowledge scale. An overall knowledge score was created by calculating the mean of responses to the 11 knowledge statements. Some items were recoded so that a higher score indicates more knowledge. The mean for this scale was 4.32 ($SD = 0.74$). A score of 7 indicates perfect knowledge. In general, this sample showed relatively little knowledge about tobacco and reduced-exposure products.

Cognitive/affective consistency. A consistency score was created by subtracting a participant's cognitive score from the affective score, and squaring the absolute value of this result. As scores increase from zero, there is greater inconsistency between affective and cognitive components of one's attitude

toward harm reduction. The overall mean for the cognitive/affective consistency scale was .39, with a range from 0 to 5.20 ($SD = 0.61$).

Attitude measurements. Overall attitudes were created by taking the mean of responses to the four rating scales for each attitude item. Lower values indicate more negative attitudes; therefore, a value of 7 is the most positive, and a value of 1 is the most negative. The mean attitude toward smoking was 2.04 ($SD = 1.44$); toward harm reduction was 3.02 ($SD = 1.62$); toward nicotine-replacement products was 3.05 ($SD = 1.64$); toward reduced-exposure cigarettes was 2.64 ($SD = 1.48$); and toward oral tobacco was 1.80 ($SD = 1.28$). In general, all attitudes were toward the negative end of the scale. A matrix of zero-order correlations between predictors and attitude items is presented in Table 2.

Tobacco-use experience. Overall, 87.7% of participants reported that they had heard of nicotine gum, and 13.2% reported that they had tried nicotine gum. In addition, 26.7% of participants reported that they had heard of reduced-exposure cigarettes, while only 1.1% reported that they had tried reduced-exposure cigarettes. Finally, 84.9% of participants reported that they had heard of oral tobacco, while 28.3% had tried oral tobacco.

Of the participants, 69.4% ($N = 304$) reported that they had smoked once in their lifetime, and 21.9% ($N = 96$) reported that they had smoked in the last 30 days. Participants who indicated that they had smoked within the last 30 days were coded as *smokers*, and participants who had not smoked within the last 30 days were coded as *nonsmokers*.

Testing the Competing Models

Ordinary least squares linear regressions were conducted on each overall attitude item, using participants' affective scores, cognitive scores, knowledge scores, consistency scores, and whether they had smoked in the last 30 days as predictors in Step 1; and interactions between cognitive score and smoking status, and affective score and smoking status in Step 2. If one of these interactions proved to be marginal or significant, the relationship was examined further by analyzing the prediction patterns of the attitude properties for smokers and nonsmokers separately.[4] Unstandardized betas are reported in the following text.

[4]Ex-smokers could be examined as a third group with smoking experience, along with smokers and nonsmokers. There were 58 participants in the survey who reported that they had been successful in quitting smoking and, therefore, could be considered ex-smokers. However, the mean attitude of ex-smokers toward harm reduction was not significantly different from the attitude of nonsmokers ($p > .50$), and the pattern of prediction of attitudes toward harm reduction was the same for ex-smokers and nonsmokers. Consequently, we report the results solely for smokers and nonsmokers.

Table 2

Zero-Order Correlation Matrix of Attitudes and Predictors

	1	2	3	4	5	6	7	8	9
1. Affective score	—								
2. Cognitive score	.79*	—							
3. Knowledge score	−.12	−.10	—						
4. Consistency score	.04	−.25*	−.03	—					
5. Experience	−.17*	−.17*	−.03	−.07	—				
6. Attitude toward smoking	.14*	.12*	−.13*	.15*	−.52*	—			
7. Attitude toward harm reduction	.41*	.37*	.03	−.06	−.27*	.32*	—		
8. Attitude toward nicotine-replacement products	.21*	.23*	.01	.03	−.28*	.32*	.69*	—	
9. Attitude toward reduced-exposure cigarettes	.42*	.39*	−.05	.03	−.33*	.44*	.81*	.72*	—
10. Attitude toward oral tobacco	.14*	.18*	−.08	.01	−.22*	.52*	.43*	.35*	.47

*$p < .05$.

Smoking attitudes. Attitudes toward smoking were predicted best by experience with smoking, $b = -1.42$, $t(233) = -7.80$, $p < .0001$; knowledge, $b = -0.03$, $t(233) = -2.54$, $p < .012$; and cognitive–affective consistency, $b = 0.41$, $t(233) = 2.78$, $p < .006$. Thus, smokers, people with less knowledge, and people with greater inconsistency between the cognitive and affective components of their attitudes toward harm reduction showed a more positive attitude toward smoking. Neither the cognitive scale nor the affective scale significantly predicted attitudes toward smoking ($ps > .69$), and neither of the interactions of cognitive and affective scales with smoking status reached significance ($ps > .39$).

Overall tobacco harm-reduction attitudes. Attitudes toward harm reduction were predicted best by affective score, $b = 0.50$, $t(230) = 3.10$, $p < .002$; and experience with smoking, $b = -0.56$, $t(230) = -2.73$, $p < .007$. Thus, smokers and participants with more positive feelings about harm reduction had more positive attitudes toward harm reduction. Also, the interaction between affective score and experience with smoking was of marginal significance, $b = -0.54$, $t(230) = -1.68$, $p < .093$; so regressions were also conducted separately for smokers and nonsmokers.

For smokers, attitudes toward tobacco harm reduction were predicted by their affective scores, $b = 1.04$, $t(67) = 3.98$, $p < .0001$; and cognitive–affective consistency, $b = -0.48$, $t(67) = -2.00$, $p < .05$. Thus, people with more positive feelings toward harm reduction and more consistent attitudes had more positive overall attitudes toward harm reduction. For nonsmokers, attitudes toward tobacco harm reduction were not significantly predicted by any of the predictors.

Reduced-exposure product attitudes. Attitudes toward nicotine-replacement products were predicted best by experience with smoking, $b = -0.80$, $t(230) = -3.71$, $p < .0001$; and cognitive score, $b = 0.46$, $t(230) = 2.12$, $p < .04$. Thus, smokers and participants with positive thoughts and beliefs about harm reduction had more positive attitudes toward nicotine-replacement products. Also, the interaction between affective score and experience with smoking was significant, $b = -0.67$, $t(230) = -1.95$, $p = .05$, so regressions were also conducted separately for smokers and nonsmokers.

For smokers, attitudes toward nicotine-replacement products were marginally predicted by their affective score, $b = 0.54$, $t(68) = 1.87$, $p < .07$. Thus, people with more positive feelings about harm reduction had more positive attitudes toward nicotine-replacement products. For nonsmokers, attitudes toward nicotine-replacement products were significantly predicted by their cognitive scores, $b = 0.66$, $t(161) = 2.40$, $p < .018$. Thus, people with more positive thoughts and beliefs about harm reduction had more positive attitudes toward nicotine-replacement products.

Attitudes toward reduced-exposure cigarettes were predicted best by affective score, $b = 0.40$, $t(230) = 2.86$, $p < .005$; and experience with smoking, $b = -0.74$, $t(230) = -4.22$, $p < .0001$. Thus, smokers and participants with positive feelings about harm reduction had more positive attitudes about reduced-exposure cigarettes. Also, the interaction between affective score and experience with smoking was significant, $b = -0.55$, $t(230) = -1.96$, $p < .05$. Therefore, regressions were also conducted separately for smokers and nonsmokers.

For smokers, attitudes toward reduced-exposure cigarettes were predicted by their affective scores, $b = 0.86$, $t(68) = 4.01$, $p < .0001$. Thus, people with more positive feelings about harm reduction had more positive attitudes toward reduced-exposure cigarettes. For nonsmokers, attitudes toward reduced-exposure cigarettes were predicted by their cognitive scores, $b = 0.49$, $t(161) = 2.11$, $p < .04$. Thus, people with more positive thoughts and beliefs about harm reduction had more positive attitudes toward reduced-exposure products.

Attitudes toward oral tobacco products were best predicted by cognitive score, $b = 0.46$, $t(231) = 2.52$, $p < .01$; and experience with smoking, $b = -0.49$, $t(231) = -2.68$, $p < .01$. Thus, participants with more positive thoughts and beliefs about harm reduction and smokers had more positive attitudes toward oral tobacco products. Neither of the interactions between cognitive and affective score and experience with smoking was significant ($ps > .32$).

Discussion

The present research addresses a research question squarely in the tradition of the psychology of attitudes: What role does attitude structure play in understanding attitudes toward tobacco harm reduction? Based on previous research, we expected and found that people's feelings about harm reduction, in conjunction with their level of experience as smokers, best predicts their overall attitudes toward harm reduction, as well as specific reduced-exposure products.

For the overall attitude object of tobacco harm reduction, we obtained an interaction between affective component scale scores and experience, such that smokers and nonsmokers could be characterized as having different bases to their attitudes about harm reduction. For smokers, their attitudes toward harm reduction were predicted best by their feelings about harm reduction, as well as the consistency of their attitudes about harm reduction. For nonsmokers, by contrast, their attitudes toward harm reduction were not predicted by any of the properties of attitudes, perhaps because tobacco

harm reduction is a new concept for many people. Therefore, nonsmokers may be ambivalent or unsure about this concept.

For the specific reduced-exposure products of nicotine replacement and reduced-exposure cigarettes, we found that for smokers, the affective component of their attitudes best predicted their overall attitudes; while for nonsmokers, the cognitive component of their attitudes best predicted their overall attitudes. For the specific product of oral tobacco, we did not find this distinction between smokers and nonsmokers, suggesting that although oral tobacco is considered a reduced-exposure product, the general public views this product differently from nicotine-replacement products or reduced-exposure cigarettes.

This research extends previous research in three ways. First, the present research tested the applicability of affective–cognitive attitude structure to understanding overall attitudes, and also tested this in relation to three other pertinent properties of attitude structure: knowledge, experience, and affective–cognitive consistency. Measures of the cognitive and affective bases of attitudes toward harm reduction were developed through extensive pilot testing to ensure that these reflect a broad sample of general thoughts and feelings about harm reduction. Although the ensuing cognitive and affective scales were correlated, the results of a CFA—as well as the differential predictive power of these scales—support our contention that these scales tap two distinct factors.

Second, the attitudes in question were assessed in a non-student sample. In fact, the attitudes in question were from a random cross-sectional sample of adult respondents from the five-state Upper Midwest region. The findings support the predictive and explanatory value of affective–cognitive attitude structure and the notion that attitudes generally can be better understood by examining their informational bases (e.g., Aikman, Crites, & Fabrigar, 2006).

Last, and most important, the issue domain of tobacco harm reduction and reduced-exposure products is an entirely new policy context in which to examine the role of attitude structure. This research is the first psychological analysis of the public's attitudes toward this concept and related products, and contributes to the literature on the psychology of harm reduction. Some past work has examined the attitudes of smokers toward nicotine-replacement products (e.g., nicotine patches, nicotine gum), but this has focused more on the misperception of nicotine as harmful and the efficacy of feedback on improving knowledge about nicotine replacement (Mooney, Leventhal, & Hatsukami, 2006).

Previous research has focused mainly on smokers' attitudes, rather than including both smokers and nonsmokers. We extend previous work from a related issue domain (i.e., alcohol and marijuana use; Simons & Carey, 1998) by showing that knowledge (which may be gathered through experience with

using tobacco) does not influence attitudes toward tobacco harm reduction. However, it is important to note that our cognitive and affective scales did not differentially predict attitudes toward smoking itself: We see the predicted effects only for the issue of tobacco harm reduction and reduced-exposure products. This suggests that attitudes toward tobacco harm reduction are more complex than just being an extension of attitudes toward smoking, and that attitude structure may play an even more important role when considering attitudes formed in a novel and relatively unfamiliar domain.

Our findings are also consistent with Huskinson and Haddock's (2004) findings that individuals differ in the degree to which their attitudes are generally affect- or cognition-based. Smokers, in this instance, are more likely to base their attitudes toward harm reduction on their experiences with and feelings about smoking. By contrast, nonsmokers simply do not have this experiential and affective component to their attitudes, so their attitudes toward harm reduction may be more inconsistent or even ambivalent, and may be more focused on their beliefs and thoughts about specific products. Experience did not interact with knowledge to influence harm-reduction attitudes, but instead seems to have influenced participants' cognitions directly, as well as affect about harm reduction, to lead to overall attitudes.

There are some limitations of the present study that should be addressed in future research. First, although our sample was representative of the population of the five-state area in which we conducted our survey, this also means that the survey respondents were predominantly White. Future research may want to target different minority groups specifically in order to understand better the nature of attitudes toward tobacco harm reduction in a more racially and ethnically diverse sample.

Also, this survey only specifically examined attitudes toward three large groups of products: nicotine-replacement products, reduced-exposure cigarettes, and oral tobacco. Because new products are constantly being developed, and each product carries its own unique marketing claims, future research should target specific products from those groups in order to better assess the public's perception of and attitudes toward individual products. This may be especially important for the product group of oral tobacco, which in this survey was defined as including chewing tobacco and snuff, as well as tobacco lozenges. Overwhelming negative response to the product category of oral tobacco in this survey suggests that most participants were thinking of chewing tobacco as an exemplar of oral tobacco products. However, future research should specifically separate chewing tobacco from other oral products (e.g., nicotine lozenges), as there may be differences in the public's attitudes toward these products.

Clearly, attitude structure matters when thinking about the nature of public attitudes toward tobacco harm reduction and reduced-exposure products that claim reduced risk to users in their marketing messages. The fact that attitude structure interacts with levels of experience as a smoker has potentially important consequences for understanding the ways in which consumers respond to public health warnings about potential health threats, as well as tobacco and pharmaceutical company advertisements about a variety of reduced-exposure products currently in the marketplace. Establishing individual differences in attitude structure may be a necessary precondition for better understanding when affective and cognitive information may influence attitudes (Huskinson & Haddock, 2004).

For our sample of smokers from the Upper Midwest, their feelings about harm reduction were the primary predictor of overall attitudes toward harm reduction. Feelings associated with smoking (e.g., fueled by taste sensations, reduction of other cravings, relaxation) may, in turn, create strongly positive attitudes toward reduced-exposure products that are difficult to counter with traditional health messaging strategies (see Slovic, 2001). Resistance to persuasion may interfere with efforts to promote smoking cessation or to process in systematic ways messages that convey information about health risks; particularly unsubstantiated claims about reduced risk. Greater resistance to health messages with either a prevention or promotion focus may be one of the consequences of such resistance to persuasion among smokers whose attitudes are based primarily on affect.

Past research on cognitive- and affective-based persuasion techniques (Edwards, 1990; Fabrigar & Petty, 1999) has generally supported a matching approach, whereby affective persuasive appeals are more effective in changing attitudes based in affect; and cognitive persuasive appeals are more effective in changing attitudes based in cognition. An interesting and policy-relevant focus of future research would be to present both smokers and nonsmokers with cognitive- and affective-based information about tobacco harm reduction and reduced-exposure products to determine if this matching effect also holds in this domain.

Future research on attitudes toward tobacco harm reduction and reduced-exposure products should also be directed toward developing regulatory policies based on a scientific understanding of the public's attitudes. Calls for a change in the regulatory environment that would create strict testing standards and place limits on marketing claims seem justified, on consumer health grounds. Reduced-exposure claims may well be misleading consumers and either undermining smoking-cessation efforts or increasing the odds that PREPs will be used by individuals who otherwise are not inclined to smoke. The latter claims are central to understanding the scope of the health threat to consumers and, as MacCoun (1998) suggested,

these claims about outcomes are quite amenable to rigorous scientific assessment.

Hodge and Eber (2004), in their review and analysis of federal interventions to achieve tobacco control, suggested that federal regulation and oversight of the tobacco industry's marketing claims about the alleged safety of reduced-exposure products is crucial to ensure the accuracy of information conveyed to consumers. More generally, Hodge and Eber (cf. Warner & Martin, 2003; MacCoun, 1998) argued that the development of any comprehensive tobacco-control policy must, at its core, be science-based and not based on conjecture or vested interests.

At the very least, educating the public about new reduced-exposure products now on the market or soon to be on the market should take attitude structure and individual differences in attitude structure into account when structuring health messages and communications. Efforts to persuade smokers to use reduced-exposure products to reduce their health risks and also to stay on the path toward smoking cessation may well be enhanced by taking into consideration the role of attitude structure when developing public health interventions. It is in this sense, then, that the psychology of attitudes has the potential to provide some insight into the intra-attitudinal dynamics associated with the public's understanding of a significant public health dilemma.

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Appendix

Affective and Cognitive Scale Items

Affective items

1. I feel good about the medical community for producing harm-reduction products. [R]
2. It makes me feel encouraged that others are trying to quit smoking by using reduced-exposure products. [R]
3. Harm reduction gives me hope for smokers who want to quit. [R]

4. I am angry at tobacco companies who create reduced-exposure products for possibly falsely advertising the safety of these products.*
5. I am happy that secondhand smoking will be reduced through people using reduced-exposure products. [R]
6. It makes me mad to think people use reduced-exposure products instead of quitting entirely.
7. I feel pessimistic that these reduced-exposure products won't really change anything.
8. I feel angry that the tobacco companies are making more money by producing reduced-exposure products.
9. When reduced-exposure products are promoted, it makes me happy to know that others care about my health. [R]
10. I am happy that reduced-exposure products are being developed. [R]
11. It makes me angry that more people do not use reduced-exposure products. [R]
12. I am proud of those I know who are using reduced-exposure products. [R]
13. Commercials about reduced-exposure products make me mad.
14. I feel apprehensive about using reduced-exposure products.

Cognitive items

1. The tobacco industry is creating reduced-exposure products just as an excuse to make money.
2. I think that use of reduced-exposure products increases the probability of someone quitting smoking. [R]
3. Reduced-exposure products are less harmful to others. [R]
4. Reduced-exposure products are a good compromise for people trying to stop smoking. [R]
5. Reduced-exposure products bring money to the tobacco industry.*
6. Harm reduction balances addictions and desires to quit. [R]
7. People should be made more aware of harm reduction and reduced-exposure products. [R]
8. Reduced exposure does reduce the harmful effects of smoking. [R]
9. I think that reduced-exposure products are just as addictive as smoking.
10. Reduced-exposure products cut down on the harmful effects of secondhand smoke. [R]

11. Only people who want to quit smoking should use reduced-exposure products.*
12. Reduced-exposure products provide a safer way to get nicotine. [R]
13. Harm-reduction products are too costly to use.
14. Reduced-exposure products are not effective.

Note. All items were rated on a 7-point scale ranging from 1 (*strongly agree*) to 7 (*strongly disagree*). [R] = item was reverse-scored.
*Item was removed following the confirmatory factor analysis of the data of the main study.