Theories into practice: a content analysis of anti-smoking websites

Hye-Jin Paek

*Department of Advertising, Public Relations and Retailing,
College of Communication Arts and Sciences, Michigan State University,
East Lansing, Michigan, USA*

Beom Jun Bae

*Department of Communication, College of Communication,
Florida State University, Tallahassee, Florida, USA*

Thomas Hove

*Department of Advertising, Public Relations and Retailing,
College of Communication Arts and Sciences, Michigan State University,
East Lansing, Michigan, USA, and*

Hyunjae Yu

School of Communication, Sogang University, Seoul, South Korea

Abstract

Purpose – This study aims to examine the extent to which anti-smoking websites use intervention strategies that have been informed by four prominent theories of health-related behavior change: the health belief model, the theory of reasoned action/theory of planned behavior, the transtheoretical model, and social cognitive theory.

Design/methodology/approach – Content analysis was applied to 67 unique and independent anti-smoking websites to determine their use of 20 intervention strategies based on the four theories.

Findings – The findings reveal that anti-smoking websites used the health belief model the most and social cognitive theory the least. In addition, websites devoted to smoking cessation used these theories more extensively than websites devoted to smoking prevention.

Research limitations/implications – The sample size is somewhat small, which may result in lack of sufficient statistical power. Also, the analysis may have overlooked some important intervention strategies that are particularly effective for smoking intervention programs.

Practical implications – Anti-smoking website designers should take more advantage of the internet as a health promotion medium and use more intervention strategies that have been informed by scientifically tested theories of behavior change, particularly with respect to affective and behavioral strategies.

Originality/value – This study contributes to current knowledge about which kinds of anti-smoking messages are available online and how extensively they employ theory-based intervention strategies.

Keywords Public health, Behaviour modification, Tobacco

Paper type Research paper

After decades of national and statewide efforts to combat smoking, anti-smoking practitioners and researchers have begun to understand how the internet poses both challenges and opportunities for anti-smoking advocacy (Evers, 2006). While several recent studies have revealed an abundance of pro-smoking messages online (Ribisl, 2003;

Ribisl *et al.*, 2003), only a few have examined the availability of messages aimed at helping people to either avoid or quit smoking (Bock *et al.*, 2004; Paek *et al.*, 2009). To study this area of internet content, the following analysis examines how many and what kinds of anti-smoking websites are available to US internet users. In particular, it investigates the extent to which anti-smoking websites encourage anti-smoking behaviors through strategies that have been informed by scientifically tested theories of behavior change.

According to the uses and gratifications tradition of studying media effects, internet users are known to be more motivated to search for information when they believe it can meet their goals and expectations (LaRose *et al.*, 2001; Shao, 2009). To reach users who have the goal of either avoiding or quitting smoking, an appropriate format would be websites that offer anti-smoking intervention programs. Such programs, however, should have some likelihood of working. For this reason, health communication researchers have advised anti-smoking advocates to influence their target audiences with intervention strategies that are based on scientifically tested theories of behavior change (Glanz *et al.*, 2002; Slater, 1999).

A handful of recent studies have examined the extent to which communication campaigns have used these theories to influence smoking behavior (Cohen *et al.*, 2007) and drug use (Stephenson and Quick, 2005). In an exhaustive study of physical activity websites, Doshi *et al.* (2003) identified 20 behavioral intervention strategies that were validated by 19 health promotion and communication experts. The study's purpose was to investigate how the websites used four of the most influential theories of health beliefs and behaviors – the health belief model, social cognitive theory, the theory of reasoned action/theory of planned behavior, and the transtheoretical model.

Adopting that study's schema of theories and intervention programs, we apply it to anti-smoking websites to assess how extensively they use behavior change theories to influence internet users to either avoid or quit smoking. Although there are differences among the four theories, they do not contradict but rather complement one another because they can address similar types of communication problems, depending on whether those problems are cognitive or behavioral in nature (Slater, 1999, p. 335). For example, the transtheoretical model and social cognitive theory provide extensive intervention strategies that address target audiences at both cognitive and behavioral levels. Alternatively, a more consistent focus on cognitive strategies can be found in the health belief model and the theory of reasoned action/theory of planned behavior. For smoking cessation, researchers have found the transtheoretical model to be particularly effective (Dijkstra *et al.*, 1998; Perz *et al.*, 1996). To examine the link between these theories of behavior change and the communicative practices they can inform and improve, a useful method is content analysis of health messages (Cohen *et al.*, 2007; Stephenson and Quick, 2005). The following analysis of anti-smoking website content can inform anti-smoking researchers, advocates, and campaigners about the availability of theoretically grounded smoking messages on the internet.

The internet as a useful tool for health promotion and intervention
Using the internet in health promotion has become an increasingly widespread and popular practice (Evers, 2006). Approximately 81 percent of internet users look for health information online, and two-thirds of them have searched for information about a specific disease or medical problem (Fox and Jones, 2009). Of those, 60 percent reported that the health information they found online influenced a decision about how to deal

with an illness or condition (Fox and Jones, 2009). With respect to smoking, about 7 percent of adult US internet users have had experience searching for information on how to quit smoking. Women (10 percent) are twice as likely to search for such information than men (5 percent), and the age group most likely to do so is young adults between ages 18 and 29 (11 percent) (Fox, 2006). This proportion is quite substantial considering that about 20 percent of adults in the USA smoked in 2007 (Pleis *et al.*, 2008).

Now that health communication researchers are learning to take advantage of the internet as a health promotion tool, they have begun to explore the following: available health content (McMillan, 1999); effectiveness of that content (e.g. Bock *et al.*, 2004); difficulties in understanding online health information (Friedman and Tanner, 2007); and the roles of interactivity in improving comprehension and attitudes toward health content (Lustria, 2009). Such studies focus mainly on how the internet's unique features, such as interactivity and the networking of social support, make it a useful medium for health promotion.

But the internet can also provide various channels for negative influences on people's health behavior. For example, in the context of smoking, the internet enables tobacco companies to sidestep legal regulations that have for years restricted tobacco marketing in specific locales and in the mass media of print and broadcasting. Addressing this issue, several recent studies have called for further investigation of the regulatory guidelines for pro-smoking messages on the internet. In particular, they suggest exploring whether online pro-smoking messages that target youths either can or should be regulated as strictly as they are in other media (Hong and Cody, 2002; Ribisl, 2003; Ribisl *et al.*, 2003). Supporting this recommendation, Duke *et al.* (2009) found that, from 2000 to 2004, adolescents' exposure to pro-tobacco messages online increased from 22 to 33 percent while it was declining in all other mass media channels such as TV/movies (decrease from 90 to 81 percent) and newspapers/magazines (decrease from 66 to 50 percent).

If we acknowledge how the internet has enabled tobacco companies to enhance their marketing capabilities, we also need to understand how it can enhance tobacco control efforts. One notable way it can do so is by enabling more precise tailoring and dissemination of anti-smoking messages to different types of target audiences, particularly people at different stages of quitting. Only a few studies have analyzed anti-smoking websites to determine how much they tailor their prevention and cessation messages to specific audiences and make use of the internet's unique features. For example, Paek *et al.* (2009) analyzed US and South Korean anti-smoking websites and compared their different cultural characteristics and their culturally tailored uses of health promotion strategies. In another study that content-analyzed 46 smoking cessation websites to assess their usability and readability, Bock *et al.* (2004) found that some websites did not fully exploit internet features such as interactivity. Supplementing those studies, the current study investigates how extensively anti-smoking websites make use of intervention strategies that are informed by prominent, scientifically tested theories of behavior change.

Examining anti-smoking websites for their use of behavior change theories
Health communication scholars have increasingly tried to integrate behavioral theory with health promotion practice. To advance this endeavor, behavior change theories provide a framework that can both identify critical predictors of specific behaviors and inform interventions that affect those behaviors (Fishbein and Cappella, 2006; Glanz

et al., 2002; Leventhal *et al.*, 2007; Slater, 1999). Many empirical studies have applied theoretical concepts drawn from well-established theories to test their effects on various health behaviors. But health communication researchers have only begun to explore the extent to which certain theories have been put into practice by campaigners and others whose purpose is to communicate about health issues.

As several researchers have suggested, one way to explore this question is to perform content analysis of health messages. Such studies have shown that few existing campaigns seem to have been directly informed by theories of behavior change. For example, in a content analysis of anti-drug public service announcements, Stephenson (2002) and Stephenson and Quick (2005) found that less than half of the PSAs they examined reflected the influence of scientifically tested theories. In the smoking context, only a handful of studies have examined the content of anti-smoking ads, and most of those focus predominantly on topics such as the perceived risks of smoking, or on persuasive appeals and executional styles (e.g. Beaudoin, 2002). However, there is one study that examined the application of health behavior change theories and their relevant concepts. Focusing on anti-smoking ads, Cohen *et al.* (2007) found that 61 percent of the ads presented the benefits of not smoking, while 17 percent presented perceived barriers.

To further explore how online anti-smoking advocates have used behavior change theories, the following analysis examines anti-smoking websites to determine whether they have been informed by four theories that have proven influential in the scientific study of health beliefs, attitudes, and behaviors. These theories are the health belief model, social cognitive theory, the theory of reasoned action/theory of planned behavior, and the transtheoretical model. These theories have been found to be effective across various health contexts, and researchers have recommended their use in the development of intervention strategies (e.g. Cohen *et al.*, 2007; Doshi *et al.*, 2003; Slater, 2006). To establish the context for the current study's content analysis, the following sections describe each theory.

Health belief model (HBM)

The health belief model explains and predicts health behaviors by focusing on individuals' attitudes and beliefs. It identifies six determinants that facilitate healthy behaviors:

(1) *Perceived susceptibility*, or the perception of getting a condition.

(2) *Perceived severity*, or the perception of the seriousness of a condition and its consequences.

(3) *Perceived benefits*, or the perception of receiving tangible and psychological benefits by performing the advised action to reduce risk or seriousness of impact.

(4) *Perceived barriers*, or the perception of having to pay tangible and psychological costs of the advised action.

(5) *Self-efficacy*, or the conviction of being able to successfully execute the healthy behavior to achieve the desired outcome.

(6) *Cues to action*, or strategies to activate readiness (Glanz and Rimer, 2005; Janz and Becker, 1984; Rosenstock *et al.*, 1994).

Anti-smoking websites would benefit from using the health belief model because an awareness of these determinants can inform both communicators' and internet users' efforts to develop anti-smoking interventions. In general, the model advises health communicators to understand the following about their target audiences: how susceptible they feel toward the health problem; whether or not they think the problem is serious; and whether or not the suggested healthy action could sidestep risks while bringing acceptable costs and benefits (Glanz and Rimer, 2005). The health belief model has been widely applied to a variety of health behaviors (Rosenstock et al., 1994), including smoking prevention and cessation (e.g. Manfredi et al., 1998; Janz and Becker, 1984; Tessaro et al., 1997). Studies have found that some of the model's components have a definite relation to individuals' health behavior or behavioral intention. For example, perceived severity was found to be related to the probability of quitting smoking (Pederson et al., 1984). The level of perceived susceptibility showed a negative relationship with smoking, and it also related to smokers' desire and intention to quit (Manfredi et al., 1998; Tessaro et al., 1997). Thus, anti-smoking websites that provide information guided by these concepts may achieve their goals more effectively.

Social cognitive theory (SCT)
The basic premise of social cognitive theory is that people learn not only from their own experiences but also from observing how others behave and what results their behavior produces (Bandura, 2001). The theory identifies a triadic interaction among internal factors, external factors, and behavior. Internal factors include motivational forces and personal traits. One of these factors, self-efficacy, is perhaps the most prominently and extensively studied concept in health communication research. Self-efficacy is a person's internal belief that he or she can organize and execute the courses of action necessary for achieving an intended goal (Bandura, 1997). It is a useful and important internal force that can make people do the following: quit smoking (Stuart et al., 1994; Manfredi et al., 1998); use condoms (Abbey et al., 2007; Kvalem and Traeen, 2000); engage in more physical activity (Doshi et al., 2003; Morris et al., 2008); and change risky behaviors (Schwarzer and Fuchs, 1995). But on its own, self-efficacy may not be sufficient unless there are other external incentives and driving forces such as other people's encouragement, behavioral modeling, and the promise of rewards.

The social cognitive theory has been applied in various intervention programs. It can enhance online health promotion because it stresses the importance of helpful and harmful environmental factors. "Pro-environments" should be developed because they can encourage behavior change, while "anti-environments" should be constrained because they may deter behavior change. In particular, social cognitive theory guides specific strategies that highlight behavioral reinforcement, emotional coping, observational learning, and self-control (Barnowski et al., 2002).

Theory of reasoned action (TRA)/theory of planned behavior (TPB)
Often grouped together, the theory of reasoned action and the theory of planned behavior explain the relationship between behavior on one hand and beliefs, attitudes, and intentions on the other. In other words, behaviors are dependent on people's intentions, which are determined by their attitudes (i.e. beliefs and values about the outcome of a behavior) and subjective norms (i.e. beliefs about how significant others

perceive one's own behavior). The theory of planned behavior extends the theory of reasoned action by including a perceived behavioral control, defined as a person's perceptions of his or her ability or feelings of self-efficacy to perform a behavior.

Anti-smoking websites would benefit from using these two theories because they have been extensively tested in various health contexts and found to be effective (Armitage and Conner, 2001). Particularly related to intervention strategies, the theories have been used to present beliefs and information that can form favorable attitudes towards the behavior and support the behavior by indicating specific benefits.

Transtheoretical model (TTM)

Also known as the stage of action theory, the transtheoretical model posits that people change their behavior through different stages of action (Prochaska and Velicer, 1997; Glanz and Rimer, 2005). The number of action stages identified has changed over time, and it may vary across health contexts, but five stages were originally proposed:

(1) *Precontemplation*, when people have no intention to change behavior in the near future.

(2) *Contemplation*, when people are aware that a problem exists, are seriously thinking about overcoming it, but have not yet committed to action.

(3) *Preparation*, when people intend to take action and have started to make changes.

(4) *Action*, when people modify their behavior or environment to overcome their problems and reach certain goals.

(5) *Maintenance*, when people maintain behavior changes for six months or more (Dunn, 2000; Prochaska and DiClemente, 1983).

Anti-smoking websites would benefit from using insights from the transtheoretical model that are relevant to a specific type of audience targeting. The model suggests that communication messages should target people differently throughout the various stages of behavior change. For example, action-oriented messages may be effective with people in the decision or action stages but less effective with those in the pre-contemplation or contemplation stages (Prochaska *et al.*, 1992). This model has been successfully applied to many health contexts, including smoking and drug cessation, weight control, condom use, and mammography screening (see Prochaska *et al.*, 1994). Its predictive value has been demonstrated particularly persuasively in the smoking cessation context (Dijkstra *et al.*, 1998; Perz *et al.*, 1996).

Theory-based intervention strategies

Collectively, these theories of behavior change have been found useful in various health contexts, and they share several important theoretical concepts and premises. For example, Bandura (2004) notes that the key concepts of social cognitive theory are also widely employed in the other three theories. But only a few of these concepts have been studied in existing content analyses. For example, Cohen *et al.* (2007) examined anti-smoking TV ads for their references to perceived benefit and risk, self-efficacy, and fear appeals. By contrast, our own content analysis takes the more extensive approach of Doshi *et al.* (2003), who identified 20 intervention strategies that were

generated from these theories. Table I lists these strategies, along with brief examples. Recall that some strategies emerge from general information common to all four theories of behavior change, while other strategies emerge only from one theory. For example, the strategies of stress management and negative affect management emerge only from social cognitive theory. Finally, the 20 strategies can be further classified into five categories: knowledge, cognitive strategies, affective strategies, behavioral strategies, and therapeutic interventions.

We adopt this schema of 20 strategies to examine the extent to which anti-smoking websites employ them and how their use differs between smoking prevention and cessation websites. Some anti-smoking websites may function mainly to disseminate information, for example facts about the kinds of diseases smoking can cause. But websites might also perform other functions: sharing feelings, for example through personal stories about loved ones dying of cancer; providing social support, for example by sharing successful stories of how former smokers managed to quit; and providing actual tools for behavior change, for example a timetable for smoking cessation efforts. If anti-smoking websites serve these different functions, particularly

Intervention strategy	Health belief model	Transtheoretical model	Theory of planned behavior	Social cognitive theory
Knowledge				
General information	×	×	×	×
Cognitive strategies				
Perceived benefits	×	×	×	×
Perceived barriers	×	×		×
Perceived risks	×		×	
Self-efficacy		×	×	×
Self-talk		×		×
Subjective norm		×	×	
Behavioral strategies				
Self-monitoring		×		×
Realistic goal setting				×
Time management				×
Stimulus control		×		×
Self-reward		×		×
Social support		×		×
Modeling/vicarious learning				×
Relapse prevention		×		×
Emotion-focused strategies				
Stress management				×
Negative affect management				×
Therapeutic interventions				
Skill building/overview		×		×
Increasing knowledge	×	×	×	
Motivational readiness		×		

Table I.
Intervention strategies
according to theories of
behavior change

Note: The intervention strategies and categories are adapted from Doshi *et al.* (2003)

if they differ in focus between smoking prevention and smoking cessation, then they are likely to use the theory-based intervention strategies in different ways. In other words, it is possible that websites devoted to smoking cessation may use more therapeutic intervention strategies that aim to change behaviors, while those devoted to smoking prevention may use more cognitive strategies that mainly provide information about benefits and risks. Thus, we ask the following research questions:

RQ1. What health behavior theories (i.e. HBM, SCT, TRA/TPB, TTM) and intervention strategies (i.e. cognitive, affective, behavioral, and therapeutic strategies) are most prevalent in anti-smoking websites?

RQ2. Will the theories and intervention strategies used in anti-smoking websites differ by intervention types (i.e. prevention vs cessation)?

Methods
Sample
Anti-smoking websites were collected in summer 2006, using such key terms as "anti-smoking," "smoking cessation," "smoking prevention," and "no smoking." The websites were found through the three major search engines that were known to be the most frequently used in the USA – msn.com, yahoo.com, and google.com (CMR, 2006a). This collection method also provides external validity because most internet users rely on search engines to seek health-related information online, as opposed to navigating directly to specific health websites (Fox, 2006).

We defined anti-smoking websites as those whose aims match up with the conceptual definitions of "communication campaign" (Rice and Atkin, 2002) and "social marketing" (Andreasen, 1995). Underlying these separate but related concepts is the idea that the ultimate goal of health communication campaigns is to serve the welfare of their target audiences and society in general, as opposed to marketing products and services. Accordingly, we included only websites whose purpose was to promote anti-smoking behavior rather than to sell anti-smoking products such as nicotine patches or medication. We also prioritized stand-alone anti-smoking websites, as opposed to anti-smoking pages within a website that is not predominantly devoted to smoking prevention or cessation.

We started looking at websites from the top down because search engines tend to list sites in the order of the webpage most visited by users and/or the webpage that corresponds best to the key word (CMR, 2006b). Although search engines report 100,000s of links as search results, they show only the 1,000 sites that have been visited the most. Moreover, the 1,000 results that a search generates are the number of webpages, not websites. Many of them were redundant results, broken links, or pages that serve different purposes on the same website. Among about 100 results per result page, less than 20 were stand-alone websites. After the first result page, the subsequent result pages showed many redundant pages and websites that were shown on the first page. Some, however, were unrelated. We sorted out anti-smoking websites that matched the operational definitions described above, and we deleted redundant items such as identical websites with different URLs. Finally, we removed all stand-alone websites dedicated to selling anti-smoking products such as nicotine patches, pills, and gums. After this thorough screening procedure, 67 unique websites were collected. The Appendix lists the results.

Coding scheme
There were three major coding categories:

(1) The 20 types of intervention strategies.

(2) Website sponsor.

(3) Type of anti-smoking website – prevention or cessation.

First, the 20 intervention strategies identified by Doshi *et al.* (2003) were modified in
their operational definitions to fit the smoking context (see Table I for information on
which strategies reflect which theories; see the list below for operational definitions)[1].
Second, we adopted types and sponsors of anti-smoking websites from past
anti-smoking studies and national intervention programs (Bock *et al.*, 2004; Goldman
and Glantz, 1998; Wakefield *et al.*, 2006).

Coding procedures
Each anti-smoking website served as a unit of analysis. Three coders who were blind
to the hypotheses coded the websites independently. These coders were trained during
multiple sessions and group discussions in which each coder shared meanings and
pointed out nuances about the variables to code. Based on results of pilot-testing, a
series of training sessions, and discussions, the coding scheme was further developed
with more detailed operational definitions for each item:

(1) *Knowledge*:

· *General information* (0.95). Provides general information or guidelines about
smoking (e.g. prevalence of anti-smoking among adults; expert
recommendations for quitting smoking; statistics).

(2) *Cognitive strategies*:

· *Perceived benefits* (0.78). Provides general information or guidelines about
the benefits of quitting smoking or not starting smoking (e.g. feel better,
experience better health, save money for not buying cigarettes).

· *Perceived barriers* (0.83). Provides general information or guidelines about
barriers or disadvantages to quitting smoking/not starting smoking (e.g.
time constraints).

· *Perceived risks* (0.79). Provides general information or guidelines about the
risks of smoking (e.g. smoking causes cancer).

· *Self-efficacy* (0.76). Mentions concept of self-efficacy and/or its importance
(e.g. confidence-building) in starting and maintaining smoking
cessation/smoking prevention (e.g. "you can do it").

· *Self-talk* (0.87). Provides general information or guidelines about self-talk for
smoking cessation/smoking prevention, or gives examples of self-statements
users can make. Assesses user's personal self-talk techniques (e.g. "do you
tell yourself to quit smoking?").

· *Subjective norm* (0.93). Provides general information or guidelines for
perception of how much significant others approve of smoking behaviors
(e.g. "quitting smoking is a socially acceptable and encouraged activity; your
spouse will love it if you quit smoking").

(3) *Behavioral strategies*:

- *Self-monitoring* (1.00). Provides general information or guidelines about self-monitoring techniques regarding what people do to keep track of their smoking behaviors (e.g. keeping a written record of how long they stop smoking each day).

- *Realistic goal setting* (0.78). Provides general information or guidelines about goal-setting for smoking cessation/smoking prevention (e.g. "you can try a new method (nicotine patches) and join an online smoking cessation group").

- *Time management* (0.84). Provides general information or guidelines on time management and schedules regarding smoking cessation/smoking prevention.

- *Stimulus control* (0.85). Provides general information and guidelines about stimulus-control regarding smoking cessation/smoking prevention (e.g. "things to remind yourself to quit smoking").

- *Self-reward* (0.84). Provides general information or guidelines about self-reward techniques such as self-praise.

- *Social support* (0.76). Provides general information or guidelines about social support (e.g. community resources including local events/contests, online support groups).

- *Modeling/vicarious learning* (0.85). Provides general information and guidelines about modeling or vicarious learning as a method to start quitting smoking or to maintain non-smoking routine (e.g. other people who quit smoking can be role models).

- *Relapse prevention* (0.85). Provides general information and guidelines about relapse and relapse prevention (e.g. "5 ways to recover once you've relapsed").

(4) *Emotion-focused strategies*:

- *Stress management* (0.89). Provides general information and guidelines about stress management techniques to enable users to quit smoking or not to start smoking (e.g. relaxation techniques, biofeedback, or meditation that reduces users' stress so that they quit smoking).

- *Negative affect management* (0.81). Provides general information and guidelines about affect (mood) management techniques to increase likelihood of quitting or not starting smoking.

(5) *Therapeutic interventions*:

- *Skill building* (0.86). Provides general information and guidelines about skill-building to quit smoking or not to start smoking (e.g. use of cognitive or behavioral skills to help start or continue quitting smoking).

- *Increasing knowledge* (0.83). Provides general information, guidelines, or resources for additional information (e.g. links to other websites, referral sources, "a free 149 page quit smoking book in PDF format by Joel Spitzer of Chicago, the internet's leading authority").

- *Motivational readiness* (0.75). Provides general information about motivational readiness (e.g. "If you are ready, you are more likely to start quitting smoking; it needs to be the right time for you").

Note: numbers in the parentheses of each item indicate the inter-coder reliability coefficients. The coefficients can range from 0.0 to 1.00, and the number closer to 1.00 indicates that the coding categories were highly agreed upon by the coders and are thus reliable. As a rule-of-thumb, coefficients higher than 0.75 are considered to be reliable. Definitions of each intervention strategy were adapted from those of Doshi *et al.* (2003) and modified to fit the anti-smoking context.

To compute the reliability of the coders' findings, we adopted Perreault and Leigh's (1989) index (P/L index). This index is known to be appropriate for nominal variables, and it applies in this case because all the anti-smoking intervention strategies were measured with a binary scale, "yes, present" or "no, not present." The index is also known to be relatively rigorous and to take chance agreements into account (Rust and Cooil, 1994). The average inter-coder reliability was 0.84. Moreover, all reliability coefficients equaled or exceeded the rule-of-thumb size of 0.75 (Rust and Cooil, 1994), ranging from 0.75 to 1.00 (see the list above for inter-coder reliability coefficients for each item). Any disagreements in coding were resolved by further discussions among the coders.

Analytic strategy
First, to examine research question 1, we created a standard percent scale for the four theories, similar to that used by Doshi *et al.* (2003). For example, to examine how extensively the health belief model was used, we counted each of the five intervention strategies (see Table I) associated with the health belief model. Presence of each of the five intervention strategies was counted and coded as "1." This means that, if a website included all five intervention strategies associated with the health belief model, the score would be 5. If it included none of the five strategies, the score would be 0. As a result, a scale ranging from 0 (none of the health belief model strategies presented) to 5 (all of the model's strategies presented) was constructed. The same procedure was performed on each of the other behavior change theories.

Next, the scale was transformed to a percentage (i.e. HBM scale/5 * 100, social cognitive theory/16 * 100) because each theory contains a different number of intervention strategies. By transforming into a percentage in each case, we were able to standardize all the theories of our inquiry within the same range (0 to 100 percent) and to compare the proportion of each theory employed in each anti-smoking website.

Second, in addition to examining the extent to which anti-smoking websites used each of the four theories, we compared how extensively each website used different types of intervention strategies – cognitive, behavioral, emotion-focused, and therapeutic (note that knowledge is excluded because it refers to mere information rather than an intervention strategy). As shown in Table I, these four types of intervention strategies can be measured by summing each corresponding item and transforming the result into a percentage through the same procedure used for the health behavior theories (see the formula in the note under the table).

Results

Descriptive statistics

Among the 67 anti-smoking websites, 47.8 percent were sponsored or created by individuals, followed by non-profit organizations (37.3 percent), government organizations (11.9 percent), medical organization/professionals (1.5 percent), and tobacco companies (1.5 percent). Individual websites were defined as those that indicate specific persons' names or indicate no sponsor. Examples of individuals associated with such websites would be the following: past smokers who want to help smokers quit; loved ones of a smoker who died because of smoking; celebrities (e.g. www.smokingisugly.com/main.html by Christy Turlington); or people who indicated their names but no further information (e.g. www.quitsmokingsupport.com). In the case of tobacco companies, some actually provide anti-smoking websites (e.g. http://keepkidsfromsmoking.com). To be sure, tobacco control experts doubt the effectiveness of anti-smoking campaigns and websites sponsored by tobacco companies. But from the internet user's perspective, such websites would appear as a stand-alone anti-smoking website similar to others.

For types of anti-smoking websites, about 51 percent focused on smoking cessation, and a little more than 43 percent focused on smoking prevention. Four websites (6 percent) did not specify either smoking prevention or cessation. Instead, their main purpose was to advocate smoke-free environments and smoking bans in public places such as restaurants, bars, hotels, and airports (e.g. smokefreemichigan.org):

> *RQ1.* Extent to which the health behavior theories and intervention strategies were used.

The behavior change theory that was used most frequently in anti-smoking websites was the health belief model (M = 51 percent, SD = 24 percent), followed by the theory of reasoned action/theory of planned behavior (M = 42 percent, SD = 19 percent), the transtheoretical model (M = 33 percent, SD = 19 percent), and social cognitive theory (M = 28 percent, SD = 18 percent). In other words, on average, anti-smoking websites tended to employ strategies associated with the health belief model the most, and strategies associated with social cognitive theory the least.

Given that some of the behavior change intervention strategies overlap across some or all of the four theories, it is worthwhile to examine each of the strategies both individually and categorically. As shown in Table II, about 97 percent of the websites included general information (n = 5 websites), followed by social support (83.6 percent), increasing knowledge (61.2 percent), and perceived risks (55.2 percent). By contrast, none of the websites employed self-monitoring, and only one used the subjective norm strategy. In terms of each of the five categories of intervention strategies, the websites used about 54 percent of the therapeutic strategies (e.g. for motivational readiness: "If you are ready, you are more likely to start to quit smoking"). By comparison, the websites used only less than one third of the strategies that comprise each of the other three intervention types: 20.7 percent of the cognitive strategies (e.g. "What do you know about the benefits of quitting smoking?"); 9.7 percent of the affective strategies (e.g. "Imagine being 44 years-young and fighting for your life. Click the above image to follow Kim's nightmare"); and 26.9 percent of the behavioral strategies (e.g. "quitting by gradual withdrawal," "stop smoking benefits timetable"):

> *RQ2.* Extent to which health behavior theories and intervention strategies were used according to intervention type.

Intervention strategy	Frequency (*n*)	%
Knowledge		
General information	65	97.0
Cognitive strategies		20.65 (18.82)[*]
Perceived benefits	20	29.9
Perceived barriers	8	11.9
Perceived risks	37	55.2
Self-efficacy	6	9.0
Self-talk	11	16.4
Subjective norm	1	1.5
Behavioral strategies		26.87(21.79)[*]
Self-monitoring	0	0.0
Realistic goal setting	18	26.9
Time management	13	19.4
Stimulus control	11	16.4
Self-reward	13	19.4
Social support	56	83.6
Modeling/vicarious learning	19	28.4
Relapse prevention	14	20.9
Emotion-focused strategies		9.70 (24.98)[*]
Stress management	6	9.0
Negative affect management	7	10.4
Therapeutic interventions		54.23 (41.37)[*]
Skill building/overview	31	46.3
Increasing knowledge	41	61.2
Motivational readiness	37	55.2

Notes: $n = 67$; [*]Mean (standard deviation) for each category: the percentage was computed using the following formula to be comparable across the intervention strategies with a different scale: {(Sum of the items that comprise each intervention strategy − "yes, present = 1" and "no, not present = 0")/the number of the items) × 100 percent}

Table II.
Frequency of each
intervention strategy
employed in the websites

Our second research question asked whether some of the websites may have used the various health behavior theories and intervention strategies differently depending on whether their focus is smoking prevention or smoking cessation. Table III reports the independent-samples *t*-test results.

Our findings indicate that websites focusing on smoking prevention seemed to use all the theories and intervention strategies less extensively than websites focused on smoking cessation did. In particular, prevention-focused websites used the health belief model significantly less than cessation-focused websites ($t(61) = -2.21, p = 0.03$). Some marginal differences were found for the transtheoretical model ($t(61) = -1.70, p = 0.09$), social cognitive theory ($t(61) = -1.73$, $p = 0.088$), cognition-focused intervention strategies ($t(61) = -1.89$, $p = 0.06$), and therapeutic intervention strategies ($t(54.51) = -1.94$, $p = 0.06$). According to a cross-tabulation analysis between each of the intervention items and type of anti-smoking websites, cessation-focused websites tended to use the strategies of perceived benefit (Chi-square $(1) = 5.22$, $p = 0.02$, also Fisher's exact test[2]; $p = 0.03$) and motivational readiness (Chi-square $(1) = 6.67$, $p = 0.01$, also Fisher's exact test; $p = 0.01$) more than prevention-focused websites did.

	Prevention ($n = 29$)		Cessation ($n = 34$)				
	Mean (%)	SD (%)	Mean (%)	SD (%)	t-value	df	p-value
Theories of behavior changes							
Health belief model	46.21	20.77	58.82	24.09	− 2.21	61	0.03
Trans-theoretical model	30.54	19.92	38.45	16.96	− 1.70	61	0.09
Theory of reasoned action	39.66	18.59	47.06	18.56	− 1.58	61	0.12
Social cognitive theory	24.78	17.56	32.35	17.50	− 1.73	61	0.09
Categories of intervention strategies							
Cognitive strategies	17.24	19.15	25.98	17.50	− 1.89	61	0.06
Emotion-focused strategies	5.17	15.50	14.71	31.45	− 1.56[*]	49.71	0.13
Behavioral strategies	23.71	21.74	31.62	21.59	− 1.45[*]	61	0.15
Therapeutic strategy	47.13	43.20	66.67	35.77	− 1.94[*]	54.51	0.06

Note: [*]Because F was significant in Levene's test for equality of variances ($p < 0.05$), equal variances were not assumed

Table III.
Use of intervention strategies according to intervention type

Discussion

Despite the internet's ever increasing popularity as a health promotion and intervention tool, there has been very little research on the prevalence and strategies of anti-smoking websites. This study examined the extent to which anti-smoking websites use specific intervention strategies guided by four prominent behavior change theories that are known to be effective: the health belief model (HBM), the theory of reasoned action/theory of planned behavior (TRA/TPB), the transtheoretical model (TTM), and social cognitive theory (SCT). Some studies have analyzed anti-smoking campaigns in terms of advertising content (Goldman and Glantz, 1998), persuasive appeals (Beaudoin, 2002), and website usability (Bock *et al.*, 2004). But few studies have examined how online anti-smoking campaigns use intervention strategies that have been informed by scientifically tested theories. Adopting the schema developed by Doshi *et al.* (2003), our analysis provides a more comprehensive account of these uses.

First and foremost, the anti-smoking websites examined in this study seemed to focus more on providing general information rather than developing theory-based intervention strategies. Almost all the websites examined provided general knowledge and guidelines about smoking, while the most dominantly used theory was the health belief model, with about 50 percent of its components used.

This finding is consistent with that of Doshi *et al.* (2003), who determined that physical activity websites provided general knowledge and guidance but developed very few intervention strategies based on the predominant behavior change theories. In addition, it is discouraging to find that only one-third of the anti-smoking websites use either the transtheoretical model or social cognitive theory. The transtheoretical model is known to be particularly effective in informing smoking interventions (Slater, 1999), while social cognitive theory is a comprehensive theory that can integrate multiple approaches to behavior change (Bandura, 2004; Fishbein and Cappella, 2006). Specifically, the anti-smoking websites rarely used the strategies of self-efficacy, subjective norm, and self-monitoring. This finding about websites is consistent with a recent content-analytic study of anti-smoking campaigns on television. Cohen *et al.* (2007) found that anti-smoking TV ads tended to focus more heavily on the severity of

harm than on self-efficacy and subjective norm. Similarly, our findings indicate that perceived risk of smoking (55.2 percent) is more prevalent than self-efficacy (9 percent) and subjective norm (1.5 percent).

But anti-smoking websites might be more effective if they were to use these two strategies. Health communication research has demonstrated significant associations between individuals' own smoking behavior and their subjective norm, which refers to the perception that others who are important to them think they should not smoke (Pechmann and Reibling, 2000). This significant association also exists for self-efficacy, which refers to smokers' belief that they can either stop smoking or resist peer pressure to take up the habit in the first place (Siegel, 2002; Wakefield *et al.*, 2006). Deploying these concepts to influence internet users' behavior may improve anti-smoking websites' ability to achieve their intended goals.

On the other hand, as we expected, our findings suggest that smoking cessation websites tended to use health behavior change theories more than smoking prevention websites did. This was particularly true of the health belief model. But at the same time, we should note that smoking cessation websites did not use more affective and behavioral strategies than prevention websites did. Studies have found that smoking cessation programs are more effective when they use emotional and behavioral strategies, and when they incorporate stage-specific interventions, which could be informed by the transtheoretical model (Dijkstra *et al.*, 1998; Perz *et al.*, 1996). Smoking cessation websites would likely become more effective if they were to employ these strategies more frequently and saliently, particularly in their efforts to tailor anti-smoking messages to target audiences at different stages of the quitting process.

Limitations and directions for future research
First, our sample size is rather small, which may result in lack of sufficient statistical power. The small sample size is partially due to our strict definition of "anti-smoking websites," which excludes websites that promote products that aid in smoking cessation. However, we contend that this restrictive sampling provides a better way to identify websites exclusively devoted to anti-smoking. We also used a more rigorous statistical test that is relatively insensitive to sample size (Fisher's exact test; Fleiss, 1981). Nevertheless, future studies should examine smoking-related product websites with a larger sample size to test whether the findings in this study also hold true for product websites.

Second, we adopted 20 intervention strategies that Doshi *et al.* (2003) developed for their assessment of physical activity websites, based on the four prominent behavior change theories. Although we modified this schema of strategies to fit the smoking context, we may have missed some important strategies that work particularly well in smoking intervention programs. Future research should develop these theory-based strategies further and replicate them in other health contexts such as drug use, obesity, cancer, and heart disease.

Considering these limitations, we recommend a consumer response study to investigate whether anti-smoking websites or other health promotion websites that use behavior change theories are indeed more effective than ones that do not. Such a study could also identify the types of people who are more receptive to certain intervention strategies as opposed to others. For example, as past research has demonstrated (Dijkstra *et al.*, 1998; Perz *et al.*, 1996), one interesting empirical question concerns whether people

who try to quit smoking and visit a smoking cessation website may prefer either emotional strategies or transtheoretical model-based strategies over cognitive strategies.

Implications

Despite some limitations, this study contributes to current knowledge about what kinds of anti-smoking messages are available online and how extensively they use theory-based intervention strategies. On the one hand, anti-smoking website designers seem to be providing and disseminating adequate information about smoking. But on the other hand, they should take more advantage of the benefits that could result from using theory-based intervention strategies, particularly in their efforts to produce affective and behavioral changes. Examining what is available online is a small yet necessary step toward the next stages of exploring how much people are exposed to and influenced by anti-smoking messages online (Ribisl, 2003). Health communication researchers have devoted decades of effort to identifying what kinds of behavior change theories are effective in specific types of intervention programs and under specific social and psychological conditions. But anti-smoking advocates and other health campaigners still have much to do to translate those theories into practice online.

Notes

1. We express our gratitude to Dr Amol Doshi, who shared the coding scheme that he and his colleagues developed for their study.

2. In addition to the chi-square test that is typically employed to determine statistical significance for the associations between categorical variables, we used Fisher's exact test for determining statistical significance. Fisher's exact test is known to be a more appropriate alternative to the Chi-square test, especially when the sample size is small and 2-by-2 tables are highly unbalanced, which is true of our study (Fleiss, 1981).

References

Abbey, A., Parkhill, M., Buck, P. and Saenz, C. (2007), "Condom use with a casual partner: what distinguishes college students' use when intoxicated?", *Psychology of Addictive Behaviors*, Vol. 21, pp. 76-83.

Andreasen, A.R. (1995), *Marketing Social Change: Changing Behavior to Promote Health, Social Development, and the Environment*, Jossey-Bass, San Francisco, CA.

Armitage, C. and Conner, M. (2001), "Efficacy of the theory of planned behaviour: a meta-analytic review", *British Journal of Social Psychology*, Vol. 40, pp. 471-99.

Bandura, A. (1997), *Self-Efficacy: The Exercise of Control*, W.H. Freeman, New York, NY.

Bandura, A. (2001), "Social cognitive theory of mass communication", *Media Psychology*, Vol. 3, pp. 265-99.

Bandura, A. (2004), "Health promotion by social cognitive means", *Health Education and Behavior*, Vol. 31, pp. 143-64.

Barnowski, T., Perry, C.L. and Parcel, G. (2002), "How individuals, environments, and health behavior interact: social learning theory", in Glanz, K., Lewis, F.M. and Rimer, B.K. (Eds), *Health Behavior and Health Education*, Jossey-Bass, San Francisco, CA, pp. 165-84.

Beaudoin, C.E. (2002), "Exploring anti-smoking ads: appeals, themes, and consequences", *Journal of Health Communication*, Vol. 7, pp. 123-37.

Bock, B.C., Graham, A.L., Sciamanna, C.N., Krishnamoorthy, J., Whiteley, J., Carmona-Barros, R., Niaura, R. and Abrams, D. (2004), "Smoking cessation treatment on the internet: content, quality, and usability", *Nicotine and Tobacco Research*, Vol. 6, pp. 207-19.

Center for Media Research (CMR) (2006a), "Pick influential search engine by category, but Yahoo! Safe bet", February 21, available at: www.centerformediaresearch.com/cfmr_brief. cfm?fnl=060221 (accessed September 2006).

Center for Media Research (CMR) (2006b), "First page search engine listing provides brand lift", April 27, available at: www.centerformediaresearch.com/cfmr_brief.cfm?fnl=060427 (accessed August 2006).

Cohen, E.L., Shumate, M.D. and Gold, A. (2007), "Anti-smoking media campaign messages: theory and practice", *Health Communication*, Vol. 22 No. 2, pp. 91-102.

Dijkstra, A., De Vries, H., Roijackers, J. and van Breukelen, G. (1998), "Tailored interventions to communicate stage-matched information to smokers in different motivational stages", *Journal of Consulting and Clinical Psychology*, Vol. 66, pp. 549-57.

Doshi, A., Patrick, K., Sallis, J.F. and Calfas, K. (2003), "Evaluation of physical activity web sites for use of behavior change theories", *Annals of Behavioral Medicine*, Vol. 25 No. 2, pp. 105-11.

Duke, J.C., Allen, J.A., Pederson, L.L., Mowery, P.D., Xiao, H. and Sargent, J.D. (2009), "Reported exposure to pro-tobacco messages in the media: trends among youth in the United States, 2000-2004", *American Journal of Health Promotion*, Vol. 23 No. 3, pp. 195-202.

Dunn, P. (2000), "The stages and processes of change model: implications for social work ATOD practice", in Abbott, A.A. (Ed.), *Alcohol, Tobacco, and Other Drugs*, National Association of Social Workers Press, Washington, DC, pp. 111-43.

Evers, K.E. (2006), "E-health promotion: the use of the internet for health promotion", *American Journal of Health Promotion*, Vol. 20 No. 4, pp. 1-7.

Fishbein, M. and Cappella, J.N. (2006), "The role of theory in developing effective health communications", *Journal of Communication*, Vol. 56, pp. 1-17.

Fleiss, J.L. (1981), *Statistical Methods for Rates and Proportions*, John Wiley & Sons, New York, NY.

Fox, S. (2006), "Online health search 2006", available at: www.pewinternet.org/PPF/r/190/report_display.asp (accessed April 2007).

Fox, S. and Jones, S. (2009), "Generations online in 2009", available at: www.pewinternet.org/w/media//Files/Reports/2009/PIP_Generations_2009.pdf (accessed April 2009).

Friedman, D. and Tanner, A. (2007), "Reading difficulty level of medical resources on television web sites: recommendations for a social practices approach to consumer health literacy", *Journal of Consumer Health on the Internet*, Vol. 11 No. 4, pp. 43-60.

Glanz, K. and Rimer, B.K. (2005), *Theory at a Glance: A Guide for Health Promotion Practice*, National Institute of Health, Washington, DC.

Glanz, K., Rimer, B.K. and Lewis, F.M. (2002), *Health Behavior and Health Education: Theory, Research and Practice*, Wiley & Sons, San Francisco, CA.

Goldman, L. and Glantz, S. (1998), "Evaluation of anti-smoking advertising campaigns", *The Journal of the American Medical Association*, Vol. 279, pp. 772-7.

Hong, T. and Cody, M.J. (2002), "Presence of pro-tobacco messages on the web", *Journal of Health Communication*, Vol. 7, pp. 273-307.

Janz, N.K. and Becker, M.H. (1984), "The health belief model: a decade later", *Health Education Quarterly*, Vol. 11 No. 1, pp. 1-47.

Kvalem, I.L. and Traeen, B. (2000), "Self-efficacy, scripts of love and intention to use condoms among Norwegian adolescents", *Journal of Youth and Adolescence*, Vol. 29, pp. 337-53.

LaRose, R., Mastro, D. and Eastin, M.S. (2001), "Understanding internet usage: a social cognitive approach to uses and gratifications", *Social Science and Computer Review*, Vol. 19, pp. 395-413.

Leventhal, H., Musumeci, T.J. and Contrada, R.J. (2007), "Current issues and new directions in psychology and health: theory, translation, and evidence-based practice", *Psychology and Health*, Vol. 22 No. 4, pp. 381-6.

Lustria, M. (2009), "Can interactivity make a difference? Effects of interactivity on the comprehension of and attitudes toward online health content", *Journal of the American Society for Information Science and Technology*, Vol. 58 No. 6, pp. 766-76.

McMillan, S. (1999), "Health communication and the internet: relations between interactive characteristics of the medium and site creators, content, and purpose", *Health Communication*, Vol. 11, pp. 375-90.

Manfredi, C., Lacey, L.P., Warnecke, R. and Petraitis, J. (1998), "Sociopsychological correlates of motivation to quit smoking among low-SES Amrican-American women", *Health Education and Behavior*, Vol. 25, pp. 304-18.

Morris, K.S., McAuley, E. and Motl, R.W. (2008), "Neighborhood satisfaction, functional limitations, and self-efficacy influences on physical activity in older women", *The International Journal of Behavioral Nutrition and Physical Activity*, Vol. 5, pp. 1-8.

Paek, H.-J., Yu, H. and Bae, B. (2009), "Is online health promotion culture-bound? Cultural characteristics manifested in US and South Korean anti-smoking websites", *Journal of Advertising*, Vol. 38 No. 1, pp. 35-47.

Pechmann, C. and Reibling, E.T. (2000), "Planning an effective anti-smoking mass media campaign targeting adolescents", *Journal of Public Health Management and Practice*, Vol. 6 No. 3, pp. 80-94.

Pederson, L.L., Wanklin, J.M. and Baskerville, J.C. (1984), "The role of health beliefs in compliance with physician advice to quit smoking", *Social Science and Medicine*, Vol. 19, pp. 573-80.

Perreault, W.D. and Leigh, L.E. (1989), "Reliability of nominal data based on qualitative judgments", *Journal of Marketing Research*, Vol. 26, pp. 135-48.

Perz, C.A., DiClemente, C.C. and Carbonari, J.P. (1996), "Doing the right thing at the right time? The interaction of stages and processes of change in successful smoking cessation", *Health Psychology*, Vol. 15, pp. 462-8.

Pleis, J.R., Lucas, J.W. and Ward, B.W. (2008), "Summary health statistics for US adults: National Health Interview Survey", *Vital Health Stat.*, Series 10 No. 242, pp. 1-157.

Prochaska, J.O. and DiClemente, C.C. (1983), "Stages and processes of self-change of smoking: toward an integrative model of change", *Journal of Consulting and Clinical Psychology*, Vol. 51, pp. 390-5.

Prochaska, J.O. and Velicer, W.F. (1997), "The transtheoretical model of health behavior change", *American Journal of Health Promotion*, Vol. 12, pp. 38-48.

Prochaska, J.O., DiClemente, C.C. and Norcross, J.C. (1992), "In search of how people change", *American Psychology*, Vol. 47, pp. 1102-14.

Prochaska, J.O., Velicer, W.F., Rossi, J.S., Goldstein, M.G., Marcus, B.H., Rakowski, W., Fiore, C., Harlow, L.L., Redding, C.A., Resonbloom, D. and Rossi, S.R. (1994), "Stages of change and decisional balance for 12 problem behaviors", *Health Psychology*, Vol. 13 No. 1, pp. 39-46.

Ribisl, K.M. (2003), "The potential of the internet as a medium to encourage and discourage youth tobacco use", *Tobacco Control*, Vol. 12, pp. 48-59.

Ribisl, K.M., Lee, R.E., Henriksen, L. and Haladjian, H.H. (2003), "A content analysis of web sites promoting smoking culture and lifestyle", *Health Education and Behavior*, Vol. 30 No. 1, pp. 64-78.

Rice, R.E. and Atkin, C.K. (2002), "Communication campaigns: theory, design, implementation, and evaluation", in Bryant, J. and Zillman, D. (Eds), *Media Effects: Advances in Theory and Research*, Lawrence Erlbaum, Mahwah, NJ, pp. 427-51.

Rosenstock, I., Strecher, V. and Becker, M. (1994), "The health belief model and HIV risk behavior change", in DiClemente, R.J. and Peterson, J.L. (Eds), *Preventing AIDS: Theories and Methods of Behavioral Interventions*, Plenum Press, New York, NY, pp. 5-24.

Rust, R.T. and Cooil, B. (1994), "Reliability measures for qualitative data: theory and implications", *Journal of Marketing Research*, Vol. 31, pp. 1-14.

Schwarzer, R. and Fuchs, R. (1995), "Changing risk behaviors and adopting health behaviors: the role of self-efficacy beliefs", in Bandura, A. (Ed.), *Self-efficacy in Changing Societies*, Cambridge University Press, New York, NY, pp. 1-45.

Shao, G. (2009), "Understanding the appeal of user-generated media: a uses and gratification perspective", *Internet Research*, Vol. 19 No. 1, pp. 7-25.

Siegel, M. (2002), "The effectiveness of state-level tobacco control interventions: a review of program implementation and behavioral outcomes", *Annual Review of Public Health*, Vol. 23, pp. 45-71.

Slater, M.D. (1999), "Integrating application of media effects, persuasion and behavior change theories to communication campaigns: a stages-of-change approach", *Health Communication*, Vol. 11, pp. 335-54.

Slater, M.D. (2006), "Specification and misspecification of theoretical foundations and logic models for health communication campaigns", *Health Communication*, Vol. 20 No. 2, pp. 149-57.

Stephenson, M.T. (2002), "Anti-drug public service announcements targeting parents: an analysis and evaluation", *Southern Communication Journal*, Vol. 67 No. 4, pp. 335-50.

Stephenson, M.T. and Quick, B.L. (2005), "Parent ads in the national youth anti-drug media campaign", *Journal of Health Communication*, Vol. 10, pp. 701-10.

Stuart, K., Borland, R. and McMurray, N. (1994), "Self-efficacy, health *locus* of control, and smoking cessation", *Addictive Behavior*, Vol. 19 No. 1, pp. 1-12.

Tessaro, I., Lyna, P., Rimer, B., Heisler, J., Woodsy-Powell, C., Yarnall, K. and Barber, L. (1997), "Readiness to change smoking behavior in a community health center population", *Journal of Community Health*, Vol. 22 No. 1, pp. 15-30.

Wakefield, M., Terry-McElrath, Y., Emery, S., Saffer, H., Chaloupka, F.J., Szczypka, G., Flay, B., O'Malley, P.M. and Johnston, L.D. (2006), "Effect of televised, tobacco company-funded smoking prevention advertising on youth smoking-related beliefs, intentions, and behavior", *American Journal of Public Health*, Vol. 96, pp. 2154-60.

Appendix. Anti-smoking websites analyzed in this study

- www.americanlegacy.org
- www.ansrmn.org
- www.anti-smoking.org
- www.ash.org

- www.ashtraymouth.com
- www.bestquitsmoking.com
- www.buttout.net
- www.californiasmokershelpline.org
- www.champss.org
- www.cigarette.com
- www.cigarette-smoking.net
- www.costkids.org
- www.gottaquit.com
- www.joechemo.org
- www.join-the-circle.org
- www.keepkidsfromsmoking.com
- www.kickbuttsday.org
- www.mascotcoalition.org
- www.nicotinevictims.com
- www.njgasp.org
- www.njrebel.com
- www.no-smoke.org
- www.notobacco.org
- www.nysmokefree.com
- www.pas-online.org
- www.protectlocalcontrol.org
- www.quit.com
- www.quit.org
- www.quit4good.com
- www.quitline.com
- www.quitnet.com
- www.quit-smoking-guide.com
- www.quitsmokingjournals.com
- www.quitsmokingstop.com
- www.quitsmokingsupport.com
- www.quitway.com
- www.secondhandsmokesyou.com
- www.smokefree.gov
- www.smokefree.net
- www.smokefreecapital.org
- www.smokefreecoalition.org
- www.smokefreeindiana.org
- www.smokefreejacksonville.com
- www.smokefreejeffco.org

- www.smokefreekids.com
- www.smokefreemd.org
- www.smokefreemichigan.org
- www.smokefreeseattle.org
- www.smokefreevirginia.org
- www.smoking-cessation.org
- www.smokingisugly.com
- www.standonline.org
- www.stepupnc.com
- www.stopsmokingcenter.net
- www.stop-smoking-tips.com
- www.stopthesmoke.com
- www.thetruth.com
- www.tobacco-facts.info
- www.tobaccofree.org
- www.tobaccofreedom.org
- www.tobaccofreekids.org
- www.tobaccofreelouisiana.org
- www.tobaccofreemaine.org
- www.tobaccofreeutah.org
- www.trytostop.org
- www.whyquit.com
- www.worldnotobaccoday.com

Corresponding author
Hye-Jin Paek can be contacted at: paekh@msu.edu