HOW DOES DRUG AND SUPPLEMENT MARKETING AFFECT A HEALTHY LIFESTYLE?

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HOW DOES DRUG AND SUPPLEMENT MARKETING AFFECT A HEALTHY LIFESTYLE?

This research investigates consumer reactions to the marketing of drugs and supplements and the consequences for a healthy lifestyle. A series of experiments provides evidence that drug marketing undermines intentions to engage in health-protective behaviors (i.e., a boomerang effect). The boomerang arises because drugs lower perceptions of health and efficacy, and reduce perceived importance of, and motivation to engage in, complementary health-protective behaviors. A combined intervention accompanying a drug remedy that targets both efficacy and motivation mitigates the drug boomerang and increases healthy lifestyle intentions.

A healthy lifestyle has been defined as minimizing and preventing health problems while maximizing personal well being (Bloch 1984; Divine and Lepisto 2005). A variety of health care products (i.e., health remedies) purport to aid consumers in adopting and maintaining a healthy lifestyle. One important distinction between such products is that of drugs versus supplements. Over-the-counter drugs are a common method for self-care by consumers (Wellner 1998), and consumers have also fostered the $13 billion supplement industry (Nutrition Business International 1998). Moreover, prescription drug advertising has grown rapidly from $40 million in 1989 to approximately $2.5 billion in 2002 (Main, Argo, and Huhmann 2004), and supplement advertising is also on the rise (Wilke 1997). Our research investigates consumer reactions to drug and supplement marketing and the implications for a healthy lifestyle. This research should be valuable to the public, regulatory agencies, the courts, Congress, the media, the business community, the medical and scientific communities as well as consumer advocacy and special interest groups.

THE MARKETING OF HEALTH REMEDIES

Research on health marketing has been premised on various theoretical frameworks, including protection motivation theory, the health belief model, and the theory of reasoned action. Most models in this area propose that health-protective behavior (i.e., stopping a risky behavior, or maintaining or starting a protective behavior) is a function of the probability and severity of health outcomes, the perceived effectiveness of the protective behavior, and the perceived costs and barriers to action (for a review, see Weinstein 1993). At the individual consumer level, health remedies are intended to facilitate protective behaviors and, as a result, *should* reduce consumer health risk. However, recent research by Bolton, Cohen, and Bloom (2006) suggests that problem status (consumer's relationship to the problem domain, or its

relative attractiveness) moderates the effects of remedy messages. Specifically, remedy messages *undermine* risk avoidance and increase risky behavior, especially among those most at risk. For example, as smoking increased, smoking cessation intentions decreased after exposure to a remedy (versus control) message for a nicotine replacement product (Bolton et. al 2006; Experiments 1 and 2). Similar results in other health and non-health domains were also found. These authors argue that consumers within the problem domain (i.e., relatively attracted to the risky behavior) perceive the remedy as a "get-out-of-jail-free card" that takes the risk out of risky behavior, thereby encouraging it (i.e., a boomerang effect).[1]

Within the health domain, there are many risky behaviors (e.g., high-fat eating, a sedentary lifestyle, smoking, excessive drinking) that are attractive to consumers and yet contribute to an unhealthy lifestyle that increases disease risk (e.g., heart disease, stroke, cancer, liver disease).[2] The present research investigates the psychological mechanisms that contribute to a boomerang effect of health remedies on healthy lifestyle intentions. The research also investigates whether the boomerang extends to both drugs and supplements as health remedies. On the surface, there may seem little reason to expect differences. For consumers within the problem domain, both drugs and supplements may be perceived as health remedies that reduce risk and thereby undermine risk avoidance via a healthy lifestyle. In contrast, however, we investigate whether consumer react differentially to drug versus supplement marketing. Specifically, how does drug and supplement marketing affect health-protective behaviors that contribute to a healthy lifestyle? As will be shown, differences in consumer reaction to drug and

[1] The terminology "boomerang" has been used in a number of well-established theoretical perspectives, including cognitive dissonance (e.g., Scher & Cooper 1989), social judgment theory (e.g., M. Sherif & Sherif 1967), and psychological reactance (e.g., Brehm 1966). We adopt the definition that boomerang effects are unintended consequences of a communications message (i.e., opposite to the position intended by the message).

[2] Of course, individual behavior and lifestyle contribute far more to certain disease states than others. In the latter case (e.g., depression), remedies may undermine risk perceptions but not boomerang on risk-avoidance—since there may be no individual lifestyle practices that contribute to the disease state and that some consumers find attractive.

supplement marketing shed light on the psychological mechanisms that underlie the boomerang effect on a healthy lifestyle.

CONSUMER REACTION TO DRUG AND SUPPLEMENT MARKETING

Drugs and supplements are defined by federal regulation.[3] Their regulations differ in complex ways[4] and whether more or less enforcement action is necessary, and of what nature, is a hotly contested debate (e.g., Galloway 2003; Vladeck 2000; Milner and Van Doren 2000). Part of what underlies the regulatory debate is whether consumers fully understand the differences between drugs and supplements.[5] Both drug and supplement marketing may rely on scientific jargon to persuade consumers (Haard, Slater and Long 2004) and may claim to promote health or prevent disease in ways that may confuse the consumer or lead the consumer to infer similar benefits (Vladeck 2000). For example, a supplement can claim to help maintain a healthy cholesterol level (i.e., via a structure-function claim, accompanied by the required disclosure) but cannot claim to prevent an unhealthy level by reducing it (i.e., a disease-prevention claim) (Mason 1998; Vladeck 2000)—a fine distinction that consumers may not grasp (Wall Street Journal 2000; see also Mitra, Hastak, Ford and Ringold 1999). Compounding the problem, some

[3] The Federal Food, Drug, and Cosmetic Act defines a drug as "any article (excluding a device) intended for use in the diagnosis, cure, mitigation, treatment, or prevention of disease and articles (other than food) intended to affect the structure or function of the body". The Dietary Supplement and Health Education Act defines a dietary supplement as "any product (other than tobacco) intended to supplement the diet that bears or contains one or more of the following dietary ingredients: a vitamin, mineral, amino acid, herb or other botanical; or a dietary substance for use to supplement the diet by increasing the total dietary intake; or a concentrate, metabolite, constituent, extract, or combination of any ingredient described above; and intended for ingestion in the form of a capsule, powder, softgel, or gelcap, and not represented as a conventional food or as a sole item of a meal or the diet" (cf. Mason 1998; Mason and Scammon 2000).

[4] To illustrate: Prior to going on the market drugs are subject to Food and Drug Administration (FDA) approval whereas supplements are not. However, the regulations are complex and not easily summarized. (For example, review is not necessary for over-the-counter (OTC) drugs if the ingredients have prior approval. New ingredients or prescription-to-OTC switches do require review.) Once on the market, drugs and supplements are subject to a variety of regulations by agencies such as the FDA (e.g., safety) and the Federal Trade Commission (e.g., advertising).

[5] Of course, there are many other important aspects to the regulatory debate—from questions about the impact of direct-to-consumer advertising of drugs to concerns over deceptive claims made by supplements. Space does not permit a full review of this debate.

health remedies have “dual status”; that is, low doses may be considered a supplement whereas high doses must be treated as a drug. Moreover, research suggests that consumers process dietary supplement claims through biased filters (France and Bone 2005) and that labeling and warning messages may have unintended consequences (Stewart and Martin 1994). Hence, it seems worthwhile to investigate how drug and supplement marketing influence healthy lifestyle decisions (cf. Eggers and Fischoff 2004).

Past research suggests that the drug/supplement distinction may be important. First, drug versus supplement nomenclature may serve to aid consumer categorization of the product and thereby bring to mind a schema that guides subsequent processing of product information and inference-making from product claims (Alba and Hutchinson 1987). Second, it may influence learning about the product by providing a consumption vocabulary that guides subsequent consideration of product features and claims (West, Brown and Hoch 1996). Third, it may lead to transfer of category affect (Boush and Loken 1991; Broniarczyk and Alba 1994) about drugs and supplements that affects judgment even in the absence of deeper processing. Fourth, it may create a mental set that frames the health problem and restricts the solution space—for example, influencing expectations and preferences (Moreau, Markman, and Lehmann 2001) and even inhibiting learning about the product and alternatives or complementary behaviors (Wood and Lynch 2002). Together, these effects suggest that consumer reactions to drug and supplement marketing may differ in important ways.

We have previously suggested that consumers likely do not understand the regulatory definitions or distinctions for drugs and supplements. Indeed, consumer miscalibration is common in a variety of knowledge domains (cf. Alba and Hutchinson 2000). However, the mere name itself conveys meaning that may affect consumer response. First, the name “drug” may

carry with it an association to poor health inasmuch as prescription and over-the-counter drugs are commonly used when consumers are sick or treating a disease. Indeed, the ordinary dictionary definition of a drug is that of "a substance intended for use in the diagnosis, cure, mitigation, treatment, or prevention of disease" (Merriam-Webster 2005), and we suggest that most consumers will bring to mind this common meaning. Second, the name "supplement" in itself suggests "something that completes or makes an addition" (Merriam-Webster 2005). If so, then supplements may be seen as part of a broader array of complementary behaviors that must be engaged in to protect one's health (i.e., a healthy lifestyle package).

As a result, we propose that drug marketing may be *more* likely to lead to a boomerang effect than supplement marketing for two reasons. First, by increasing the salience of thoughts about poor health, a drug may lead consumers to classify their problem as one of poor health. This low self-image may reduce self-efficacy about enacting complementary health-protective behaviors and living a healthy lifestyle (Bandura 1986) inasmuch as a sick person feels less empowered to take responsibility for their own health outcomes and instead may look to external aid and treatment. Second, drugs—by reducing the salience and perceived importance of other complementary health-protective behaviors—may persuade consumers that drugs alone are sufficient to reduce risk. If so, then consumers will be less motivated to engage in complementary health-protective behaviors. With supplements, additional protective behaviors that contribute to a healthy lifestyle will still be seen as important to protect one's health—indeed; the name itself serves as a reminder.

To summarize, the present research focuses on consumers within the problem domain who are susceptible to the boomerang effect (cf. Bolton et al. 2006) and investigates the psychological mechanisms that drive the boomerang. We hypothesize that:

H1: Drugs (compared to supplements) will decrease intentions to engage in healthy lifestyle practices (i.e., a boomerang effect).

We attribute the boomerang of drugs (versus supplements) to two mechanisms. First, drugs will reduce health perceptions and, in turn, perceived efficacy to engage in health-protective behaviors. Second, drugs will reduce the perceived importance and, in turn, motivation to engage in health-protective behaviors. Accordingly, we hypothesize that:

H2: Drugs (compared to supplements) will a) reduce perceptions of health and perceived efficacy; and, b) reduce perceived importance of, and motivation to engage in, complementary health-protective behaviors that constitute a healthy lifestyle.

Both motivation and efficacy together are needed for consumers to engage in healthy lifestyle practices. Accordingly, we further hypothesize that:

H3: Motivation and efficacy will mediate the effects of drug and supplement marketing on healthy lifestyle intentions.

If supported, these findings would be significant for five reasons: 1) our research proposes a boundary condition in the health domain for the boomerang effect of remedies demonstrated in previous research, namely the type of product (supplement versus drug); 2) identifying products as supplements (or supplemental in nature) could serve as a corrective technique by reminding consumers that their use should accompany a healthy lifestyle; 3) from a health care perspective, corrective interventions that target motivation and efficacy as mediating psychological mechanisms can ‘undo’ the drug boomerang and promote healthy lifestyle practices; 4) from a consumer welfare perspective, the proliferation of supplement marketing may in fact be less harmful to a healthy lifestyle than similar drug marketing that undermines other health-protective behaviors; and 5) from a public policy perspective, the marketing activities of companies promoting drugs and supplements may merit attention to ensure that information is prominently displayed to reinforce healthy lifestyle practices.

A series of experiments was conducted to investigate consumer reactions to drug and supplement marketing and to test our hypotheses. In experiment 1, we examine the effects of drug and supplement marketing on healthy lifestyle intentions (testing H1). Experiment 2 replicates and extends experiment 1 by examining the role of product effectiveness in a field study of consumers (testing a corollary to H1). In experiments 3 and 4, we investigate the psychological mechanisms for the previously observed effects (testing H1—H3). And, finally, experiments 5 and 6 provide further evidence for the psychological mechanisms (testing H1—H3) while concomitantly investigating corrective interventions to mitigate the boomerang of drug marketing (H4, to be discussed later).

EXPERIMENT 1

The purpose of the present experiment is to investigate consumer reaction to drug and supplement marketing, providing an empirical test of hypothesis H1. We examine a problem domain—high-fat eating—attractive to many Americans, for which food marketing has been implicated in epidemic rates of obesity (Seiders and Petty 2004). Meanwhile, various products (both fat-fighting drugs and supplements) continue to proliferate. Do they both do so at the expense of a healthy lifestyle, specifically low-fat eating? Or is drug marketing more susceptible to the boomerang effect than supplement marketing?

Method

Participants and Design. The experiment was a 2-group (Drug vs. Supplement) between-subjects design. Participants were staff and students (recruited from two local universities and a hospital) who received financial payment for participating in the experiment.

Materials and Procedure. The experiment consisted of three phases. In the first phase, participants were screened to identify those high in problem status related to the risky behavior

(eating fatty foods) and therefore susceptible to the boomerang effect (cf. Bolton et al. 2006). Specifically, participants were screened on a 10-item six-point self-image scale (Cooper et al. 1986; Evans and Dolan 1993) that was part of a "self-perception questionnaire" embedded in a longer survey This scale included items reflecting participants' self-perceptions about their body (e.g., "Have you avoided wearing clothes which make you particularly aware of the shape of your body?", "Have you felt that it is not fair that other people are thinner than you?"). Participants also provided height and weight information.

In the second phase (following a delay and filler task), participants completed a "consumer promotion study" and were exposed to one of two advertisements. Each message began by warning about the risks of high-fat eating and recommended that participants "Avoid fatty foods and follow a sensible eating plan. This is the only way to achieve an overall healthy lifestyle." The message continued with the exclaimer "Until Now! Introducing Chitosan RX Ultra" and then provided additional information about a fat-fighting product ("When taken with fatty foods, [it] absorbs up to 60% of the fat in your food so that it doesn't end up in your digestive system or on your body").

In the drug condition, the product was described as an FDA-approved drug and a label on the bottle indicated FDA Drug. In the supplement condition, the product was described as a natural herbal supplement and a label on the bottle indicated Supplement. After an open-ended thought-listing task, participants rated their attitude toward the ad on four five-point scales (with endpoints "very unfavorable/very favorable", "bad/good", "really dislike/really like", "negative/positive") and rated the product's perceived performance on five-point scales (with endpoints "low quality/high quality", "ineffective/effective", "harmful/harmless", "useless/useful", "a bad means of protection/a good means of protection", "risky/safe",

"addictive/non-habit forming", and "unreliable/reliable"). As a manipulation check, participants also rated their perception of the product as a supplement or drug on two seven-point scales (with endpoints "a medicine/a supplement", "a drug/a vitamin").

The third phase followed immediately and asked participants to complete a "restaurant dining study". In the cover story, participants were instructed to imagine themselves dining out with family and friends, looking forward to a meal because they were moderately hungry, and taking the product. Participants were then shown four menus, each with multiple items for 3 meals (lunch, dinner and dessert). The menu items within each meal varied in terms of fat content and always included at least one low-fat item. High- and low-fat items were identified by consulting food guides. Participants then chose a menu item from each meal on each menu (i.e., 4 menus X 3 meals = 12 choices). Participants were also asked to provide behavioral intention ratings ("please indicate the likelihood that you would order each item on the menu") on 0-100% scales (with endpoints "definitely would not order/definitely would order") for each menu's items. These measures were designed to capture unhealthy lifestyle intentions. Finally, participants provided ratings of each menu on various dimensions as part of the cover story.

Results

The body image scale (coefficient $\alpha = 0.90$) was averaged, and 28 participants who scored above the sample median (2.0) were retained for subsequent analyses. Note that body image correlated positively ($r = 0.26$, $p < .05$) with body mass index (calculated using height and weight information), indicating that self-image does reflect a more objective measure of problem status (i.e., bmi). Subsequent results are reported based on analyses of dependent variables as a function of drug versus supplement.

Manipulation Checks. Average perceptions of the product as a drug versus supplement

were a function of the manipulation as intended (M_{drug} = 3.23 (2.13) vs. $M_{supplement}$ = 5.53 (1.85); $F(1, 26) = 9.41$, $p < .01$). In addition, average performance perceptions (coefficient alpha 0.71) did not differ for the drug or supplement (M_{drug} = 1.65 (0.68) vs. $M_{supplement}$ = 1.85 (0.68); $F < 1$) nor did average attitude toward the ad (coefficient $\alpha = 0.94$; M_{drug} = 2.31 (1.19) vs. $M_{supplement}$ = 2.46 (1.44); $F < 1$). As intended, the manipulation did not influence other perceptions or preference (e.g., the drug and supplement are perceived as equally effective, safe, a good means of protection, etc.).

Behavioral Intentions. Two behavioral intention measures were constructed: 1) the number of high-fat items chosen across menus; and 2) average intention scores for high-fat versus low-fat menu items. MANOVA revealed a significant effect of drug/supplement ($F(1, 26) = 8.11$, $p < .01$), qualified by its interaction with measure ($F(1, 26) = 10.21$, $p < .01$) . Follow-up univariate ANOVAs indicate that intention scores were higher in the drug versus supplement condition (M_{drug} = 2.19 (5.19) vs. $M_{supplement}$ = -4.80 (6.62); $F(1, 26) = 9.44$, $p < .01$), indicating greater intentions to eat high-fat than low-fat items with a drug remedy. The number of high-fat items chosen was directionally higher in the drug condition but not significantly (M_{drug} = 8.46 (1.85) vs. $M_{supplement}$ = 7.13 (2.36); $F(1, 26) = 2.69$, $p = .11$).

Taken together, these results provide support for H1 inasmuch as healthy lifestyle intentions decreased for a drug versus supplement. We argue that a drug's association with poor health reduces perceived efficacy to engage in health-protective behaviors. In addition, a drug reduces the perceived importance of, and motivation to engage in, health-protective behaviors. As a result, drug (versus supplement) marketing reduces both motivation and efficacy to engage in a healthy lifestyle, driving the boomerang effect. One alternative explanation for this experiment is that the drug was perceived as less effective and therefore led to a greater decline

in healthy lifestyle intentions than the supplement. We refute this explanation by noting that the performance ratings of the drug and supplement did not differ. Thus, we attribute the observed differences to consumer perceptions of drugs versus supplements rather than differences in perceived effectiveness of the products. Of course, we acknowledge that effectiveness also has a role to play—inasmuch as products are unlikely to boomerang if perceived as ineffective. In the next experiment, we manipulate effectiveness to test its role. We also use a different, albeit related, product category and healthy lifestyle practice, and employ a field setting with a different sample population.

EXPERIMENT 2

The purpose of this experiment is to investigate consumer reaction to drug and supplement remedies that vary in effectiveness. We examine a problem domain—high-cholesterol—that is increasingly common in America and an important risk factor for heart disease (American Heart Association 2005). Various drugs exist to treat high cholesterol, and various supplements purport to promote good cholesterol levels; however, the FDA clearly recommends that: “Even with drug treatment, a cholesterol-lowering diet and exercise are still recommended” (FDA Consumer 2005).

In the present experiment, we investigate a sample of older men with multiple cardiac risk factors. These individuals are at substantially elevated risk for coronary heart disease, the primary adverse effect of high cholesterol levels. Hence, the experiment provides a field test of H1 with a different health remedy and consumer population within the problem domain. In addition, we investigate the role of effectiveness as a moderator of the boomerang effect. We have previously argued that the drug (versus supplement) reduces motivation and efficacy to engage in healthy lifestyle practices—instead, consumers believe that the drug alone will take care of the risk. Obviously, such reasoning is less likely when a product is relatively ineffective.

Hence, a product of low effectiveness may be viewed as a control group against which a product of high effectiveness can be compared. Accordingly, we hypothesize that as effectiveness increases, a drug (versus supplement) message will undermine intentions to engage in healthy lifestyle practices. Specifically, we hypothesize an interaction between drug/supplement and effectiveness, such that:

> **H1** (corollary): For high (versus low) effectiveness, a drug (vs. supplement) message will decrease intentions to engage in healthy lifestyle practices (i.e., a boomerang effect).

Method

Participants and Design. The experiment was a 2 (Drug vs. Supplement) x 2 (Effectiveness: Low vs. High) between-subjects design. The sample consisted of patients of a Veterans' Affairs Medical Center, screened for cardiac risk factors (and therefore likely susceptible to the boomerang effect). Respondents were mailed surveys and received a financial incentive to participate. A total of 185 individuals responded to the survey (which had a response rate of 44.3%).

Materials and Procedure. Participants were exposed to an advertisement for a product. The header read "Ask Your Doctor About PRADEL™ Today!". Beside a picture of a male, the introductory text read "Richard Johnson did. Now he takes his family history of high cholesterol a lot more seriously. Because even though he was doing everything right his cholesterol was still too high and he was at risk of a heart attack. So his doctor told him about PRADEL and now his cholesterol is right where it should be." The product was then described as either a drug or a supplement as follows: "PRADEL™ is a [medicine/supplement] that along with diet and exercise can significantly lower cholesterol." The effectiveness of the product was then manipulated as follows [high/low]: "An independent study among people with high cholesterol found that one PRADEL is guaranteed to reduce cholesterol to normal in just 2 weeks. / An independent study

among people with high cholesterol found that three PRADEL a day may slightly reduce cholesterol levels in 6 to 12 months."

Participants then rated the product's effectiveness on three five-point scales: "does not work/works very well", "a bad idea/a good idea", and "not very effective/very effective". Participants also rated the similarity of the product to an herb, a vitamin, a medication, and a drug, on five-point scales (with endpoints "not similar/very similar"). Participants also rated the ad on two five-point scales: "did not like/really liked" and "did not believe/did believe".

After a filler task, participants indicated their intentions toward various behaviors on 0-10 scales (with endpoints "Never/Often"), including the target behavior "I will eat low-cholesterol foods." Participants also answered various background questions, including self-reported cholesterol level and cholesterol treatment.

Results

Subsequent results are reported based on analyses as a function of drug/supplement, effectiveness (high vs. low), cholesterol level (high vs. low, a self-reported binary covariate), and their higher-order interactions. In accordance with H1 (corollary), we predict an interaction of drug/supplement and effectiveness on behavioral intentions.[6]

Manipulation Checks. Perceived effectiveness of the product was calculated by averaging the three-item effectiveness scale (coefficient $\alpha = 0.93$). As intended, perceived effectiveness was greater for high versus low effectiveness conditions ($M_{high} = 3.75$ (1.21) vs. $M_{low} = 2.54$ (1.30); $F(1, 79) = 19.77$, $p < .01$). Also as intended, the average of the similarity ratings (coefficient $\alpha = 0.70$), coded such that higher numbers reflect greater similarity to drug/medicine

[6]The sample was selected based on its substantially elevated risk for coronary heart disease, the primary adverse effect of high cholesterol levels. Overall, 75.7% of respondents indicated either having high cholesterol (51%), following a low-cholesterol diet (53%), and/or taking cholesterol medication (47%). These numbers are likely lower than actual levels due to non-response bias of respondents on these medical history questions or to lack of knowledge about cholesterol goals (Goal Standard 2005).

and lower numbers reflect greater similarity to vitamin/herb, was a significant function of the drug/supplement manipulation (M_{drug} = 3.83 (0.92) vs. $M_{supplement}$ = 3.40 (1.08); $F(1, 72) = 5.52$, $p < .05$). Ad liking and ad believability did not differ (all n.s.). Thus, the manipulations appear to have succeeded.

Behavioral Intentions. ANOVA of the intention measure (to eat low-cholesterol foods) revealed a significant interaction of drug/supplement and effectiveness ($F(1, 177) = 4.11$, $p < .05$). Follow-up simple effect tests indicate that higher effectiveness of the drug decreased intentions (M_{low} = 7.64 (2.19) vs. M_{high} = 6.96 (2.21); $F(1, 177) = 2.80$, $p < .10$) whereas higher effectiveness of the supplement had no effect on intentions (M_{low} = 6.98 (2.22) vs. M_{high} = 7.48 (2.42); $F(1, 177) = 1.45$, $p = .23$). These results indicate that exposure to a message for a more effective drug leads to a boomerang effect that decreases intentions to engage in healthy lifestyle practices (by eating low-cholesterol foods). In contrast, a supplement message eliminated this boomerang. These findings support H1 (corollary).

Post-Hoc Analysis. As noted previously, all participants in the sample had multiple cardiac risk factors placing them at risk of high cholesterol and its health complications. However, participants did differ in terms of how their cholesterol was being managed—specifically, whether they were currently taking cholesterol medication or not (a self-reported bivariate variable). In an exploratory follow-up analysis, we examined behavioral intentions as a function of drug/supplement, effectiveness, cholesterol medication status, and their higher-order interactions. ANOVA of the intention measure yields a two-way interaction of drug/supplement and effectiveness ($F(1, 177) = 5.90$, $p < .05$), qualified by a marginal three-way interaction with cholesterol medication status ($F(1, 177) = 3.30$, $p = .07$). For respondents not taking cholesterol medication, the two-way interaction of drug/supplement and effectiveness was significant (F(1,

177) = 6.74, $p < .05$). For respondents taking cholesterol medication, this interaction was n.s. ($F < 1$). Overall, these results suggest that the interaction effect on behavioral intentions observed in the sample is mainly driven by those respondents not already taking cholesterol medication.

On the one hand, this finding might be interpreted as good news—consumers taking medicine under a doctor's care were not susceptible to the boomerang effect. Although we have no direct evidence, we speculate that such consumers are likely to have received educational interventions from health care professionals designed to increase their motivation and efficacy to engage in complementary health protective behaviors that contribute to a healthy lifestyle.[7] (We experimentally test this kind of corrective intervention in experiments 5 and 6.) If this is the case, then it appears that one-on-one patient education can work to mitigate the boomerang effect of drug marketing. On the other hand, this finding is also worrisome—consumers not taking medicine under a doctor's care are susceptible to the boomerang effect. That is, mere exposure to drug marketing undermines intentions to engage in a healthy lifestyle for these consumers. Certainly, this finding represents a potential downside of direct-to-consumer advertising of drugs that reach individuals who are at risk yet not receiving health care. Indeed, in the case of Americans with borderline or high cholesterol levels, the majority are unaware of or not being treated for their condition (Arnett et al. 2005). Moreover, there is less opportunity for one-on-one patient education with over-the-counter versus prescription drugs—a point that seems relevant to the debate over changing prescription drugs to over-the-counter status (e.g., Mitka 2004).

EXPERIMENT 3

Thus far, our research has focused on the consequences of drug and supplement messages for healthy lifestyle intentions. In experiment 1, we find that healthy lifestyle intentions decline

[7] Note that an alternative explanation—that consumers already taking cholesterol medication responded differentially to the drug or supplement (e.g., did not perceive the advertised product as effective, credible, etc.)—is not borne out by the data.

for a drug (vesus supplement) remedy. In experiment 2, we examine the role of effectiveness, which enhances the boomerang effect of the drug (vs. supplement). We now turn to an investigation of the psychological mechanisms for these differential effects. Specifically, the purpose of the present experiment is to investigate consumer perceptions of drugs and supplements, providing an initial empirical test of H2. We investigate consumer understanding of the definition of an over-the-counter (OTC) drug and supplement, and we also examine the health associations, salience and importance of complementary health-protective behaviors that contribute to a healthy lifestyle.

Method

Participants and Design. The experiment was a 4-group between-subjects design (where information about the drug and supplement was manipulated at four levels). Participants were staff and students (recruited from two local universities and a hospital) who received financial payment for participating in the experiment. A total of 81 subjects participated.

Materials and Procedure. Participants completed the experiment in two phases. In the first phase, participants completed an open-ended question:

> "As you know, there are many different drugs and supplements sold over the counter in your local store. In your own words, explain what is meant by a drug versus a supplement. (What is a drug? What is a supplement? How are they similar and/or different?)"

The purpose of this question was to elicit a consumer definition of OTC drugs and supplements in order to investigate the salience of poor health and other health-protective behaviors via open-ended cognitive responses.

In the second phase, participants responded to a short scenario describing an OTC drug and a supplement for weight management. The purpose of the scenario was to assess health perceptions and importance ratings for healthy lifestyle behaviors as a function of drug versus

supplement. For exploratory purposes, information about the effectiveness and safety of the drug and supplement was manipulated at four levels as shown in square brackets:

> "Assume that there are 2 brands of weight management products in the marketplace. One is a drug available over-the-counter at your local drug store; one is a supplement available in the vitamin and supplement section of your local GNC (or similar) store. Both products are taken when eating to reduce fat absorption from foods. [In independent testing, both were equally safe, and the supplement was somewhat more effective. / In independent testing, both were equally safe, and the drug was somewhat more effective. / In independent testing, both were equally safe and effective. / omitted]"

Participants then responded to the following dependent variables: "With which product will it be more important that you also follow a low-fat eating plan?" and "With which product will it be more important that you also exercise regularly?" Responses were collected on two seven point scales, with endpoints "the drug/the supplement" and midpoint "no difference". The scenario then continued by instantiating two individuals within the problem domain as follows:

> "Continue to assume that these two weight management products are available in the marketplace. Now imagine two men: each man is 40 years old and six feet tall and weighs 185 pounds (about ideal for a man of this age and height). To help manage his weight, Bob takes the drug and Bill takes the supplement."

Participants were then asked the following: "Overall, who is healthier?", "Who follows a low-fat diet?", and "Who exercises regularly?" Responses were collected on three seven point scales, with endpoints "Bob/Bill" (i.e., taking the drug/supplement) and mid-point "No difference".

Results

Qualitative Responses. Open-ended responses to the definitional question were coded by two judges who were blind to experimental hypotheses. Inter-coder reliability was 89%; disagreements were resolved through discussion by the judges. The descriptive results are shown in table 1.

Insert table 1 about here

These results provide qualitative support for our hypotheses. Consistent with H2a, 55.1% of respondents associated OTC drugs with poor health, specifically treating illness or disease (compared to 1.3% for supplements). Consistent with H2b, 68.0% of respondents reported that supplements work with or enhance other body functions (vs. 9.0% for drugs). In contrast, OTC drugs were perceived by 21.8% of respondents (vs. 5.1% for supplements) to exert their effects by altering body functions. These descriptive results also support the general notion that consumer understanding of drug and supplement differences is poor. Only 18.0% of participants noted regulatory differences (and some did so incorrectly, mistakenly believing that supplements also undergo FDA approval). Many respondents (47.4%) also associated supplements with "natural" substances like vitamins and nutrients (i.e., already found in the body or in foods) and drugs with non-natural chemicals (15.4%)—not only does this distinction lack validity, but it can also be interpreted as evidence consistent with H2. That is, drugs are seen by consumers as a chemical intervention to fix a health problem; supplements are seen to enhance what the body already does naturally. Finally, we also note that more respondents associated drugs than supplements with effectiveness (11.5% vs. 0%)—an issue that we address in the scenario-based results that follow.

Behavioral Index. ANOVA of the average rating for healthy lifestyle behaviors in the Bill/Bob scenario (coefficient $\alpha = 0.67$) as a function of information condition reveals no difference among ratings when safety is equal and effectiveness is described as equal, less or more for the drug than the supplement ($F < 1$); importantly, average ratings favor the supplement over the drug (non-neutral t-test $p < .05$). When no information is given about safety or effectiveness, the index favors supplements even more so ($F(1, 74) = 4.79$, $p < .05$). This evidence suggests that consumers will engage to a lesser extent in healthy lifestyle behaviors

when taking a drug than a supplement—consistent with the boomerang effect of H1.

Psychological Mechanisms. Health perceptions and beliefs about the importance of healthy lifestyle behaviors yield a similar pattern of results. First, ANOVA of the health rating as a function of information condition reveals no difference among ratings when safety is equal and effectiveness is described as equal, less or more for the drug than the supplement ($F < 1$); importantly, average ratings favor the supplement over the drug (non-neutral t-test $p < .05$). When no information is given, health ratings favor the supplement somewhat more ($F(1, 74) = 2.70$, $p = .10$). Second, ANOVA of the average for importance beliefs (coefficient $\alpha = 0.91$) also reveals no difference as a function of effectiveness information ($F < 1$); importantly, average ratings favor the supplement over the drug (non-neutral t-test $p < .05$). When no information is given, importance beliefs favor the supplement even more ($F(1, 74) = 4.65$, $p < .05$). Together, this evidence suggests that a) taking a drug is perceived as less healthy than taking a supplement; and b) healthy lifestyle behaviors are perceived as less important when taking a drug than a supplement—thereby supporting H2a and H2b.

Mediation. A mediational analysis was conducted to test whether health perceptions and importance beliefs together drive responses to the behavioral index. First (as reported previously), the behavioral index favors the supplement over the drug, especially when no safety and effectiveness information is provide. Second, the mediator (the product of health perceptions and importance beliefs) favors the supplement over the drug, especially when no safety and effectiveness information is provided ($F(1, 73) = 5.07$, $p < .05$). Third, when the mediator is added to the model for the behavioral index, the previously reported contrast is no longer significant ($F<1$) and the mediator is a significant predictor ($F(1, 69) = 37.87$, $p <.01$). As expected, health perceptions and importance beliefs together drive health-protective behaviors

that favor the supplement over the drug. These results provide (indirect) support for H3.[8]

Insert table 2 about here

As an additional follow-up analysis, we investigated whether consumer schema (i.e., participants' coded cognitive responses) for drugs and supplements influence their scenario-based responses. First, respondents who mentioned the enhancing or natural characteristics of supplements were contrasted with respondents who did not. Controlling for product information, ANOVA revealed that respondents with these beliefs showed greater favorability toward the supplement than the drug for healthy lifestyle behaviors (M_{belief} = 4.84 (1.05) vs. $M_{no\text{-}belief}$ = 4.17 (0.82); $F(1, 70) = 6.17$, $p < .05$ one-tailed), importance beliefs (M_{belief} = 4.90 (1.08) vs. $M_{no\text{-}belief}$ = 4.34 (1.48); $F(1, 70) = 3.64$, $p < .05$ one-tailed), and health ratings (M_{belief} = 4.84 (1.12) vs. $M_{no\text{-}belief}$ = 3.93 (1.16); $F(1, 70) = 8.41$, $p < .05$ one-tailed). Second, respondents who associated drugs with illness were contrasted with respondents who did not. Controlling for product information, ANOVA revealed that respondents with these beliefs showed greater favorability toward the supplement than the drug for health ratings (M_{belief} = 4.88 (1.03) vs. $M_{no\text{-}belief}$ = 4.40 (1.31); $F(1, 70) = 3.35$, $p < .05$ one-tailed) but not importance beliefs (M_{belief} = 4.80 (1.12) vs. $M_{no\text{-}belief}$ = 4.76 (1.27); $F < 1$) or behaviors (M_{belief} = 4.67 (1.05) vs. $M_{no\text{-}belief}$ = 4.76 (1.03); $F < 1$). Overall, these findings indicate that health perceptions and importance beliefs are influenced by consumer schema for drugs and supplements. Specifically, respondents who hold certain beliefs—identifying supplements with enhancing and natural properties or associating drugs with

[8] H3 describes mediation in terms of motivation and efficacy; consistent with H2, this study measures their precursors, importance of health-protective behaviors and health perceptions. Note that, in addition to the mediational analysis reported in the main text, alternative analyses were also run for the following mediators: health perceptions,importance beliefs, and their sum. Not surprisingly, all support mediation. We report the product of the two components as mediator in the text since, conceptually, we argue that both mechanisms together drive the boomerang effect. However, results should be interpreted with caution; experiment 6 will orthogonally manipulate the two mechanisms and its results support a combined approach.

illness—are more inclined to a) perceive that taking drugs is less healthy than taking supplements and to b) judge that healthy lifestyle behaviors are less important for drugs than supplements.

Overall, the results of experiment 3 provide support for hypotheses H1—H3. Compared to supplements, OTC drugs increased the salience of thoughts about poor health, lowered health perceptions, and reduced the perceived importance of complementary health-protective behaviors. As a result, the extent of healthy lifestyle behaviors was judged lower for a consumer taking a drug versus supplement. In addition, consumer schema—associating supplements with enhancing and natural properties and drugs with illness—exacerbated these differences. Although such qualitative evidence must be interpreted with caution, these findings are consistent with the quantitative results and provide further support for the hypotheses. In a follow-up study (omitted for brevity's sake), we conducted a replication and extension in a field sample of daycare parents that utilized a quantitative measure of drug and supplement knowledge and that included additional scenario-based measures. Consistent with H2, drugs (versus supplements) were associated with lower perceptions of health, motivation and ability to engage in health-protective behavior, as well as perceived efficacy. Although accurate knowledge of drugs and supplements did reduce the bias favoring supplements over drugs, only the highest levels of knowledge—reflecting specialized training or background in drugs and supplements—appeared sufficient to eliminate it. Thus, even otherwise highly educated consumers (60% of the sample held master's or ph.d.-level degrees) appear susceptible to the boomerang effect for drugs versus supplements. We interpret this evidence as suggesting that our findings thus far are likely to generalize to other populations where knowledge about drugs and supplements is less than that of trained professionals.

EXPERIMENT 4

Overall, the results of experiment 3 provide preliminary support for H1—H3. Although these findings are encouraging and support the rationale behind the boomerang effect, the within-subject design could (arguably) enhance perceived differences among drugs versus supplements. Moreover, experiment 3 did not examine prescription drugs and lacked a control group for comparisons against baseline. (Instead, the analyses relied in part upon comparisons against a scale mid-point labeled "no difference", which we argue is sufficient for demonstrating a bias—but which is not without its critics; cf. Pechmann & Slater 2005). In the present experiment, we employ a between-subjects design that addresses these points and provides a potentially more compelling test of H1—H3.

Method

Participants and Design. The experiment was a 4-group between-subjects design, with product manipulated at four levels (OTC drug, prescription drug, supplement, and a no-product control group). Participants were staff and students (recruited from two local universities and a hospital) who received financial payment for completing the experiment. A total of 213 subjects participated.

Materials and Procedure. Participants responded to a short description of a target individual within the problem domain, where the weight management product was manipulated as follows:

> Chris is 40 years old and weighs about the ideal based on age and height. To help with weight management, Chris takes a [prescription drug / over-the-counter drug / supplement.]

In a fourth control group, the second sentence instead read: "Chris does not take any weight management products (i.e., prescription or over-the-counter drugs or supplements)." Participants

were then asked to rate the target person's health on a seven-point scale (with endpoints "very unhealthy/very healthy") and to rate the extent of the target's healthy lifestyle behaviors on two seven-point scales ("To what extent does Chris… follow a low-fat diet?" and "…exercise?" with endpoints "not at all/regularly").

Next, participants were asked to rate the target's ability to "follow a low-fat diet" and to "engage in an exercise program" on two seven-point scales (with endpoints "not at all capable/very capable"). Similarly, participants were asked to rate the target's motivation "to follow a low-fat diet" and "to engage in an exercise program" on two seven-point scales (with endpoints "not at all motivated/very motivated"). Finally, participants were asked to describe the target on six seven-point scales (with endpoints "powerless/powerful", "weak/strong", "ineffectual/effectual", "dependent/independent", "reliant/self-reliant", and "undisciplined/disciplined"), intended as a measure of perceived efficacy.

Results

For ease of reporting, indices were constructed to reflect: 1) healthy lifestyle behaviors, by averaging the two items measuring the extent of low-fat eating and exercise (coefficient α = 0.80); 2) motivation, by averaging the two items measuring motivation to engage in low-fat eating and exercise (coefficient α = 0.91); 3) ability, by averaging the two items measuring ability to engage in low-fat eating and exercise (coefficient α = 0.79); and, 4) efficacy, by averaging the six-item efficacy scale (coefficient α = 0.93). To analyze the scenario-based responses (see table 3), planned contrasts were conducted to examine differences among the four conditions for the key dependent variables.

Insert table 3 about here

Behavioral Index. For the index of healthy lifestyle behaviors, ANOVA indicated no difference for OTC and prescription drug conditions ($F < 1$) or for supplement and no-product groups ($F < 1$). However, ratings for the behavioral index were lower in the drug conditions ($F(1, 207) = 10.19$, $p < .01$). Hence, drugs (OTC or prescription) reduced healthy lifestyle behaviors; supplements did not. These results support H1.

Psychological Mechanisms. First, ANOVA revealed no difference in health perceptions for OTC and prescription drugs ($F(1, 208) = 2.18$, $p = .14$). Similarly, health perceptions did not differ for the supplement and no-product group conditions ($F < 1$). However, a target taking a drug (prescription or OTC) was perceived as less healthy than a target taking a supplement or no product ($F(1, 208) = 32.49$, $p < .01$).). Second, ANOVA of the ability index indicated no difference for OTC versus prescription drug conditions or for supplement versus no-product conditions (F's < 1). However, perceived ability to engage in health-protective behaviors was rated lower in the drug conditions ($F(1, 209) = 9.17$, $p < .01$). Third, a similar pattern of results was also evident for perceived efficacy. ANOVA of the efficacy index indicated no difference for OTC and prescription drug conditions or for supplement and no-product conditions (respectively: $F < 1$; $F(1, 209) = 2.27$, $p = .13$). However, the target's perceived efficacy was lower in the drug conditions ($F(1, 209) = 40.75$, $p < .01$). Finally, ANOVA of the motivation index indicated no difference for OTC versus prescription drug conditions or for supplement versus no-product conditions (F's < 1). However, perceived motivation to engage in health-protective behaviors was rated lower in the drug conditions ($F(1, 209) = 20.83$, $p < .01$). This pattern of results supports H2a and H2b.

Mediation. A mediational analysis was conducted to test whether motivation and efficacy

together mediate drug/supplement differences for healthy lifestyle behaviors.[9] First (as reported previously), the behavioral index is lower for the drug conditions (prescription or OTC) versus the supplement and control groups. Second, the mediator (the product of motivation and efficacy) is lower ($F(1, 210) = 29.01$, $p < .01$) for OTC and prescription drug conditions (which do not differ, $F < 1$) than supplement and CG conditions (which also do not differ, $F < 1$). Third, when the mediator is added to the model for the behavioral index, the previously reported contrast is no longer significant ($F < 1$) and the mediator is a significant predictor ($F(1, 204) = 118.70$, $p < .01$). As expected, motivation and efficacy together drive the boomerang effect of drugs. These results support mediation consistent with H3.[10]

Overall, these results support H1—H3. In a weight management context, consumers taking a drug (either prescription or OTC) were judged to engage to a lesser extent in healthy lifestyle practices (such as low-fat eating and exercise) than consumers taking a supplement or no product. Consumers taking a drug were also perceived as being less healthy, less able, and less motivated to engage in such practices than consumers taking a supplement or no product. In a follow-up study (omitted for brevity's sake), we replicated these findings in a field sample of fitness club members. It could be argued that such respondents place more importance on healthy lifestyle practices such as regular exercise (as evidenced by their fitness club membership) and therefore will be less susceptible to the previously observed effects.[11] Findings were consistent with the experiment reported herein.

EXPERIMENT 5

[9] An alternative analysis using ability rather than efficacy also fits our theorizing and yields a similar pattern of results.

[10] In addition to the mediational analysis reported in the main text, alternative analyses were also run for the following mediators: motivation, efficacy, and their sum. Not surprisingly, as before, all support mediation. See related footnote 8.

[11] An alternative hypothesis—that fitness club members will be supplement users (and therefore more susceptible to the previously observed effects)—is not borne out by the field sample data (from a swim club) but merits future research.

Experiments 3 and 4 provide preliminary evidence that the boomerang effect of drug (versus supplement) marketing arises from two mechanisms: a) associations with poor health that lead to reduced self-efficacy; and b) reduced importance of, and motivation to engage in complementary health-protective behaviors. The present experiment attempts to provide further evidence of the psychological mechanisms by: 1) measuring both mediating processes and behavioral intention outcomes and testing for mediation, that is, a combined test of H1—H3; and 2) manipulating both mechanisms through a corrective intervention designed to 'undo' the drug boomerang. We argue that both motivation and efficacy need to be high before consumers will engage in health-protective behaviors. (If motivation is high and efficacy is not, consumers will not perceive themselves as able to engage in health-protective actions, thereby undermining any positive effects of motivation. If efficacy is high and motivation is not, consumers may perceive themselves as able to engage in health-protective actions but lack the motivation to do so.) This experiment uses a combined intervention that targets both mechanisms driving the boomerang effect by a) increasing perceived health and efficacy, and b) increasing perceived importance of, and motivation to engage in complementary health-protective behaviors. When both mechanisms are targeted, we predict that the intervention will be successful at mitigating the boomerang effect. Accordingly, we hypothesize that:

H4: A combined intervention (designed to increase motivation *and* efficacy to engage in health-protective behaviors) will increase healthy lifestyle intentions for a drug remedy (versus no intervention or a single-mechanism intervention).

(A subsequent experiment will manipulate motivation and efficacy mechanisms of the intervention orthogonally.)

Participants and Design. The experiment was a 3-group (Drug vs. Drug + Combined Intervention vs. Supplement) between-subjects design. Participants were staff and students

(recruited from two local universities and a hospital) who received financial payment for participating in the experiment. A total of 58 subjects participated.

Materials and Procedure. Participants completed the experiment in two phases. In the first phase, participants were screened in the same manner as experiment 1. In the second phase, participants completed a "consumer promotion study" and were exposed to one of two advertisements. Each message began by warning about the risks of high-fat eating ("Watch Out For Fat"), continued by "Introducing Chitosan RX Ultra", and then provided additional information about a fat-fighting product. The product information was the same as experiment 1, manipulating whether the product was described as a drug or a supplement. Following exposure to the ad, participants indicated their attitude toward the ad on five seven-point scales (with endpoints "very unfavorable/very favorable", "bad/good", "really dislike/really like", "negative/positive" and "ineffective/effective") and rated their perception of the product on three seven-point agree/disagree scales ("Chitosan is like a drug", "Chitosan is like a supplement", and "Chitosan is like a vitamin"). The first item was reverse-coded.

All participants were then told:

> "Imagine that, after seeing this advertisement, you check with a qualified health care professional about Chitosan. S/he assures you that the product is safe and effective."

In the combined intervention condition, participants also read:

> "S/he adds: 'Sometimes, people who take this product forget about the importance of continuing with other fat-fighting behaviors, like daily exercise and low-fat eating. Some people also think that, because they are taking a drug to help manage their weight, that they are in poor health and therefore incapable of carrying out activities like daily exercise and low-fat eating. This just isn't the case. You should exercise and eat healthy foods even when taking the drug. Just do it!'"

Participants then rated their attitude toward the product on four seven-point scales (with endpoints "very unfavorable/very favorable", "bad/good", "really dislike/really like", and

"negative/positive"). Participants also rated the product's perceived performance on eight five-point scales (with endpoints "low quality/high quality", "ineffective/effective", "harmful/harmless", "useless/useful", "a bad means of protection/a good means of protection", "risky/safe", "addictive/non-habit forming", and "unreliable/reliable").

Participants were then instructed to answer an open-ended thought-listing task as follows:

> "Now imagine that you decide to start taking Chitosan on a regular basis. Take a moment to imagine youself in that situation, what it would be like, what your life would be like, how you would think, feel, and act. Then answer the questions that follow, imagining yourself in that situation."

Given this scenario, participants were asked to rate their health on two seven-point scales (with endpoints "poor health/good health", "no health problems/serious health problems"). Participants also indicated their behavioral intentions to "follow a low-fat diet" and to "exercise" on two-seven-point scales (with endpoints "No, never/Yes, regularly"). Participants then rated their motivation to follow a low-fat diet and to exercise on two seven-point scales (with endpoints "not at all motivated/very motivated") and also rated their capability on two seven-point scales (with endpoints "not at all capable/very capable"). Participants were also asked to describe themselves on six seven-point scales (with endpoints "powerless/powerful", "weak/strong", "reliant/self-reliant", "dependent/independent", "undisciplined/disciplined", and "ineffectual/effectual"), intended as a measure of perceived efficacy.

As additional measures of behavioral intentions, participants were also asked "How likely would you be to do the following?" and indicated the probability on 0-100% scales (with endpoints "very unlikely/very likely) for the following behaviors: "Exercise regularly (e.g., working out at home or at the gym)", "Work in physical activity as part of your day (e.g., walking, taking the stairs, etc."), "Eat healthy foods", and "Avoid all high-fat foods". Finally, participants responded to additional background questions (omitted for brevity's sake).

Results

Based on the average score of the body image scale (coefficient $\alpha = 0.81$), participants who scored above the sample median were retained for subsequent analyses. Subsequent results are reported based on planned contrasts: H1 predicts that the drug health remedy will reduce healthy lifestyle intentions (compared to the supplement remedy). H4 predicts that the drug remedy will not reduce healthy lifestyle intentions when accompanied by the combined intervention (compared to the supplement remedy). H2 and H3 will also be tested for evidence regarding the psychological mechanisms that may underlie the boomerang effect.

Manipulation Checks. Average perceptions of the product as a supplement were marginally higher in the supplement versus drug conditions ($M_{supplement}$ = 3.60 (1.26) vs. M_{drug} = 2.86 (1.31); $F(1, 55) = 3.25$, $p = .08$)—indicating that our manipulation was reasonably successful. In addition, average performance perceptions (coefficient $\alpha = 0.94$) did not differ for the drug or supplement ($M_{supplement}$ = 2.21 (0.73) vs. M_{drug} = 2.27 (1.08); $F < 1$) nor did average attitude toward the ad (coefficient $\alpha = 0.97$; M_{drug} = 3.34 (1.75) vs. $M_{supplement}$ = 3.25 (1.64); $F < 1$) and product (coefficient $\alpha = 0.98$; M_{drug} = 3.68 (2.00) vs. $M_{supplement}$ = 3.66 (1.76); $F < 1$. As intended, the manipulation did not influence other perceptions or preference (e.g., the drug and supplement are perceived as equally effective, safe, a good means of protection, etc.).

Behavioral Intentions. Consistent with H1, MANOVA of behavioral intentions (coefficient $\alpha = 0.89$) revealed a significant contrast of drug and supplement conditions ($F(1, 55) = 5.75$, $p < .05$). As expected, intentions to engage in complementary health-protective behaviors were lower in the drug versus supplement conditions—reflecting a boomerang effect of the drug health remedy. When the drug message was accompanied by a combined intervention, behavioral intentions did not differ from the supplement condition ($F(1, 55) = 1.54$, $p = .22$).

That is, the intervention successfully mitigated the boomerang effect of the drug remedy—consistent with H4. Combining the warning and supplement conditions and contrasting against the drug condition confirms the drug boomerang ($F(1, 55) = 13.34$, $p < .01$): behavioral intentions are lower when a drug remedy is not accompanied by a combined intervention. Overall, these results support H1 and H4 and indicate that a drug remedy undermines complementary health-protective behavior—but a combined intervention can undo this boomerang effect. Descriptive results (averaged across items scaled similarly for ease of reporting) are shown in table 4.

Insert table 4 about here

Psychological Mechanisms. For ease of reporting, indices were constructed to reflect: 1) health perceptions, by averaging the two-item health scale (coefficient $\alpha = 0.52$); 2) motivation, by averaging the items measuring motivation to follow a low-fat diet and exercise (coefficient $\alpha = 0.80$); 3) ability, by averaging the two ability items (coefficient $\alpha = 0.73$); and, 4) efficacy, by averaging the six-item efficacy scale (coefficient $\alpha = 0.96$).

Ratings for motivation and efficacy to engage in healthy lifestyle practices revealed a pattern of results similar to the behavioral intentions data. First, ANOVA of the motivation index indicates no difference for supplement and drug intervention conditions ($F < 1$) but motivation is lower in the drug condition ($F(1, 55) = 6.12$, $p < .05$). Second, ANOVA of the efficacy index indicates no difference for supplement versus drug intervention conditions ($F(1, 55) = 2.81$, $p = .10$) but efficacy is lower in the drug condition ($F(1, 55) = 13.97$, $p < .01$). Third, the ability index revealed a similar pattern, although failing to reach traditional levels of significance: no difference for supplement versus drug intervention conditions ($F < 1$) but ability was

directionally lower in the drug condition ($F(1, 55) = 2.06$, $p = .16$). Finally, and unexpectedly, health perceptions did not differ across condition (F's < 1). Overall, these results partially support H2: as expected, a drug remedy reduces motivation and perceived efficacy to engage in complementary health protection behaviors. Moreover, the combined intervention increased both motivation and efficacy, as predicted.

Mediation. A mediational analysis was conducted to test whether motivation and efficacy together mediate the effects of drug and supplement remedies on behavioral intentions (i.e., consistent with H3).[12] First (as reported previously), behavioral intentions are reduced for a drug remedy (versus intervention and supplement conditions). Second, the mediator (the product of motivation and efficacy) declines for a drug remedy (versus intervention and supplement conditions) ($F(1, 55) = 10.57$, $p < .01$). Third, when the mediator is added to the model for behavioral intentions, the previously reported contrast is no longer significant ($F(1, 52) = 1.45$, $p = .23$) and the mediator is a significant predictor ($F(1, 55) = 52.47$, $p < .01$). As expected, motivation and efficacy together mediate the effects of supplement and drug remedies (and a combined intervention) on healthy lifestyle intentions—consistent with H3.

Taken together, these results suggest that the boomerang effect arises because drug remedies reduce motivation and perceived efficacy to engage in health-protective behaviors whereas supplements do not. Moreover, a combined intervention accompanying the drug remedy that increased motivation and efficacy eliminated the boomerang effect. The mediational analysis and the effect of the combined intervention both support motivation and efficacy as psychological mechanisms that drive the boomerang effect. We argue that an intervention

[12] In addition to the mediational analysis reported in the main text, alternative analyses were also run for the following mediators: motivation, efficacy, and their sum. Not surprisingly, all support mediation. See related footnote 8.

targeting both mechanisms is necessary to undo the boomerang, and the current experiment deliberately combined both in the intervention. The next experiment manipulates the two mechanisms orthogonally via a corrective intervention, focusing on the drug remedy.

EXPERIMENT 6

Experiment 5 suggests that the boomerang effect of a drug (versus supplement) can be mitigated by providing a combined intervention to increase motivation and efficacy to engage in complementary health-protective behaviors. When such an intervention accompanies the drug remedy, healthy lifestyle intentions do not differ from a supplement. This experiment manipulates components of the corrective intervention for a drug remedy orthogonally. (Intervention for a supplement remedy is not our focus because, as we have seen, supplements do not reduce health and efficacy perceptions and motivation to engage in health-protective behaviors). Consistent with H4, we hypothesize that a combined intervention (designed to increase both motivation *and* efficacy to engage in health-protective behaviors) will increase healthy lifestyle intentions for a drug remedy (versus no intervention). A single intervention (targeting either motivation or efficacy) will have no effect (versus no intervention). We test this hypothesis in the context of an OTC drug scenario, where the no-intervention condition serves as a baseline control group.

Participants and Design. The experiment was a 2 (Efficacy component: present/absent) x 2 (Motivation component: present/absent) between-subjects design. Participants were staff and students (recruited from two local universities and a hospital) who received financial payment for participating in the experiment. A total of 92 subjects participated.

Materials and Procedure. Participants responded to a scenario describing a consumer within the problem domain taking a drug remedy. The scenario read as follows:

> "Chris is 40 years old and has been over-weight by about 35 pounds for a few years. Recently, he saw an ad for an over-the-counter drug that helps with weight management. Chris consulted a health care professional, who indicated that the drug was safe and effective. [intervention manipulations inserted here] Now, Chris has started taking the over-the-counter drug to help with weight management."

When the motivation component of the intervention was present, it read as follows: "Chris learned that the drug works best if accompanied by low-fat eating and a regular exercise program." When the efficacy component of the intervention was present, it read as follows: "Chris learned that, aside from being over-weight, he is in good health and should be able to do what is needed to lose weight."

After an open-ended thought-listing task, participants rated the target's health on two seven-point scales (with endpoints "very unhealthy/very healthy" and "no serious problems/serious health problems"). Participants also rated "To what extent is Chris… capable of following a low-fat diet" and "…capable of engaging in exercise" and "To what extent is Chris… motivated to follow a low-fat diet" and "… motivated to exercise" on four seven-point scales (with endpoints "not at all/very much"). Participants were then asked to rate Chris on six seven-point scales (with endpoints "powerless/powerful", "weak/strong", "ineffectual/effectual", "dependent/independent", "reliant/self-reliant", "undisciplined/ disciplined"), intended as a measure of perceived efficacy. Finally, participants were asked "to what extent does Chris…follow a low-fat diet" and "… exercise" on two seven-point scales (with endpoints "not at all/regularly"), providing a behavioral measure. Participants also answered several background questions (omitted for brevity's sake).

Results

For ease of reporting, indices were constructed to reflect: 1) healthy lifestyle behaviors, the average of low-fat eating and exercise measures (coefficient $\alpha = 0.87$); 2) motivation, the

average of the two motivational items (coefficient $\alpha = 0.94$); 3) ability, the average of the two capability items (coefficient $\alpha = 0.96$); and, 4) efficacy, the average of the six-item efficacy scale (coefficient $\alpha = 0.94$). Descriptive results are shown in table 5.

Insert table 5 about here

Behavioralal Index. As expected, the behavioral index was a function of the motivation component ($F(1, 88) = 5.11$, $p < .05$) and efficacy component ($F(1, 88) = 3.79$, $p = .05$) of the intervention, and their interaction ($F(1, 88) = 3.98$, $p < .05$). Specifically, the motivation component of the intervention increased the behavioral index when accompanied by an efficacy component ($F(1, 88) = 8.32$, $p < .01$); otherwise, it had no effect ($F < 1$). Looked at another way, the efficacy component of the intervention increased the behavioral index ($F(1, 88) = 7.56$, $p < .01$) when accompanied by a motivation component; otherwise, it had no effect ($F < 1$) This pattern of means supports H4—a combined intervention successfully increased healthy lifestyle behaviors.

Psychological Mechanism. As expected, health perceptions were higher when the efficacy component of the intervention was present: the target was judged as more healthy ($F(1, 88) = 10.38$, $p < .01$) and having less serious health problems ($F(1, 88) = 3.91$, $p = .05$).[13] Also as expected, the efficacy component of the intervention also increased capability and efficacy indices (respectively, $F(1, 88) = 9.99$, $p < .01$; $F(1, 88) = 6.10$, $p < .05$). These results indicate that the efficacy component of the intervention manipulation succeeded as intended. Turning to the motivation index, motivation was a function of the motivation component of the intervention ($F(1, 88) = 7.31$, $p < .01$) and its interaction with the efficacy component ($F(1, 88) = 7.46$, $p <$

[13] Health perception measures are reported separately due to low reliability.

.01). Specifically, the motivation component of the intervention increased the motivation index when accompanied by an efficacy component ($F(1, 88) = 8.96$, $p < .01$); otherwise, it had no effect ($F < 1$). This result is consistent with the drug boomerang effect: motivation to engage in health-protective behaviors will be low unless consumers taking a drug are reminded of their importance *and* believe they are able to perform them.

Mediation. A mediational analysis was conducted to test whether motivation and efficacy together mediate the effects of the interventions on behavioral intentions. First (as reported previously), behavioral intentions were a function of the interaction of the two components of the intervention. Second, the mediator (the product of motivation and efficacy) is also a function of the interaction ($F(1, 88 = 6.25$, $p < .05$). Third, when the mediator is added to the model for the behavioral index, the interaction is no longer significant ($F < 1$) and the mediator is a significant predictor ($F(1, 87 = 81.50$, $p < .01$).[14] As expected, motivation and efficacy together mediate the effects of the drug interventions on healthy lifestyle behaviors.

Together, these findings support H1—H4 as follows: Drug remedies reduce perceptions of health and efficacy and lower perceived importance of, and motivation to engage in, complementary health-protective behaviors, leading to a boomerang effect on healthy lifestyle practices. When accompanied by a combined intervention to heighten efficacy and motivation, healthy lifestyle practices increase and the drug boomerang effect is mitigated. When the intervention targets only one mechanism (i.e., efficacy *or* motivation), healthy lifestyle practices are unaffected. Thus, these data suggest that a combined intervention is necessary to undo the boomerang effect of drug marketing, as we also observed in experiment 5. Recalling our speculation in experiment 2 that consumers taking cholesterol medication were less susceptible

[14] In addition to the mediational analysis reported in the main text, alternative analyses were also run for the following mediators: motivation, and the sum of motivation and efficacy. (Efficacy alone is not a candidate since the two-way interaction was non-significant.) Not surprisingly, all support mediation. See related footnote 8.

to the boomerang effect because of educational interventions from health care professionals, the present experiment supports the notion that such interventions can work—*if* they target both motivation and efficacy to engage in healthy lifestyle practices.

GENERAL DISCUSSION

A healthy lifestyle not only has immediate health benefits but also helps to prevent the onset of major premature debilitating conditions (e.g., heart disease, stroke, cancer and diabetes [Jessor, Turbin and Costa 1998; Sallis 1993]). Indeed, a healthy lifestyle—including healthy eating and physical activity—have been identified as key factors in disease prevention by the United States Department of Health and Human Services (2006). Consumers are faced with decisions about healthy lifestyle practices on a daily basis. For example: to smoke or not to smoke; fries or a salad with your meal; TV or a brisk walk after dinner? Moreover, the market is flooded with products and services that are meant to help consumers achieve and maintain a healthy lifestyle including health remedies such as drugs and supplements. However, very little is known about how consumers react to the marketing of drugs and supplements in the healthy lifestyle domain.

The present research investigated the effects of drug and supplement marketing on intentions to live a healthy lifestyle. In experiment 1, a drug (versus supplement) undermined healthy lifestyle intentions. In experiment 2, healthy lifestyle intentions declined for a drug (versus supplement) as effectiveness increased. In experiment 3, drugs were associated with poorer health and reduced importance of healthy lifestyle practices than supplements; cognitive schema about drugs and supplements were shown to influence such judgments. In experiment 4, a consumer taking a drug (OTC or prescription) versus a supplement or no product was perceived as engaging to a lesser extent in healthy lifestyle practices. A drug also led to lower

perceptions of health, efficacy, ability, and motivation to engage in healthy lifestyle behaviors. In experiment 5, a drug reduced efficacy and motivation to engage in health-protective behaviors and, in turn undermined healthy lifestyle intentions. When accompanied by a combined intervention that increased efficacy and motivation, the drug no longer boomeranged. Finally, in experiment 6, a combined intervention accompanying a drug remedy that targeted efficacy and motivation increased healthy lifestyle intentions; single-component interventions targeting motivation or efficacy alone did not.

Taken together, these studies indicate that drug marketing boomerangs and undermines a healthy lifestyle for consumers. The boomerang arises because a) drugs are associated with poor health and thereby reduce efficacy; and b) drugs reduce the importance of, and motivation to engage in, complementary health-protective behaviors. Supplements—which are not associated with poor health and which by their name remind consumers of the need for complementary health protective behaviors—do not boomerang. Moreover, based on these psychological mechanisms, interventions that heighten motivation and efficacy can mitigate the drug boomerang and increase healthy lifestyle intentions.

Limitations. We note several limitations of the present set of experiments. First, we utilize self-reported intentions data and rely upon other research that has established the link between intentions and actual behavior. Self-report data does, however, allow us to investigate psychological process (by measuring efficacy and motivation, etc.) rather than relying on observed behavior only. Second, experiments 1, 2 and 5 provide a specific instantiation for the drug and supplement that may not generalize to other domains and stimuli. On the other hand, greater control of other information about the product arguably provides a stronger test inasmuch as drug/supplement differences must be sufficiently powerful to overcome an equivalent but

detailed product description. Third, experiments 3, 4 and 6 used an impoverished set of stimuli (that provided only minimal information about the drug and supplement) and may not generalize to other domains and more specific instantiations. On the other hand, using impoverished stimuli was deliberate because it allowed us to examine consumers' spontaneous reactions, relatively uncontaminated by specific aspects of the stimuli. Fourth, we utilized convenience samples that make no claims for representativeness to the general population in these experiments. However, our findings were obtained in both laboratory and field experiments that provided some variation across population sample, in addition to product and healthy lifestyle practices.

Psychological Mechanisms. We have proposed two possible mechanisms that account for the differential consumer reaction to drug and supplement marketing. First, a drug reduces the perceived importance of, and motivation to engage, in health-protective behaviors that contribute to a healthy lifestyle. Second, a drug prompts associations to poor health which lower efficacy and leads consumers away from relying upon healthy lifestyle practices. We offer evidence for these mechanisms in experiments 3—6. We also test corrective interventions to undo the boomerang effect based on these mechanisms: as experiments 5 and 6 attest, a combined intervention that increases motivation and efficacy to engage in health-protective behaviors can mitigate the boomerang effect of a drug remedy on healthy lifestyle intentions. We note that this evidence may be consistent with our finding in experiment 2 that patients under a doctor's care while taking a drug remedy are less susceptible to the boomerang.

Future research might further examine the psychological mechanisms underlying the drug boomerang effect. For example, does the reduction in motivation and efficacy spill over to other healthy lifestyle behaviors beyond healthy eating and exercise? Are there other consequences of drug marketing beyond a healthy lifestyle? Preliminary research (omitted for brevity's sake)

indicates that quality of life perceptions may be undermined when consumers engage in healthy lifestyle practices while consuming a drug remedy. We speculate that the need for complementary health-protective behaviors to accompany a drug violates the drug schema—as a get-out-of jail-*free* card (cf. Bolton et al. 2006)—and thereby costs the consumer in terms of quality of life perceptions. Moreover, consumers may perceive that healthy lifestyle practices will be more costly (i.e., difficult, effortful) when motivation and efficacy is low. If so, then future research might investigate the relative psychic cost (time, effort, difficulty, dislike) of the drug and its complementary behaviors. For example, a drug may be perceived as more costly when it requires a prescription (versus over-the-counter), includes a demanding treatment regime (painful daily injections vs. a simple pill or patch), or has prominent and undesired side effects (sexual dysfunction). Similarly, complementary health-protective behaviors may be perceived as more costly when they require complex lifestyle changes or impinge upon ingrained habits. The contrast between the drug and complementary behaviors may alter perceptions of the drug as a get-out-of-jail-*free* card and thereby reduce or enhance the boomerang effect. Related to this point, the risks associated with the remedy itself may also play a role—although the present research controls for this factor (via remedy effectiveness and other performance measures), consumers who perceive that a drug or supplement entails greater risk may be more likely to live a healthy lifestyle 'as back-up protection'. Of course, such an argument assumes that consumers can take such factors into account in an unbiased fashion when responding to drug marketing. Moreover, puffery by marketers—and, more seriously, deceptive claims and false advertising—that makes a product seem relatively easy, effortless, or otherwise cost-free to use (relative to healthy lifestyle practices) may likewise facilitate the boomerang. .

Expertise. Consistent with a need to better understand the "lay theories" that guide human

behavior (Molden and Dweck 2006), our research sheds light on lay theories about drugs and supplements that drive consumer behavior in the health domain. First, experiment 3 provides evidence that drug/supplement cognitive schema influence health perceptions and the perceived importance of complementary health-protective behaviors when taking a drug versus supplement. Subsequent experiments extend these differences to motivation and efficacy to engage in health-protective behaviors. Second, experiment 2 provides preliminary evidence that consumers taking a drug under a doctor's care may be less susceptible to the boomerang effect. We cautiously speculate that these results may arise from the one-on-one education that such patients typically receive from medical providers when prescribed a drug. Hence, extensive education may be effective at "undoing" the boomerang of drugs versus supplements—although our evidence suggests that these effects are nonetheless prevalent among consumers. Indeed, other research (omitted for brevity's sake) indicates that even highly educated consumers and consumers who have otherwise acknowledged the importance of a healthy lifestyle (as evidenced by fitness club membership) are nonetheless susceptible to the boomerang effect for drugs. Third, experiments 5 and 6 indicate that educational interventions to undo the boomerang effect can be successful—*if* they utilize a combined approach that targets both efficacy and motivation to engage in healthy lifestyle practices. That is, a better understanding of the lay theories behind drug and supplement effects can lead to corrective interventions that promote a healthy lifestyle. Similarly, if consumer lay theories about drugs and supplements include guidance on when and who should use them and for what purpose, can we leverage this understanding to promote a healthy lifestyle? Although the present research explored drug and supplement knowledge, other kinds of knowledge and experience merit investigation. For example, would health knowledge about nutrition and exercise mitigate the boomerang effect—or would lay reasoning about the

drug dominate such knowledge? Similarly, how does past experience with drugs and supplements affect consumer reactions—will there be evidence of learning over time that reduces the drug boomerang or will such experience "seduce" consumers (cf. Hoch 2002) and reinforce their existing schema about such products?

Consumer Welfare. The present research adds to the extant literature on the effects of health marketing—topics of considerable interest to marketers, consumers and consumer welfare advocates, health care workers, and government regulatory agencies. In addition to accounting for mixed effects of drug and supplement advertising, our research also addresses an important problem in health care—how to encourage consumers to engage in healthy lifestyle practices and to comply with medication or treatment regimes (e.g., McDonald, Garg, and Haynes 2002; Bowman, Heilman, and Seetharaman 2004; Dellande, Gilly, and Graham 2004). We find that detrimental effects of drug (vs. supplement) marketing arise from actual consumption of the product (e.g., now that I'm taking this drug, I can do/eat whatever I want; experiment 1) or from simple exposure to direct-to-consumer advertising (e.g., why live a healthy lifestyle when a drug exists to take care of the problem; experiment 2). Of course, drugs do, in fact, lower specific health risks (e.g., hypercholesterolemia); but consumers appear willing to trade away some of this safety gain by engaging in riskier behavior (e.g., a sedentary lifestyle) that may also increase their exposure to other health risks not treated by the drug (e.g., osteoporosis). That is, by narrowing focus on the presumed benefit of the drug, consumers may neglect other important benefits of a healthy lifestyle.

Our findings add to the growing debate over the regulation of drug and supplement markets, the role of direct-to-consumer advertising, and de-marketing efforts to reduce risky consumption. Specifically, our research suggests that drugs boomerang on consumers by

undermining their motivation and efficacy to engage in health-protective behaviors. Thus, consumers “tune out” other health-protective behaviors that contribute to a healthy lifestyle. In contrast, supplements remind consumers to “turn on” complementary protective behaviors as part of a healthy lifestyle package. Thus, drug marketing—and even supplement marketing—should be treated with caution—lest such products seduce consumers into treating them as get-out-of-jail-free cards.

TABLE 1: CONSUMER DEFINITION OF DRUG AND SUPPLEMENT (EXPERIMENT 3)

COGNITIVE RESPONSE	DRUG (%)	SUPPLEMENT (%)
Illness/disease	55.1	1.3
Work with/enhance other body function	9.0	68.0
Alter body function	21.8	5.1
FDA	18.0	2.6
Prescription	19.2	0
Natural substance	0	47.4
Non-natural chemical	15.4	7.7
Effective	11.5	0
Risky	15.4	5.1

Note: Percent of participants ascribing each cognitive response to the drug or supplement. Three participants (out of 81) were omitted who did not answer the question.

TABLE 2: SUPPLEMENT VERSUS DRUG SCENARIO RATINGS AS A FUNCTION OF DRUG/SUPPLEMENT INFORMATION (EXPERIMENT 3)

INFORMATION	N	BEHAVIORAL INDEX	HEALTH PERCEPTIONS	IMPORTANCE BELIEFS
Equally effective	19	**4.53** (1.01)	**4.74** (1.24)	**4.71 (1.42)**
Drug more effective	20	**4.55** (1.17)[a]	4.37 (1.42)[a]	**4.63 (1.04)**
Supplement more effective	21	**4.62** (0.80)	**4.52** (0.81)	**4.55 (1.11)**
No Information	19	**5.16** (1.11)	**5.05** (1.18)	**5.31 (1.09)**[a]

[a] 1 missing value

Note: Cell means in bold are significantly different from midpoint in t-tests ($p < .05$).

TABLE 3: SCENARIO TARGET RATINGS
AS A FUNCTION OF REMEDY PRODUCT (EXPERIMENT 4)

PRODUCT	N	BEHAVIORAL INDEX	HEALTH PERCEPTIONS	MOTIVATION INDEX	ABILITY INDEX	EFFICACY INDEX
OTC drug	57	4.10 (1.27) [b]	4.20 (1.35)[a]	3.59 (1.36)	4.72 (1.37)	3.84 (1.10)
Prescription drug	49	4.18 (1.22)	3.87 (1.29)	3.66 (1.44)	4.56 (1.52)	3.85 (1.25)
Supplement	53	4.66 (1.07)	4.93 (0.99)	4.51 (1.43)	5.08 (1.16)	4.61 (0.98)
No product	54	4.59 (0.75)	4.96 (0.93)	4.40 (1.00)	5.27 (1.37)	4.93 (0.84)

[a] data missing from 1 respondent
[b] data missing from 2 respondents

TABLE 4: CONSUMER RESPONSE AS A FUNCTION OF DRUG, SUPPLEMENT, AND DRUG INTEVENTION (EXPERIMENT 5)

PRODUCT	N	BEHAVIORAL INTENTIONS (7-POINT SCALE)	BEHAVORIAL INTENTIONS (0-100% SCALE)	MOTIVATION INDEX	ABILITY INDEX	EFFICACY INDEX
Drug	21	4.21 (1.60)	42.86 (25.14)	3.81 (1.91)	4.24 (1.71)	2.60 (1.43)
Drug + Combined Intervention	21	5.17 (1.10)	70.36 (17.58)	4.98 (1.54)	5.29 (1.33)	4.56 (1.40)
Supplement	16	4.94 (1.52)	60.94 (25.24)	4.97 (1.66)	4.53 (1.76)	3.72 (1.72)

TABLE 5: CONSUMER RESPONSE TO A DRUG REMEDY AS A FUNCTION OF INTERVENTION COMPONENT (EXPERIMENT 6)

MOTIVATION COMPONENT	EFFICACY COMPONENT	N	BEHAVIORAL INDEX	HEALTH PERCEPTIONS	MOTIVATIONAL INDEX	ABILITY INDEX	EFFICACY INDEX
Absent	Absent	25	3.56 (1.65)	3.32 (0.92)	3.60 (1.83)	3.46 (1.77)	3.24 (1.42)
Absent	Present	22	3.44 (1.65)	3.66 (0.92)	3.59 (1.46)	4.27 (1.60)	3.59 (1.31)
Present	Absent	25	3.64 (1.18)	3.34 (0.86)	3.26 (1.56)	3.74 (1.57)	3.31 (1.20)
Present	Present	20	4.83 (1.16)	4.33 (0.95)	5.03 (1.21)	4.95 (0.94)	4.25 (0.95)

REFERENCES

Alba, Joseph W. and J. Wesley Hutchinson (1987), "Dimensions of Consumer Expertise," *Journal of Consumer Research,* 13 (March), 411-454.

Alba, Joseph W. and J. Wesley Hutchinson (2000), "Knowledge Calibration: What Consumers Know and What They Think They Know," *Journal of Consumer Research*, 27 (Sep), 123-156.

American Heart Association (2005), "Why Should I Care? Cardiovascular Disease is America's No. 1 Killer," (accessed 15 June 2005), [available at http://www.americanheart.org/presenter.jhtml?identifier=1502].

Arnett, D.K., et al. (2005), "Twenty-year Trends in Serum Cholesterol, Hypercholertolemia, and Cholesterol Medication Use: the Minnesota Heart Survey, 1980-1982 to 2000-2002," *Circulation*, 112 (25), 3884-91.

Bandura, Albert (1986), *Social foundations of thought and action: A social cognitive theory*, Englewood Cliffs, NJ: Prentice-Hall.

Bloch, P. (1984), "The Wellness Movement: Imperatives for Health Care Marketers," *Journal of Health Care Marketing*, 4 (Winter), 9-16.

Bolton, Lisa E., Joel B. Cohen, and Paul N. Bloom (2006), "Does Marketing Products as Remedies Create "Get Out of Jail Free Cards"?", *Journal of Consumer Research* (forthcoming).

Bowman, Douglas, Carrie M. Heilman, and P.B. Seetharaman (2004), "Determinants of Product-Use Compliance Behavior," *Journal of Marketing Research*, 41 (3), 324-338.

Boush, David M. and Barbara Loken (1991) "A Process-Tracing Study of Brand Extension Evaluation," *Journal of Marketing Research*, 37, 16-28.

Brehm, Jack W. (1966). *A Theory of Psychological Reactance*. New York: Academic Press.

Broniarczyk, Susan M., and Joseph W. Alba (1994) "The Importance of the Brand in Brand Extension", *Journal of Marketing Research*, 31, 214-228.

Cooper, P. J., et al. (1986), "The Development and Validation of the Body Shape Questionnaire," *International Journal of Eating Disorders*, 6, 485-494.

Dellande, Stephanie, Mary C. Gilly, and John L. Graham (2004), "Gaining Compliance and Losing Weight: The Role of the Service Provider in Health Care Services," *Journal of Marketing*, 68 (3), 78-91.

Divine, Richard L. and Lawrence Lepisto (2005), "Analysis of the Healthy Lifestyle Consumer," *Journal of Consumer Marketing*, 22(4), 275-284.

Eggers, Sara L. and Baruch Fischoff (2004), "Setting Policies for Consumer Communications: A Behavioral Decision Research Approach," *Journal of Public Policy & Marketing*, 23 (1), 14-27.

Evans, C., and B. Dolan (1993), "Body Shape Questionnaire: Derivation of Shortened "Alternate Forms"," *International Journal of Eating Disorders*, 13, 315-321.

FDA Consumer (2005), "How to Keep Your Heart Healthy", (accessed 14 June 05), [available at http://www.fda.gov/fdac/features/2003/603_heart.html].

France, Karen Russo and Paula Fitzgerald Bone (2005), "Policy Makers' Paradigms and Evidence from Consumer Interpretations of Dietary Supplement Labels," *The Journal of Consumer Affairs*, 39 (1), 27-51.

Galloway, Chester S. (2003), "The First Amendment and FTC Weight-loss Advertising Regulation," *The Journal of Consumer Affairs*, 37 (2), 413-423.

Goal Standard (2005), "New Survey Shows Most Patients Being Treated for High Cholesterol

Don't Know Their Goal," (accessed 3 Mar 06), [available at www.goalstandard.com/].

Haard, Jenifer, Michael D. Slater and Marilee Long (2004), "Scientese and Ambiguous Citation in the Selling of Unproven Medical Treatments," *Health Communication*, 16 (4), 411-426.

Hoch, Stephen J. (2002), "Product Experience is Seductive," *Journal of Consumer Research*, 29 (Dec), 448-454.

Jessor, Richard, Mark S. Turbin and Frances M. Costa (1998), "Protective Factors in Adolescent Health Behavior," *Journal of Personality and Social Psychology*, 75 (3), 788-800.

Main, Kelley J., Jennifer J. Argo, and Bruce A. Huhmann (2004), "Pharmaceutical Advertising in the USA: Information or Influence?" *International Journal of Advertising*, 23, 119-142.

Mason, Marlys J. (1998), "Drugs or Dietary Supplements: FDA's Enforcement of DSHEA," *Journal of Public Policy & Marketing*, 17 (2), 296-302.

McDonald, H.P., A.X. Garg, and R.B. Haynes (2002), "Interventions to Enhance Patient Adherence to Medication Prescriptions: Scientific Review," *Journal of the American Medical Association*, 288 (22), 2668-2679.

Merriam-Webster Online (2005), (accessed 14 June 2005), [available at http://www.m-w.com/].

Milner, Henry, and Peter Van Doren (2000), "Food Risks and Labeling Controversies," *Regulation*, 23, 1, 35-39.

Mitka, Mike (2004), "Are OTC Statins Ready for Prime Time?", *Journal of the American Medical Association*, 292 (3), 317-318.

Mitra, Anu, Manoj Hastak, Gary T. Ford, and Debra Jones Ringold (1999), "Can the Educationally Disadvantaged Interpret the FDA-Mandated Nutrition Facts Panel in the Presence of an Implied Health Claim?," *Journal of Public Policy and Marketing*, 18(1) 106-117.

Moreau, C. Page, Arthur Markman, and Donald R. Lehmann (2001), "'What is it?' Categorization Flexibility and Consumers' Responses to Really New Products," *Journal of Consumer Research*, 27 (4), 489-498.

Nutrition Business International (1998), "$23 Billion and Counting: Nutrition Industry Braces for a Competitive Figure," *Nutrition Business Journal*, 3 (September), 1-5, 13, 18; cited in France and Bone (2005).

Pechmann, Cornelia, and Michael D. Slater (2005), "Social Marketing Messages that May Motivate Irresponsible Consumption Behavior," in *Inside Consumption*, ed. S. Ratneshwar and David Glen Mick, New York: Routledge, 185-207.

Sallis, J. F. (1993), "Promoting Healthful Diet and Physical Activity," in *Promoting the Health of Adolescents: New Directions for the Twenty-first Century*, ed. S. G. Millstein, A. C. Petersen, and E. O. Nightingale, New York: Oxford University Press, 209-241.

Scher, Steven J., and Joel Cooper (1989), "Motivational Basis of Dissonance: The Singular Role of Behavioral Consequences," *Journal of Personality and Social Psychology*, 56 (6), 899-906.

Seiders, Kathleen, and Ross D. Petty (2004), "Obesity and the Role of Food Marketing: A Policy Analysis of Issues and Remedies," *Journal of Public Policy & Marketing*, 23 (2), 153-169.

Sherif, Carolyn W., and Muzafer Sherif (1967). *Attitude, Ego-Involvement, and Change*. Westport CT: Greenwood Press.

Stewart, David W. and Ingrid M. Martin (1994), "Intended and Unintended Consequences of Warning Messages: A Review and Synthesis of Empirical Research," *Journal of Public Policy & Marketing*, 13 (1), 1-19.

United States Department of Health and Human Services (2006), "Public Health Priorities: Disease Prevention", (accessed 8 Feb 06), [available at http://www.surgeongeneral.gov/publichealthpriorities.html].

Vladeck, David C. (2000), "Truth and Consequences: The Perils of Half-Truths and Unsubstantiated Health Claims for Dietary Supplements," *Journal of Public Policy & Marketing*, 19 (1), 132-138.

Wall Street Journal (2000), "Splitting Hair on Supplement Claims," Feb 22, B1.

Weinstein, Neil D. (1993), "Testing Four Competing Theories of Health-Protective Behavior," *Health Psychology*, 12 (4), 324-333.

Wellner, Alison Stein (1998), "Eat Drink and be Healed," *American Demographics*, 20 (3), 55-59.

West, Patricia M., Christina L. Brown, and Stephen J. Hoch (1996), "Consumption Vocabulary and Preference Formation," *Journal of Consumer Research*, 23, 120-135.

Wilke, Michael (1997), "Alternative Remedies Enter the Mainstream," *Advertising Age*, 68 (8), 18.

Wood, Stacy L and , John G Lynch, Jr. (2002), "Prior Knowledge and Complacency in New Product Learning," *Journal of Consumer Research*, 29 (3), December, 416-426.