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CONSUMER WELL-BEING

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Consumers and the Allure of "Safer" Tobacco Products

Scientific and Policy Issues

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According to the U.S. Surgeon General (2004), cigarette smoking is the leading preventable cause of death and disease in the United States, causing more than 440,000 premature deaths a year. Given these health risks, the development and marketing of products designed to reduce the harmful effects of tobacco use should come as no surprise (Kozlowski, 1984). 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. As a marketing tactic, some manufacturers claim that reduced exposure to tobacco toxins may lead to reduced risk of cancer or other health conditions" (Hatsukami & Hecht, 2005, p. 5).

In this chapter, we examine the scientific and policy issues associated with reduced harm products. We begin with a primer on PREPs and the set of issues and health claims associated with them, including some epidemiological and clinical research on tobacco toxin exposure suggesting that product labels claiming reduced risk in fact may pose a health threat to consumers. We then examine divergences and convergences of opinion and perception of PREPs held by public health experts and tobacco control advocates, on the one hand, and the public at large, on the other hand. Next, our focus shifts to a discussion of theory and research from the psychology of attitudes in social psychology for a more nuanced and psychological understanding of the bases of *public* attitudes toward harm reduction and PREPs. One of our central claims in this chapter is that the psychology of attitudes can indeed make such a contribution. Finally, in the last section of the chapter, we discuss one approach to the "psychology of harm reduction" (MacCoun, 1998) as it has been applied to the development of policies aimed at the effective control of illicit drug use in the United States. We discuss the extent to which the psychology of harm reduction analogously pertains to the on-going regulatory debate about the marketing of PREPs. Harm reduction, in this

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context, represents one of a few strategies that policy makers should consider integrating in the development of effective science-based regulatory policies on PREPs.

A PRIMER ON PREPS

PREPs generally fall into one of two categories: variants of traditional tobacco cigarettes or pharmaceutical agents that are meant to aid in smoking cessation. Inherent in the IOM definition of PREPs are two significant issues. First, there is a wide variety of different kinds of PREPs. Although the use of PREPs serve to meet a primary objective (to reduce exposure to harm), they are a very broad category with new products being introduced into the marketplace (Shiffman, Gitchell, Warner, Slade, Henningfield, & Pinney, 2002). The second issue is related to the breadth of the product category: what is known about their benefits and risks is as broad as the product category itself. Some PREPs have a longer history, and more is known about them. However, some products have been introduced relatively recently; these products may reduce exposure to known toxins but may introduce or increase others. Importantly, "there is no evidence to suggest that there is enough of a reduction in tobacco toxin exposure with any of the existing PREPs to expect a significant reduction in disease risk, nor do we know the extent of toxin exposure reduction that is necessary to result in reduction of disease" (Hatsukami & Hecht, 2005, p. 5).

The first broad category of PREPs comprises cigarette-like or other tobacco products that, while still containing tobacco, are meant to reduce exposure to other potential toxins. It is this category of PREPs that we focus on in this chapter. These products include traditional smokeless tobacco (i.e., chew), new cigarettes that heat rather than burn tobacco, and even "light" cigarettes that use special filters to allegedly expose the user to less tar. The toxicology of smokeless tobacco and "light" cigarettes is relatively well known because they have been on the market longer (Shiffman et al., 2002). Using traditional smokeless tobacco reduces the risk for some diseases associated with traditional cigarettes and presumably reduces harm to non-smokers because there is no second-hand smoke. However, smokeless tobacco is definitively linked to other kinds of diseases, most notably oral cancer (Shiffman et al., 2002), although in Sweden, the link between oral cancer and oral snuff or snus has been weak, perhaps due to the lower levels of tobacco-specific nitrosamines found in the products manufactured in Sweden. Similarly, the research on "light" cigarettes has led many to conclude that they offer no health benefits to the smoker (Shiffman et al., 2002; U.S. Department of Health and Human Services, 2004). In contrast, toxicology results on new cigarettes that heat rather than burn tobacco are mixed. Because the tobacco is not burned, users are not exposed to some of the carcinogens that result from tobacco combustion. However, there is some evidence that users are exposed to the same (or even increased) levels of *other* toxins. Furthermore, the changed form of delivery introduces the possibility of new risks, like the inhalation of glass fibers that have been associated with some of these products (Shiffman et al., 2002).

The second category of PREPs includes pharmaceutical agents like nicotine replacement products (e.g., nicotine gum, lozenges, and nicotine patch) that are meant to aid in smoking cessation. With respect to these PREPs, scientific evidence for long-term use is limited, although the public health community perceives these products as significantly less toxic than cigarettes and oral smokeless tobacco products. Available evidence suggests these products are safe to use over a short period of time, that they stave off cravings for traditional cigarettes, and that they pose no health risks to nonusers (with the possible exception of use during pregnancy). However, because these products are generally used short-term, more research needs to be conducted to better understand their toxicology, especially regarding long-term use (Shiffman et al., 2002).

The focus of the present chapter, however, is on another type of health risk associated with PREPs that is less obvious than their direct health effects. Consumer perception of the safety of

these products and the potential for these perceptions to influence consumer behavior represents a potentially significant public health threat. PREPs have largely been developed in response to an increased understanding of the danger of regular cigarette smoking and they are often marketed with claims that indirectly imply safety (Hatsukami & Zeller, 2004). Thus, some consumers are likely to turn to these products believing that they reduce their exposure to toxic ingredients (see MacCoun (2004) for an interesting analysis of how emerging "vaccines" against tobacco addiction might be perceived as a cure for addiction and potentially increase tobacco initiation rates). Unfortunately, these product marketing claims are rarely scientifically verified or regulated by an independent organization. Although the FDA regulates those nicotine replacement products that make health claims (*FDA v. Brown & Williamson Tobacco Corp*, 2000), tobacco-based PREPs are not regulated (Hatsukami & Zeller, 2004).

Furthermore, PREPs may be safer in some ways but they may also be more dangerous in ways that are unknown to consumers. As just discussed, the toxicology of tobacco-based PREPs in particular is mixed. As reviewed by Hatsukami and Zeller (2004), there are five major conclusions about the effects of using PREPs that can be drawn from the research to date. First, the use of machine-derived measurements to determine the levels of toxins from smoking light cigarettes is not accurate and therefore not sufficient. Smokers do not smoke like machines and therefore the machine-determined yields are inadequate in reflecting actual smoking behavior. Second, there is wide variation in the level of exposure to toxins across smokers when examining a PREP, which means that using mean levels of reduction is not useful. Third, although exposure to some toxins is reduced, exposure to other toxins may, in fact, increase. As an example, Hatsukami and Zeller cite the finding that use of Eclipse brand cigarettes (R.J. Reynolds' brand of cigarette that involves heating rather than burning the tobacco) resulted in lower levels of some toxins, but increased exposure to carbon monoxide. Fourth, to date, there is no evidence showing that reduced exposure to toxins actually reduces harm to the user in any meaningful way. In other words, even if data suggest that using a particular PREP results in lower levels of all toxins, there is no proof that the user benefits from a lower risk for disease or mortality.

Lastly, Hatsukami and Zeller argue that if a reduction of toxins is achievable, then we should consider making this reduction the standard across all similar products, meaning there would be no need to market reduced harm claims in the first place. The marketing claims for PREPs are an important part of this discussion because the misperception of the safety of PREPs is problematic in many ways. Public health experts express concern that smokers who do not want to (or cannot) quit smoking may turn to using PREPs instead of quitting in the future, and non-smokers may initiate use of PREPs because they believe they are a safer alternative to traditional cigarettes (e.g., Hatsukami & Zeller, 2004; Warner, 2002). This is a frightening prospect with respect to adolescents, who may be especially prone to perceive PREPs as a safer way to adopt the smoking habits to which they may already be drawn (see chapter 37, this volume). Not only are adolescents at a time in life when long-term health risks are discounted more than immediate benefits, but a preference for less systematic or deliberative information processing strategies (also a characteristic of adult consumer inferencing) may further reinforce these perceptions and choices (Shavitt & Wanke, 2001). Newer forms of smokeless tobacco like Exalt and Revel that do not involve spitting (tobacco juices) are good examples of products that may hold a special appeal to adolescents. Although some studies in Sweden suggest that the adoption of these products lead to reduced rates of lung cancer, some experts feel the confectionary-like presentation of some of these products may appeal to youth (Shiffman et al., 2002).

Understanding how adult (and adolescents, for that matter) consumers think about reduced exposure products and their perceived risks and benefits represents one approach to the consumer health controversy surrounding PREPs. Epidemiological studies and biomarkers research (research

that examines if reduced exposure, toxicity, and disease risk claims about reduced exposure products are well founded) represent different approaches to PREPs that are not based on assessing subjective perceptions.

Epidemiological studies, for example, have compared regular, light, and ultra-light cigarettes, and have not found any significant reductions in lung cancer rates. In fact, they have found an increase in adenocarcinoma, a cancer that strikes peripheral tissues of the lung, which may be a result of deeper inhalation of smoke (Harris, Thun, Mondul, & Calle 2004). To the disappointment of many in the public health community, the promise of a "reduced harm" cigarette has not been fulfilled (Thun & Burns, 2001). As Shiffman Pillitteri, Burton, and Di Marino (2004) and others, have shown, most of the public remains unaware.

More recently, researchers have sought to move beyond epidemiological studies in their analysis of tobacco products. Epidemiological studies require very large samples measured over a number of years, often decades. They also require large effect sizes to find significant results. As noted before, they are unable to measure or control most compensatory behaviors in smoking. For these reasons, researchers also use methods that measure the immediate biological exposure of tobacco toxins to individuals.

An example is the assessment of individual exposure to carcinogens through measurement of biological by-products found in their urine. While individuals differ in their absorption and metabolism of carcinogens, with an adequate sample size, this method can deliver an accurate picture of carcinogen exposure. It can be used to test products that are about to or have just been introduced to a market, and the method does not require waiting until they are used by people for a number of years.

Findings of epidemiologists about "light" cigarettes were confirmed using these methods. A study comparing the by-products of carcinogen exposure in regular, light, and ultra-light cigarette smokers found no significant differences in the level of exposure to two major carcinogens, NNK, and pyrene, an indicator of polycylic aromatic hydrocarbons (PAH). The cotinine (a by-product or metabolite of nicotine) levels were not significantly different among the three groups. The absence of significant differences in nicotine exposure is further evidence that smokers are modifying their smoking behavior to achieve a certain dose of nicotine (Hecht, Murphy, Camella, Li, Jensen, Le, Joseph, & Hatsukami, 2005).

As various modified tobacco PREPs have been tested and produced, researchers have been able to subject marketing claims to immediate scientific scrutiny. One such product, the now discontinued Omni cigarette, performed very well on the FTC testing protocol, showing a 53% reduction in NNK and a 20% reduction in PAH. Biomarker studies, however, demonstrated the reductions in NNK and PAH were less than half what was claimed. NNK was reduced by only 21% and PAH reduction (5%) was nonsignificant (Hatsukami, Henningfield, & Kotlyar, 2004). Another study of Omni, conducted by Hughes, Hecht, Carmella, Murphy, and Callas (2004), showed a smaller, nonsignificant reduction in NNK (17%) and a larger but still significant reduction in PAH (10%).

Cigarette-like delivery devices, such as Eclipse and Accord, have also been subjected to the rigors of biomarkers testing. Eclipse has shown a reduction in urine metagenicity (genes damaged by carcinogen exposure), 72%–79% in one experiment (Smith et al., 1996) and 70%–77% in another (Bowman et al., 2002). The Eclipse cigarette also maintained nicotine levels. Although no marketing claims have to date been made about Accord, Accord has shown a reduction of urine metagenicity between 53% and 66% in one experiment (Roethig et al., 2005). Further, several studies have shown a reduction in carbon monoxide, by as much as 70% (Buchhalter, Schrinel, & Eissenberg, 2001); however, this research also reported a significant reduction in nicotine levels as well. Studies have found Accord was ineffective at reducing nicotine cravings (Buchalter & Eissenberg, 2000).

In sum, the evidence based on the biomarkers approach suggests that the claims of reduced exposure or disease risk are not well supported. Some data demonstrate less reduction in exposure than FTC testing, other data show reduction in some biomarkers but increases in others, and still others show reduction. In fact, the implications of this work suggest that such reduced exposure or disease risk claims may well mislead consumers and (a) undermine smoking cessation efforts and/or (b) increase the probability that PREPs, whose reduced harm is unclear at best, will be increasingly used by individuals who otherwise might not be inclined to smoke. As the concluding section of this chapter suggests, it is crucial that independent researchers (i.e., those without conflict of interest with the tobacco industry) continue to scrutinize the marketing claims associated with PREPs and make available any of the scientific-based evidence pertinent to these claims (Hatsukami & Hecht, 2005, p. 5; Hatsukami et al., in press).

PUBLIC PERCEPTIONS AND MISPERCEPTIONS

The issues surrounding PREPs are complex and involve risks that go beyond obvious health effects. As reviewed by Fairchild and Colgrove (2004), the complexity of these reduced harm issues is exemplified by the history of the "light" cigarette in the United States, perhaps the first PREP. The debate around light cigarettes has encompassed concerns as broad as their questionable health risks and benefits as well as their social impact, and has fueled an enormous amount of litigation (see Johnston & Warner, 2006).

In response to concerns about the hazards of cigarette smoking, many tobacco companies began introducing "safer" ("light") cigarettes) in the 1950s and 1960s. Marketing claimed light cigarettes reduce harm to the smoker by reducing exposure to toxins like tar, nicotine, and carbon monoxide, most commonly through the use of a filter. Adoption of light cigarettes was quick, indicating both public interest in safer cigarettes and the widespread perception that the products were safer. As we shall later discuss, this misperception regarding the safety of light cigarettes has had deleterious effects on public health.

At first, the public health community and even the Surgeon General were optimistic and supportive of such efforts to develop a "safer" cigarette, fueling consumer misperception of the safety of these products. Fairchild and Colgrove argue that this support was largely a function of the fact that the tobacco industry's deceptions had not yet been revealed. It is also important to note that the list of diseases associated with cigarette smoking was significantly shorter in the 1950s and 1960s than it is now (U.S. Department of Health and Human Services, 2004), so people believed that the health risks of smoking were much more limited than is appreciated today. Therefore, since people's beliefs about cigarette smoking were not yet influenced by the knowledge of health risks and the tobacco companies' deception, the prevailing attitude toward safer cigarettes was positive.

Upon the introduction of light cigarettes to the marketplace, the typical consumer and even some health experts were optimistic about, and supportive of, these products (Fairchild & Colgrove, 2004). What has been surprising, however, is the *continuing* consumer perception that light cigarettes are safer than traditional cigarettes, despite the marked critical shift among health experts (e.g., Fairchild & Colgrove, 2004; Warner, 2002).

Unfortunately, the evidence-based beliefs of the public health and tobacco control communities have not been adopted by the average consumer. Kozlowski, Goldberg, Yost, White, Sweeney, and Pillitteri (1998), for example, found that less than 10%–14% of smokers knew that light cigarettes could yield similar levels of tar as regular cigarettes. In a random digit dial (RDD) survey of 2,120 daily smokers, Shiffman, Pillitteri, Burton, Rohay, and Gitchell (2001a) assessed beliefs about the tar and nicotine delivery, related health benefits, and perceived harshness of light cigarettes. In

their sample, 46% reported smoking regular cigarettes, 39% light cigarettes, and 15% reported smoking ultra-light cigarettes; the sample was weighted to reflect the U.S. smoker population with respect to age, sex, and ethnicity. Their study revealed that most smokers believe light and ultra-light cigarettes deliver less tar and nicotine than regular cigarettes. Smokers of these lighter cigarettes also reported feeling the products were less harsh. Although most smokers believe that smoking safer cigarettes is riskier than not smoking at all, they still believe that smoking safer cigarettes offers between a 25%–33% reduction in risk compared to smoking regular cigarettes. This misperception about the health benefits of light cigarettes—that reduced toxicant levels as measured by machines meant reduced risk—is especially alarming due to additional evidence suggesting that these beliefs detract smokers from intentions to quit. Shiffman, Pillitteri, Burton, Rohay, and Gitchell (2001b) found that smokers of light and ultra-light cigarettes who believed their products were safer and delivered less tar and nicotine exhibited significantly lower levels of interest in quitting. (The relationship between perceptions of harshness and quitting intent was marginally significant.) Kozlowski et al. (1998) found that roughly one third of light and ultra-light cigarette smokers said they would be more likely to quit if they learned that the tar levels of light cigarettes were comparable to regular cigarettes.

In terms of social impact, there is some evidence that the misperception of light cigarettes as a safer product may have resulted in more smoking than would have occurred if they had never been introduced (Warner, 2002). Smokers and non-smokers alike seem to regard smoking light cigarettes as less hazardous a behavior, so they are less likely to quit and may be more likely to start smoking, respectively. Again, this raises the possibility that adolescents may initiate smoking under the misguided belief that they are being careful when in fact they may be exposing themselves to a known health risk (U.S. Department of Health and Human Services, 1989).

In sum, the issues surrounding PREPs are varied and complex. As a category, PREPs are so broad that it is difficult to make generalizations about what is known and not known (see Shiffman et al., 2002). With respect to health and safety issues, some PREPs are directly or indirectly marketed as safer alternatives though the actual risks and benefits are mixed and vary depending on the product. Generally, the products that solely deliver nicotine are considered to be safer than tobacco products. However, other or non-combustible tobacco products bear greater scientific evaluation. In terms of societal impact, there is some evidence to suggest that the introduction of the newer PREPs may perpetuate the market for tobacco products because consumers believe that PREPs are a safer product. Obviously, public health experts are more sophisticated with respect to the issues surrounding PREPs, their history, and empirical evidence. But there is evidence that this knowledge does not trickle down to the public to the extent that it should, as is the case with light cigarettes, though marketing approaches can be constructed to inform consumers about the risks of lights (Kozlowski, Goldberg, Sweeney, Palmer, Pillitteri, White, & Stine, 1999; Kozlowski et al., 2000)

SCIENTIFIC ISSUES

Expert and Public Opinion on PREPs

One of the issues surrounding PREPs is the disparity between what public health experts and the general public think about PREPs, especially light cigarettes. The public is vulnerable to believing that reduced exposure to toxins (associated with PREPs) means a reduced risk of disease. Consumer perceptions, however, may be quite different than the views of public health experts or tobacco control advocates who should be more scientifically informed and less susceptible to holding this belief. The effects of PREPs and their marketing strategies on experts should be quite different from the effects on consumer perceptions.

Warner and Martin (2003) and Joseph, Hennrikus, Thoele, Krueger, and Hatsukami (2004), for example, conducted studies examining tobacco control leaders' attitudes toward harm reduction approaches, including PREPs. Joseph and her colleagues conducted nine focus groups of 48 local tobacco control leaders in Minnesota. Participants were classified as public policy experts, clinicians, and youth development/education specialists. Joseph et al.'s groups identified any strategy designed to reduce tobacco use or health risks associated with using tobacco.

Among the strategies these participants listed are PREPs (both modified traditional tobacco products and nicotine replacement therapy), smoking fewer cigarettes, and public policies designed to reduce smoking in the population at large (e.g., smoking bans, increased taxes). While discussing the risks of the various tobacco strategies, focus group participants expressed concern that endorsement of tobacco exposure reduction products sends a confusing message to society. They argued that since *any* level of tobacco is *not* safe, smokers might be lulled into a false sense of security. Another related concern they discussed was the possibility that the strategy of tobacco exposure reduction would increase tobacco use through the use of modified tobacco PREPs, and other kinds of "closet smoking." Other risks they discussed were: lack of evidence that the strategies offer any benefit to the user, the cost of diverting energy to researching the efficacy of tobacco harm reduction, inadvertently benefiting the tobacco industry, and the risks of chemoprevention. In light of these concerns, Joseph and colleagues found that tobacco control leaders were most supportive of regulatory policy as the best tobacco exposure reduction strategy. Participants considered FDA regulation of tobacco products, taxes and pricing, restrictions on youth access, and clean indoor air legislation as examples of these policies. Generally, participants felt regulatory policy had the greatest potential for having the largest impact on society and sending the most consistent and clear message about tobacco use, and anticipated policy change would be more cost effective and produce the most sustainable results.

Warner and Martin's (2003) Internet-based survey research study captured similar attitudes toward tobacco exposure reduction as Joseph et al.'s (2004) focus groups. Warner and Martin conducted an Internet survey (and follow up telephone interviews to some non-respondents) of a total of 2,833 U.S. tobacco control leaders. Participants were selected on the basis of their registration for the 2001 National Conference on Tobacco or Health. Overall, Warner, and Martin's sample was skeptical of tobacco exposure reduction. Of those who reported being aware of tobacco exposure reduction as a strategy (N = 1,473), almost half (49%) agreed that such an approach would actually reduce the numbers of those who would otherwise quit smoking completely (a concern also raised by members of the focus group participants). Also, a majority (63%) felt that there would be unintended negative health effects on PREP users.

Recall that Kozlowski et al. (1998) and the smokers in Shiffman's (2001a) survey rated smoking light and ultra-light cigarettes as significantly less risky than smoking regular cigarettes. In stark contrast, nearly 21% of Warner and Martin's participants reported thinking that these "safer" cigarettes actually *increased* the smokers' health risks (and only 10% reported believing the opposite). It is not surprising, then, that 40% answered that the collective health of Americans would be better now if light cigarettes had never been introduced to the market.

Similar to the discussion in Joseph et al.'s (2004) focus groups, the attitudes expressed by Warner and Martin's sample (2003) illustrate the complexity of issues surrounding PREPs. The focus group members of Joseph et al.'s (2004) study explicitly acknowledged that an exposure reduction approach might reduce harm and help smokers who can or will not quit. However, in both samples it was found that a tobacco exposure reduction approach was perceived as an obstacle to some smokers who otherwise might have tried to quit altogether. In addition to these negative attitudes toward tobacco harm reduction, Warner and Martin (2003) reported that their sample was also supportive of regulatory policy. Warner and Martin (2003) assessed support for various policies

designed to regulate the production and marketing of PREPs; agreement was assessed by aggregating responses across "agree" and "strongly agree." Respondents were most supportive of the surveillance and banning of products found to cause unacceptable health risks or to attract children (93% agreed), a requirement for pre-marketing approval of health claims (91% agreement), and the regulation of marketing techniques (90% agreement). However, respondents were significantly less supportive of a tax based on the level of risk to the consumer (65% agreement).

This discussion of tobacco control leaders' attitudes toward tobacco exposure reduction (including PREPs) raises the question of what the average consumer thinks. Accordingly, Kim, Borgida, Stark, and Pickens (2006) conducted a mail survey in the Fall of 2003 with the Minnesota Center for Survey Research. Surveys were mailed to a random sample of households in the five-state Upper Midwest region of the United States (Minnesota, Iowa, North Dakota, South Dakota, and Wisconsin); 438 adult participants (38%) returned the survey, and 21.9% of these respondents reported that they had smoked in the past 30 days. All respondents first read the IOM (2001) definition of harm reduction. The survey then assessed participants' opinions about PREPs and measured their beliefs about government and regulation of these products.

First, Kim, Borgida, Stark, and Pickens (2006) found that most of their sample (68%) had not heard of (or were unsure whether they had heard of) tobacco harm reduction and PREPs, and rated their knowledge of this approach very low. Furthermore, participants agreed that people should be made more aware of PREPs. Nevertheless, the average consumer surveyed had ambivalent feelings about PREPs as did Warner and Martin's (2003) and Joseph et al.'s (2004) tobacco control leaders (see Table 36.1). For instance, respondents agreed that PREPs are as addictive as smoking regular cigarettes and expressed pessimism that PREPs will change anything. They also expressed anger that some people use PREPs instead of simply quitting their tobacco use entirely. However, they expressed optimism about the development of PREPs (they were pleased that PREPs are being developed), and felt that PREPs give hope for smokers who want to quit.

Table 36.1 Participants' feelings and opinions about PREPs

	M*	SD
People should be made more aware of reduced harm products	2.6	1.6
I am happy that reduced harm products are being developed	3.2	1.8
Reduced harm products are just as addictive as smoking	3.0	1.6
I feel pessimistic that reduced harm products won't really change anything	3.2	1.7
Reduced harm gives me hope for smokers who want to quit	3.7	1.8
It makes me mad to think people use reduced harm products instead of quitting entirely	3.6	2.0
Reduced harm products are a good compromise for people trying to quit	4.0	1.7
Reduced harm products increase the probability of someone quitting smoking	4.0	1.8
Reduced harm products provide a safer way to get nicotine	4.3	1.8
Reduced harm products are not effective	3.8	1.4
Reduced harm balances addictions and desires to quit	4.2	1.6
Only people who want to quit smoking should use reduced harm products	4.8	1.9

*Based on a 7-point Likert scale in which 1 corresponded with "Strongly Agree" and 7 corresponded with "Strongly Disagree" (From: Kim, Borgida, Stark, and Pickens, 2006).

Table 36.2 Comparison of attitudes toward regulation of PREPs for Warner and Martin's (2003) tobacco control leader sample and the average consumer.

	Tobacco control leaders		Average consumer	
	% Agree*	% Agree*	M	SD
Watched and banned as necessary	93	61	2.7	2.0
Subject to approval based on health evidence	91	74	2.1	1.6
Subject to government regulation of marketing techniques	90	60	2.7	1.9
Subject to taxes based on level of risk to user	65	49	3.4	2.2

*Agreement for tobacco advocates was calculated with answers of 1-2 on a 5-point scale, whereas agreement for the Kim, Borgida, Stark, and Pickens (2006) sample was calculated using 1-3 on a 7-point scale.

Similar to tobacco leaders' views about PREPs, respondents in the Kim et al. (2006) study also supported the federal regulation of PREPs. Table 36.2 presents a comparison of the Warner and Martin (2003) sample with the Kim, Borgida, Stark, and Pickens sample on agreement with regulatory policy. Although they were less enthusiastic than Warner and Martin's sample (as can be seen by their lower levels of agreement), the average consumer was still very supportive of regulating PREPs. In particular, they were most supportive of subjecting PREPs to approval based on health evidence (74% agreement). Results from the lay sample were also similar to Warner and Martin's sample in that they were least supportive of regulatory policies involving user taxes. As was stated earlier, 65% of Warner and Martin's sample supported taxation of PREPs, which is a great reduction in support compared to the other proposed regulatory policies (see Table36.2; at least 90% of the Warner and Martin sample supported the other regulatory policies). Similarly, slightly less than half of average consumers (49%) supported differential taxation.

Consumers' opinions towards PREPs and their selective support for their regulation (i.e., not supporting taxation in particular) underscores the need for a better understanding of the *psychological* bases of these attitudes. As we shall discuss in the next section, the psychology of attitudes can contribute to an understanding of the structural and functional bases of consumers' views of these products, and also suggest ways in which these attitudes may be modified by targeted persuasion efforts.

THE PSYCHOLOGY OF ATTITUDES

One of the central claims in this chapter is that the psychology of attitudes can contribute to our understanding of public attitudes toward exposure reduction and PREPs. Several studies have been conducted examining public attitudes toward varying types of tobacco products, including reduced exposure products. These give us insight both into what the public believes about tobacco products, and also what may be influencing or informing their attitudes toward these products and issues related to exposure reduction.

In the Shiffman et al. (2001a) study, for example, most smokers believed light and ultra-light cigarettes were less harsh and delivered less tar and nicotine (also see Kozlowski et al., 1999). More importantly, these beliefs each independently contributed to the belief that these cigarettes were safer than regular cigarettes. Over half of participants rated the claims made in advertisements for light and ultra-light cigarettes as delivering less tar and being milder as credible, and 15.9% of smokers found claims made that these types of cigarettes were safer as credible. On average,

smokers believed that smoking light cigarettes carried a 25% reduction in risk, and smoking ultra-light cigarettes carried a 33% reduction in risk compared to smoking regular cigarettes.

These data show that many smokers harbor misconceptions about light and ultra-light cigarettes, based on their experience with these cigarettes and exposure to advertising claims about these cigarettes. Their beliefs that light and ultra-light cigarettes are milder, and deliver less tar and nicotine, lead to beliefs that these cigarettes are safer to smoke. Shiffman, et al. attributes these misconceptions to deliberate advertising by tobacco companies to promote light and ultra-light cigarettes as safer and milder, an attribution based on the marketing strategies uncovered in tobacco industry documents obtained in the tobacco master settlement (e.g., Pauly, Mepani. Lesses, Cummings, & Streck, 2002). These beliefs combine with sensory impressions of light and ultra-light cigarettes as milder to reinforce the perception of safety and reduced risk (see Kozlowski, et al., 1999). Shiffman et al. also suggest that scientific data may not be as persuasive as these sensory impressions and beliefs, making it difficult to change smokers' beliefs about these products.

Hamilton, Ouellette, Rhodes, Kling, and Connolly (2004) replicated the above effect by showing participants advertisements for regular, light, and reduced-harm cigarettes, and obtaining ratings of safety and other perceptions of these ads. These participants also believed that light and reduced-harm cigarettes posed fewer health risks than regular cigarettes, despite the absence of independently verifiable scientific evidence that these products are lower in risk. This study also shows the power of advertisements for new products: only 7.7% of participants said they had previously seen the advertisement for the reduced-harm product, but most participants perceived a health and safety advertising message associated with these products, and ascribed lower risk to these products (also see Kozlowski et al., 2000). Shiffman et al. (2004) extended this work to reduced exposure products. Smokers (N = 1,000) and ex-smokers (N = 499) completed a telephone survey regarding their smoking history and their perceptions of the reduced exposure product Eclipse, a modified cigarette. The interviewer described Eclipse to the participants using language based on the manufacturer's descriptions. Participants then answered questions about their perceptions of Eclipse.

Almost all current smokers (91.7%) and ex-smokers (81.3%) thought Eclipse was safer than regular cigarettes, and many also perceived Eclipse as safer than light or ultra-light cigarettes. Almost a quarter of all smokers perceived Eclipse as completely safe—as carrying the same risk as not smoking at all. Also, many current smokers (57.4%) replied that they were somewhat or very likely to purchase Eclipse in the coming months. It seems clear that participants in this study overestimated claims of "reduced risk" by the manufacturers of Eclipse, with many taking this to mean "no risk.". It may be the case that this perception would lead non-smokers to take up smoking if they thought they could use a tobacco product that did not carry any risks. Participants were not only being influenced by the manufacturer's claims about Eclipse, but they were overextending these claims and forming impressions of this new product as completely safe to use.

The key public health issue is that the attitudes of consumers toward these reduced harm products may well be shaped by advertising of these products (see chapter 37, this volume). However, it is our contention that *the psychological basis of the attitude* also may influence the way consumers respond to these messages. Many psychological studies of attitudes have examined the relationship between attitudes and their structural components, focusing primarily on cognitive and affective bases of attitudes (Eagly & Chaiken, 1993; Crites, Fabrigar, & Petty, 1994; Haddock & Zanna, 1998). The cognitive component of an attitude refers to a person's thoughts and beliefs about a certain attitude object, whereas the affective component reflects a person's feelings about that attitude object.

Previous research (e.g., Edwards, 1990; Millar & Millar, 1990; Fabrigar & Petty, 1999) has identified that attitudes toward an object, and the success of persuasion attempts, are connected to whether that attitude is based on feelings or thoughts about the object. This research has also sug-

gested that these different bases of attitudes (thoughts vs. feelings) have different implications for persuasion and other communications: people may read and understand information about an issue or product differently as a function of whether their attitude towards this issue or product is based primarily on their thoughts or their feelings.

Consistent with this structural approach to understanding attitudes, our research (Stark, Borgida, Kim, & Pickens, 2006) examined how a person's thoughts and/or feelings about tobacco harm reduction are related to their overall attitude towards harm reduction products, in the context of the same mail survey described above (Kim et al., 2006). The ratings of thoughts and feelings about harm reduction, as well as predictors such as knowledge about tobacco products, and experience with smoking, were regressed onto overall attitudes toward harm reduction products in order to understand the primary predictors of overall attitudes. It was found that, for smokers, their feelings about harm reduction were the primary predictor of their overall attitudes toward harm reduction, but for non-smokers, neither their thoughts nor their feelings about tobacco exposure reduction predicted their overall attitudes.

This suggests that one way of understanding consumer attitudes towards these products lies in understanding the structural basis of their attitudes; whether their attitudes are primarily derived from their feelings or primarily from their thoughts about the products. Also, a consumer's *experience* with tobacco products may influence the base of their attitudes toward harm reduction, so experience in the form of personal smoking history also needs to be taken into account. Therefore, the concern that Shiffman et al. raise in their 2001 papers—that sensory impressions of light cigarettes as milder lead to difficult-to-change beliefs that these cigarettes are safer—may be true. The feelings associated with smoking—taste, reduction of cravings, relaxation—may create positive attitudes that are difficult to counter through merely providing relatively abstract data on the health risks of these products (also see Kozlowski et al., 1999). A smoker's feelings about tobacco products must be taken into account in order to understand and predict their attitude towards other issues related to tobacco consumption, such as regulation or responses to marketing of new products.

In addition to differentiating the cognitive and affective base, a second approach involves examining whether the attitude reflects different *functional* qualities—the satisfaction of value expressiveness (symbolic beliefs) or instrumental needs (self-interest). Kim, Borgida, Stark, and Pickens (2006) examined three potential predictors of support for federal regulation of harm reduction products: product knowledge, self-interest, and symbolic beliefs about the role of government in society. Symbolic beliefs are value-laden, emotionally driven, stable beliefs that are learned early in life, and that have a strong influence on a range of social policy preferences. For example, Sears, Lau, Tyler, and Allen (1979) showed that attitudes of Whites toward busing Black students into predominantly White schools districts were more strongly influenced by their values and affect about race than whether they lived in a district in which busing would occur. Similarly, political ideology (liberalism vs. conservatism) is a stronger predictor for a variety of policies including preference for government-provided health insurance or privatized health care (even among those who do not have health care) and agreement that the government should guarantee jobs for everyone (even among those who were personally affected by unemployment).

Kim et al. (2006) chose these three predictors because the messages about potential reduced exposure products are often constructed in terms of educating the public about the risks associated with traditional tobacco (i.e., improving their knowledge), or emphasizing how these products affect people's direct interests (i.e., appealing to their self-interests). However, symbolic beliefs have been shown to have a stronger influence on policy preferences than self-interest, unless the self-interest component of the policy is very clear (e.g., Chong, Citrin, & Conley, 2001; Young, Thompson, Borgida, Sullivan, & Aldrich, 1991).

Kim et al. (2006) found that attitudes regarding the federal regulation of conventional tobacco and exposure reduction products are in line with predictions based on theory and research on symbolic politics: as with other social policy issues, when confronted with the overall issue of regulation, consumers tend to evaluate issues on the basis of pre-established symbolic beliefs and values. If, however, the costs of the policy are clear and cognitively accessible to the consumer, as is the case with issues involving taxation, then they are more likely to evaluate issues on the basis of their self-interest (not supporting increased taxation of these products). Also, knowledge about potentially reduced exposure products did not play a role in influencing attitudes toward regulation of these products. Again, personal experience played a role, with people identifying as current smokers basing their attitude towards regulation more in terms of their self-interest (not supporting taxation), and non-smokers basing their attitude more in terms of their symbolic beliefs and values about government. So attitudes toward federal regulation of these products may be driven either by symbolic beliefs and values about the role of government and regulation, or consumer's self-interest in avoiding increased taxation. Message content (i.e., whether it triggers a response in terms of self-interest or symbolic beliefs) will play an important role in activating different attitude bases, and perhaps even different attitudes.

In general, the question posed in this section is: on what basis do consumers think about these messages and marketing claims about reduced harm? The research reviewed suggests that the psychology of attitudes can generate some new insights into understanding how consumers react to messages about products claiming reduced harm, and how their attitudes toward these products may shape their reaction to and processing of these messages, not to mention their consumer behavior and public health, more generally. Also, experience with these reduced exposure products plays an important role in shaping attitudes, whether attitudes are based more on affect than cognition, or on motives like self-interest or symbolic beliefs that suggest a functional perspective on the attitudes held. Future research will need to take these different types of attitude structures and functions into account when examining how people respond to and process messages about these products. If these are the bases on which consumers process product advertisements, then (consistent with the psychology of attitudes) these are the very processes that must be considered when developing and implementing effective interventions to persuade consumers about the risks and benefits of these products.

POLICY IMPLICATIONS

"A popular reduced-exposure cigarette," suggests Gertner (2005), "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). Based on the scientific issues reviewed in this chapter, there are substantive reasons to be concerned about the extent to which PREPs pose a public health threat to consumers. Moreover, as our chapter highlights, the implications of several biomarkers studies investigating the reduced exposure claims associated with PREPs suggest that these claims may well lead adolescent and adult consumers down very counterproductive pathways.

Underlying the idea that the marketing of PREPs may "send the wrong message" to the public and potentially mislead consumers is the "psychology of harm reduction" (MacCoun, 1998). The concept of *harm reduction* was developed during the 1980s as an approach to addressing the risks that illicit drugs pose to public health in the United States. Although this approach has been especially pertinent to the development and implementation of various harm reduction interven-

tions in the context of drug control (e.g., needle and syringe exchanges, low-threshold methadone maintenance), the issues at the abstract level are remarkably similar to the issues associated with other policy domains such as PREPs. Each policy domain discussed by MacCoun (1998), for example, from needle exchange programs to school condom programs to welfare programs, "raises the question about the relative efficacy of policies that aim to reduce the harmful consequences of a risky behavior (harm reduction) versus policies designed to discourage the behavior itself …" (pp.1200–1201).

We suggest that the issues associated with PREPs and in particular the controversy surrounding the regulation of PREPs exemplify the psychology of harm reduction, according to MacCoun's (1998) analysis. For example, the goal of U.S. drug policy, has been *prevalence reduction* or "to reduce the total number of users by discouraging initiation on the part of nonusers, and by promoting abstinence for current users" (MacCoun, 1998, p.1199). But discouraging people from engaging in risky behavior is not the only goal in the development of an effective drug policy. MacCoun argues persuasively that there are other strategic options available for consideration when developing an effective national drug policy. Besides *prevalence reduction*, *quantity reduction* (encouraging people to reduce the frequency of the risky behavior) and *harm reduction* (reduce the harmful consequences of the behavior when it occurs) represent other, non-mutually exclusive goals for establishing an effective drug control policy.

Based on our discussion of the scientific issues associated with the marketing and promotion of PREPs, an extension of MacCoun's (1998) analysis would suggest that smoking cessation (or, rather, prevalence reduction) may represent only one strategy for tobacco control policy makers to consider. Reduced harm approaches may not lead to cessation, but cessation as an *exclusive* goal may not be as effective as its proponents claim (MacCoun, 1998). Thus, harm reduction and quantity reduction both represent important strategies that, in the PREPs context as well, are not mutually exclusive with a prevalence reduction strategy. However, as MacCoun discusses in his theoretical analysis of these three strategies in the drug policy domain, risk-benefit trade-offs must be systematically evaluated with scientific data before these three strategies can be successfully integrated into some sort of overall drug control or tobacco use policy (also see Kozlowski, Strasser, Giovino, Erickson, & Terza (2001) on their risk/use equilibrium for determining the most effective harm reduction strategy for current smokers). MacCoun (1998) offers several interesting hypotheses for thinking about how to integrate harm reduction and quantity reduction strategies with the more influential prevalence reduction strategy into a national drug control strategy. Perhaps the most pertinent of MacCoun's hypotheses with regard to developing tobacco control policies for PREPs is the following: "Harm-reduction interventions should have the greatest political viability when they can demonstrate a reduction in average harm—especially harms that affect nonusers—without increasing drug use levels" (MacCoun, 1998, p.1207). As reviewed in this chapter, reducing harm to nonusers and not increasing overall tobacco use levels are certainly central to the scientific and policy issues associated with PREPs: "An appealing product could have substantial population effects, by persuading smokers that cessation is unnecessary, persuading ex-smokers that it is now safe to resume smoking, and/or persuading potential initiates that smoking could be adopted without endangering themselves" (Shiffman, Gitchell, Warner, Slade, Henningfield & Pinney, 2002, p.S121; also see Kozlowski et al. 2001). Therefore, as in the drug policy debate, it becomes important in the domain of regulatory policies pertaining to PREPs to develop a rigorous scientific database to be able to evaluate these different types of outcome effects: whether smokers perceive or have been persuaded that cessation is unnecessary; whether ex-smokers perceive or have been persuaded that it is now safe to resume smoking; and/or whether potential initiates perceive or have been persuaded that smoking could be adopted without endangering themselves.

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The availability of scientific studies that shed credible light on these different types of consumer outcomes in the context of PREPs has become crucial. Many policy scholars and federal legislators are now calling for a change in the regulatory environment surrounding PREPs. U.S. Senators DeWine and Kennedy introduced legislation in 2004, for example, that called for FDA authority to regulate the sale, distribution, and advertising of cigarettes and smokeless tobacco, and to require manufacturers to disclose the contents and health consequences of products with new, stronger warning labels. However, these features never made it out of the joint Congressional conference committee and were not included in the legislation that subsequently passed (Hulse, 2004). The proposed legislation attracted considerable attention (Shatenstein, 2004) and certainly was not without its critics (Siegel, 2004). But others also argued that, overall, the pros associated with the proposed legislation outweighed the cons (Myers, 2004).

Well-known policy advocates like Matthew Myers, who directs the National Center for Tobacco-Free Kids, have argued for quite some time for strict testing standards and limits on the marketing claims that tobacco companies and pharmaceutical companies now affix to a variety of reduced exposure products. For example, Myers (2000) challenged the lack of health regulation over reduced exposure tobacco products, argued that tobacco companies cannot be the only source of scientific information about their products, and strongly advocated "full authority over tobacco for the FDA" as the only meaningful approach to effective government regulation of tobacco products. "Regulation of tobacco products by the FDA is not a panacea, but it is an essential component of the effort to reduce the death toll from tobacco use. To be effective, the FDA must be given formal authority over tobacco products, similar to the authority it currently has over drugs and drug-delivery devices. It must have the power to compel the tobacco companies to make public the full truth and to require changes in its products and marketing tactics in order to protect the public health" (p.1809).

Myers is by no means alone in calling for federal regulation. The Institute of Medicine (2001) proffered several criteria for the regulation of PREPs, including the requirement that manufacturers disclose all ingredients to an appropriate regulatory authority, and the requirement of scientific proof before authorizing marketing claims about reduced harm, and mandating that labels and ads and market promotions not be "false or misleading." Hodge and Eber (2004) in their review and analysis of federal interventions to achieve tobacco control, suggested that federal regulation and oversight of tobacco industry marketing claims about the alleged safety of reduced exposure products is crucial to insure the accuracy of information conveyed to consumers. "Lacking accurate data, people cannot make rational health decisions" (p. 4). Consumers, as Kozlowski and Edwards (2005) argue, have the right to consider scientifically-sound, health relevant information, including information about the comparative risks associated with different products.

More generally, Hodge and Eber (2004), like Warner and Martin (2003) and MacCoun (1998), argue that the development of any comprehensive tobacco control policy must at its core be science-based, and not based on conjecture or vested interests: "In areas where the prevalence of tobacco use in the population is unknown, or the public health effects in specific populations are unmeasured, policy makers and anti-tobacco advocates need to study the impact of tobacco use on the public's health" (p. 7).

Gilhooley (2002) also suggests that the legislative process is perhaps the most appropriate approach to establishing a regulatory scheme for tobacco control, especially if the goal is to involve FDA oversight. She points out that the IOM (2001) report that examined PREPs suggested that such products could be beneficial to consumers if there was an "adequate" regulatory scheme in place. In fact, Gilhooley argues even without *new* legislation the FDA's extant authority (as framed in the U.S. Supreme Court decision in *FDA v. Brown & Williamson Tobacco Corp.*, 2000) may already per-

mit regulatory authority over reduced exposure products based on the rationale that such reduced-risk products are *intended* to prevent disease and may benefit those consumers who would like to stop smoking. Like Myers (2000) and the IOM report, Gilhooley argues for less misleading testing and marketing procedures and a role for the FDA in ensuring that PREPs have an adequate scientific foundation. Her view is that a regulatory role for the FDA in this area is currently unresolved, but crucial, because of new products being introduced to consumers.

Based on the research reviewed in this chapter, 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. As this chapter has suggested, reduced exposure claims may well be misleading consumers and either undermining smoking cessation efforts or increasing the odds that PREPs, which in some instances have been shown to be as harmful as regular cigarettes, 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) has suggested, these claims about outcomes are quite amenable to rigorous scientific assessment.

What role science-based regulatory policies will play remains to be seen, however. The history of developing, enacting, and enforcing legislative interventions in this arena, as Hodge and Eber (2004) discuss, reflects a complex set of considerations above and beyond just the need for accurate data and sound science. MacCoun (1998), for example, suggests that the development of an effective, integrated drug control policy also must contend with various instrumental (e.g., do reduced harm interventions reduce harm without increasing overall use?) and symbolic (e.g., biased beliefs about other people's ability to control their behavior, unresolved value conflicts, hostility toward *any* form of drug use) concerns: "The tone of the harm-reduction debate suggests that attitudes toward drug policies—on both sides—are influenced by deeply rooted and strongly felt symbolic factors that are largely independent of concerns about policy effectiveness per se" (p.1202). In addition, any underappreciation of the value of science-based policy recommendations must also take into consideration the extent to which policy makers may hold different views of scientific disciplines, and some disciplines, like psychological science, may be held in less regard by policy makers than others (Arkes, 2003). In other words, for legislators and other policy makers to appreciate, pay attention to, and commit to a scientific foundation for policy recommendations and legislation in the tobacco control arena will require an approach that incorporates more complex political and legal considerations as well as quality science.

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