How Does Drug and Supplement Marketing Affect a Healthy Lifestyle?

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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 from two psychological mechanisms: (1) drugs reduce risk perceptions and perceived importance of, and motivation to engage in, complementary health-protective behaviors, and (2) drugs are associated with poor health that reduces self-efficacy and perceived ability to engage in complementary health-protective behaviors. A combined intervention accompanying a drug remedy that targets both motivation and ability mitigates the drug boomerang on a healthy lifestyle.

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). Indeed, a healthy lifestyle—including healthy eating and physical activity—has been identified as a key factor in disease prevention by the U.S. 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. Indeed, 2006 advertising expenditures soared to $4.8 billion in the pharmaceutical industry and $981 million in the supplement industry (*Brandweek* 2007; Langreth and Herper 2006). Surprisingly little is known, however, about the effects of remedy marketing on a healthy lifestyle. Our research addresses this knowledge gap by investigating consumer reaction to drug and supplement marketing.

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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]). Most research that tests or relies upon these models has examined risk-avoidance marketing, such as health warning messages and "just say no" campaigns, rather than remedy marketing. 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 (vs. control) message for a nicotine replacement product (Bolton et al. 2006; experiments 1 and 2). Similar results in other health and nonhealth 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 of the remedy message opposite to the position intended).

Although Bolton and colleagues (2006) provide evidence that risk perceptions mediate the boomerang effect of remedies on behavioral intentions, the authors imply a role for motivation but provide no direct evidence for a motivational process. In addition, these authors sought a common explanatory mechanism across health and nonhealth domains—which may preclude a more nuanced and precise understanding of the psychological mechanisms in the health domain. Indeed, research has long acknowledged both motivation and ability as predictors of behavior, and motivation and ability (or self-efficacy) have been identified as key points of comparison across health models (Weinstein 1993). The current research will therefore consider the roles of both motivation and ability in driving consumer response to the marketing of health remedies.

Thus, the present research focuses on and builds our understanding of the psychological process underlying the boomerang effect of health remedies. Specifically, two mechanisms are proposed to drive the boomerang effect on a healthy lifestyle. The first mechanism is relatively straightforward and consistent with the role of risk perceptions posited by Bolton et al. (2006). Specifically, a health remedy that undermines perceived risk reduces, in turn, the perceived importance of complementary health-protective behaviors. (If the health remedy alone reduces risk, then other actions to reduce risk will seem less important.) As a result, consumers will be less motivated to engage in complementary health-protective behaviors—thereby undermining a healthy lifestyle.

The second mechanism arises when health remedies are associated with poor health. In this case, the health remedy reduces perceptions of one's health and, in turn, perceived self-efficacy (i.e., beliefs in one's capabilities). As a physiological and emotional state, poor health will lower self-efficacy inasmuch as a sick person feels less assured of his ability to take responsibility for his own health outcomes and instead relies on external aid and treatment (Bandura 1977, 1986). Indeed, illness cognitions were negatively associated with control/coping beliefs in a meta-analysis of the commonsense model of illness representations (Hagger and Orbell 2003) consistent with the notion that poor health perceptions undermine perceived self-efficacy and ability to cope via health-protective behaviors (see also Lau-Walker 2006). Hence, the second mechanism proposes that remedies associated with illness will reduce consumer self-efficacy and, in turn, the perceived ability to engage in complementary health-protective behaviors—thereby undermining a healthy lifestyle.

Thus, health remedies may undermine both motivation and perceived ability to engage in a healthy lifestyle. Each of these mechanisms, on its own, is sufficient to undermine healthy lifestyle intentions—inasmuch as motivation and ability are each established predictors of behavior. Conceptually, the present research argues that motivation and ability together drive healthy lifestyle intentions (i.e., an interactive combinatory effect; cf. Moorman and Matulich 1993). Specifically, motivation reflects goal-directed arousal, whereas ability reflects consumers' competence beliefs for engaging in healthy lifestyle practices. When perceived ability is high, then highly motivated consumers will be aroused to engage in health-protective behaviors; when perceived ability is low, motivation will have little effect (since even motivated consumers will not perceive themselves as able to successfully carry out healthy lifestyle practices).

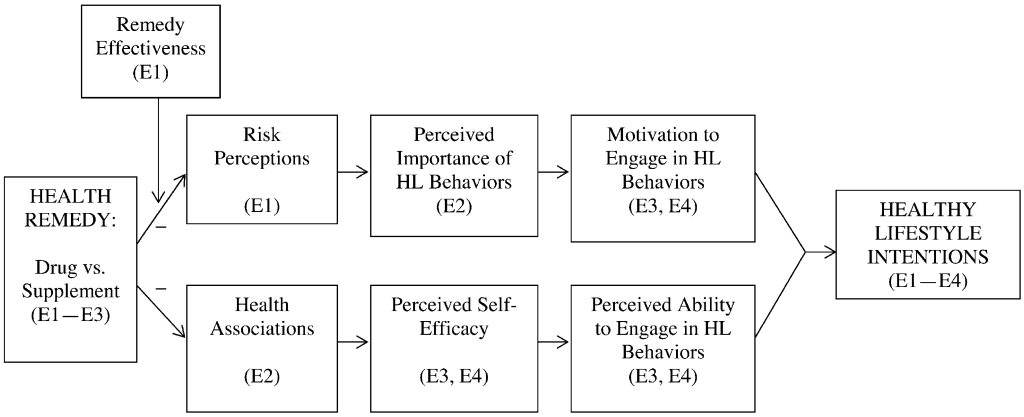
Figure 1 illustrates the two mechanisms that together drive the boomerang effect of health remedy marketing on healthy lifestyle intentions. If supported, this conceptual framework will be important for several reasons. First, the framework further develops our understanding of the role of risk perceptions in the boomerang effect—namely, the downstream effect on perceived importance of, and motivation to engage in, complementary protective behaviors. Second, the framework introduces a second mechanism contributing to the effect of health remedy marketing—namely, reduced health perceptions that undermine perceived self-efficacy and ability to engage in complementary health-protective behaviors. Third, the framework has important consequences for corrective interventions to "undo" the boomerang effect of health remedy marketing—namely, that a successful intervention will address both mechanisms in concert. And, finally, the framework identifies boundary conditions in the health domain for the boomerang effect of remedies demonstrated in previous research. Specifically, the proposed psychological mechanisms lead to differential predictions for the effects of two categories of health remedies in the marketplace—namely, drugs and supplements.

CONSUMER REACTION TO DRUG AND SUPPLEMENT MARKETING

Drugs and supplements are defined by federal regulation. 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

FIGURE 1

MECHANISMS FOR THE BOOMERANG EFFECT OF HEALTH REMEDIES ON A HEALTHY LIFESTYLE



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).[1]

Regulations for drugs and supplements differ in complex ways, and whether more or less enforcement action is necessary, and of what nature, is a hotly contested debate (e.g., Galloway 2003; Vladeck 2000). Part of what underlies the regulatory debate is whether consumers fully understand the differences between drugs and supplements. 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 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., a structure-function claim) 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 et al. 1999). Compounding the problem, some 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 (Eggers and Fischoff 2004).

Given that consumers may not understand the regulatory distinctions for drugs and supplements, the present research focuses on understanding consumers' own schema that guides processing and inference making about health remedy products (Alba and Hutchinson 1987). As a starting point, it seems useful to consider the commonly understood meaning of drug and supplement nomenclature inasmuch as consumption vocabulary has been shown to influence consumer processing (West, Brown, and Hoch 1996). First, the term "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. Second, the common 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). In this light, the word "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.

If supported, these differences in a consumer schema for drugs and supplements will have important consequences for the two mechanisms that drive the boomerang effect on a healthy lifestyle. First, a supplement works in conjunction with complementary health-protective behaviors—indeed, the name itself serves as a reminder—whereas a drug alone promises to reduce risk. Because the supplement alone does not reduce risk, complementary behaviors are still perceived as important, and consumers will be motivated to engage in them. As a result, a drug (vs. a supplement) will undermine risk perceptions and the perceived importance of, and motivation to engage in, complementary behaviors. Second, a drug carries an association with poor health that a supplement does not. Lacking an association with poor health, supplements will not undermine self-efficacy and ability perceptions. As a result, a drug (vs. a supplement) will undermine health perceptions and, in turn, the self-efficacy and perceived ability to engage in complementary health-protective behaviors. Thus, we argue that a drug remedy activates both mechanisms that drive the boomerang effect on a healthy lifestyle, whereas a supplement does not. Formally, these mechanisms lead to the proposition that drug marketing is more likely to lead to a boomerang effect than supplement marketing.

[1]See drug definition at http://www.fda.gov/opacom/laws/fdcact/fdcact1.htm and supplement definition at http://www.fda.gov/opacom/laws/dshea.html or http://www.cfsan.fda.gov/~dms/dietsupp.html.

RESEARCH OVERVIEW

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

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

We attribute the boomerang of drugs (vs. supplements) to two mechanisms. First, drugs will reduce risk perceptions and, in turn, the perceived importance of, and motivation to engage in, health-protective behaviors. (Supplements—as the name itself suggests—work to reduce risk in conjunction with other behaviors; hence, the perceived importance of, and motivation to engage in, complementary health-protective behaviors remains intact.) Second, drugs will reduce health perceptions and, in turn, the self-efficacy and perceived ability to engage in health-protective behaviors. (In contrast, supplements do not bear an association with poor health that undermines self-efficacy and ability perceptions.) Accordingly, we hypothesize two mechanisms that drive the boomerang effect as follows:

H2: Drugs (compared to supplements) will

a) reduce risk perceptions and the perceived importance of, and motivation to engage in, complementary health-protective behaviors and
b) reduce health perceptions, self-efficacy, and the perceived ability to engage in complementary health-protective behaviors that constitute a healthy lifestyle.

Both motivation and ability together are needed for consumers to engage in healthy lifestyle practices. (Motivation drives behavior only if consumers perceive themselves able to carry out such behaviors.) Accordingly, we further hypothesize that

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

These hypotheses are represented by the conceptual framework in figure 1, which accounts for how drug marketing affects a healthy lifestyle. From a theoretical perspective, supplements may be viewed as a conceptually relevant and conservative control group (vs. a no-remedy control) for comparison with drugs inasmuch as consumer perceptions of these health remedies differ on characteristics that activate the two mechanisms that drive the boomerang effect. From a substantive perspective, a comparison of drug and supplement marketing has important implications for consumer welfare and public policy (to be discussed later).

To test these hypotheses, a series of experiments was conducted in the domain of health remedy marketing. The relationship of each experiment to the conceptual framework is identified in figure 1. In experiment 1, we examine the effects of drug and supplement marketing on healthy lifestyle intentions in a field study of consumers (testing hypothesis 1). In experiments 2 and 3, we investigate the psychological mechanisms for the previously observed effects (testing hypotheses 1–3). And, finally, experiment 4 provides further evidence for the psychological mechanisms (testing hypotheses 1–3) while concomitantly investigating corrective interventions to mitigate the boomerang of drug marketing (hypothesis 4; to be discussed later).

EXPERIMENT 1

The purpose of this experiment is to investigate consumer reaction to drug and supplement remedies. We examine a problem domain, high-cholesterol, which 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 Food and Drug Administration (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 hypothesis 1 in an at-risk consumer population. In addition, we investigate the role of effectiveness as a moderator of the boomerang effect. We have previously argued that the drug (vs. supplement) reduces motivation to engage in healthy lifestyle practices because 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 remedy of low effectiveness may be viewed as a control group against which a remedy of high effectiveness can be compared. Accordingly, we predict that as effectiveness increases, a drug (supplement) message will (not) undermine risk perceptions and intentions to engage in healthy lifestyle practices.

Method

Participants and Design. The experiment was a 2 (drug vs. supplement) × 2 (effectiveness: low vs. high) between-subjects design. The sample consisted of patients of a Veterans' Affairs Medical Center, screened for cardiac risk factors (placing them at risk of high cholesterol and its health complications). 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 text read (with drug/supplement and effectiveness manipulations shown in brackets):

> 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. PRADEL™ is a [medicine/supplement] that along with diet and exercise can significantly lower cholesterol. [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." As a measure of risk perceptions, participants rated the extent to which various activities are "necessary to maintaining a normal, disease-free life" on five-point scales (with endpoints "not necessary" and "very necessary"), including the target behavior "eating 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. We predict an interaction of drug/supplement and effectiveness on risk perceptions and behavioral intentions such that as effectiveness increases, a drug (supplement) message will (not) undermine risk perceptions and intentions to engage in healthy lifestyle practices (consistent with hypotheses 1 and 2a).

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 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. $M_{sup} = 3.40$ (1.08); $F(1, 72) = 5.52$, $p < .05$). Ad liking and ad believability did not differ (all NS). 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); $F(1, 177) = 1.45$, $p = .23$).

Risk Perceptions. ANOVA of the risk perception measure revealed a significant interaction of drug/supplement and effectiveness ($F(1, 184) = 4.22$, $p < .05$). Follow-up simple effect tests indicate that higher effectiveness of the drug lowered risk perceptions ($M_{low} = 4.42$ (0.84) vs. $M_{high} = 4.06$ (1.14); $F(1, 184) = 2.85$, $p < .10$), whereas higher effectiveness of the supplement had no effect ($M_{low} = 4.28$ (1.08) vs. $M_{high} = 4.50$ (0.99); $F(1, 184) = 1.50$, $p = .22$).

Mediation. An analysis was conducted to test the mediating role of risk perceptions. As reported previously, both behavioral intentions and risk perceptions were a significant function of the interaction of drug/supplement and effectiveness. When perceived risk is added to the model for behavioral intentions, this interaction is no longer significant ($F < 1$), and perceived risk is a significant predictor ($F(1, 169) = 35.04$, $p < .01$). These results support mediation.

Overall, these results indicate that exposure to a message for a more effective drug decreases risk perceptions and thereby undermines intentions to engage in healthy lifestyle practices (by eating low-cholesterol foods). In contrast, the boomerang effect was eliminated for a supplement message. These findings are consistent with hypotheses 1 and 2a.

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 not significant ($F < 1$). Analysis of

risk perceptions yielded a similar pattern: a two-way interaction of drug/supplement and effectiveness ($F(1, 184) = 5.94$, $p < .05$), qualified by a marginal three-way interaction with cholesterol medication status ($F(1, 184) = 3.86$, $p = .05$). For respondents not taking cholesterol medication, the two-way interaction of drug/supplement and effectiveness was significant ($F(1, 184) = 7.28$, $p < .05$). For respondents taking cholesterol medication, this interaction was not significant ($F < 1$). Overall, these results suggest that the interaction effect on risk perceptions and 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. One possible 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. As an alternative explanation, we speculate that such consumers are likely to have received educational interventions from health care professionals designed to increase their perceived motivation and ability to engage in complementary health protective behaviors that contribute to a healthy lifestyle. (We experimentally test this kind of corrective intervention in experiment 4.) 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 risk perceptions and 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 but 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 2

Experiment 1 focused on the consequences of health remedy messages for risk perceptions and a healthy lifestyle. As expected, risk perceptions and healthy lifestyle intentions decline for a drug (vs. supplement) as effectiveness increases. These findings demonstrate two boundary conditions on the remedy boomerang effect documented in Bolton et al. (2006): the type of remedy (drug vs. supplement) and the remedy's effectiveness (high vs. low).

We now turn to an investigation of the psychological mechanisms for the differential effects of drug and supplement marketing. Specifically, the present experiment investigates consumer perceptions of drugs and supplements, providing a preliminary test of hypothesis 2. We explore consumer understanding of the definition of an over-the-counter (OTC) drug and supplement, and we also examine health perceptions and perceived importance of complementary health-protective behaviors that contribute to a healthy lifestyle. We have argued and will test whether such differences underlie the differential boomerang effect of drug and supplement marketing. We focus on a health domain in which marketing has been implicated in epidemic rates of obesity (Seiders and Petty 2004); meanwhile, the marketing of health remedies (such as weight management drugs and supplements) continues to proliferate.

Method

Participants and Design. The experiment was a four-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 for qualitative analysis.

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 perceived 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 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 midpoint "no difference."

Results

Qualitative Responses. Open-ended responses to the definitional question were coded by two judges who were blind to experimental hypotheses. Intercoder reliability was 89%; disagreements were resolved through discussion by the judges. The descriptive results are shown in table 1. These results provide qualitative support for our hypotheses. Consistent with hypothesis 2a, 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.) Consistent with hypothesis 2b, 55.1% of respondents associated OTC drugs with poor health, specifically treating illness or disease (compared to 1.3% for supplements). These qualitative 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 nonnatural chemicals (15.4%)—not only does this distinction lack validity, but it can also be interpreted as evidence consistent with hypothesis 2. 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. An 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 (nonneutral 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 hypothesis 1.

TABLE 1

CONSUMER DEFINITION OF DRUG AND SUPPLEMENT (EXPERIMENT 2)

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
Federal Drug Administration	18.0	2.6
Prescription	19.2	0
Natural substance	0	47.4
Nonnatural 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.

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 (nonneutral 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 (nonneutral 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*) healthy lifestyle behaviors are perceived as less important when taking a drug than a supplement and (*b*) taking a drug is perceived as less healthy than taking a supplement—consistent with hypotheses 2a and 2b.

Mediation. A mediational analysis was conducted to test whether health perceptions and importance beliefs (theoretical precursors of ability and motivation) 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 provided. 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 ($F(1, 69) = 37.87, p < .01$). These results support mediation that is consistent with hypothesis 3 (see table 2).

As an additional follow-up analysis, we investigated whether consumer schemata (i.e., participants' coded cog-

TABLE 2

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

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** (.80)	**4.52** (.81)	**4.55 (1.11)**
No Information	19	**5.16** (1.11)	**5.05** (1.18)	**5.31 (1.09)**[a]

NOTE.—Cell means in bold are significantly different from midpoint in *t*-tests ($p < .05$).
[a]One missing value.

nitive 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 ($M_B =$ 4.84 (1.05) vs. $M_{NB} = 4.17$ (0.82) [B = belief, NB = no belief]; $F(1, 70) = 6.17$, $p < .05$, one-tailed), importance beliefs ($M_B = 4.90$ (1.08) vs. $M_{NB} = 4.34$ (1.48); $F(1,70) =$ 3.64, $p < .05$, one-tailed), and health ratings ($M_B = 4.84$ (1.12) vs. $M_{NB} = 3.93$ (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 ($M_B = 4.88$ (1.03) vs. $M_{NB} = 4.40$ (1.31); $F(1, 70) =$ 3.35, $p < .05$, one-tailed) but not importance beliefs ($M_B = 4.80$ (1.12) vs. $M_{NB} = 4.76$ (1.27); $F < 1$) or behaviors ($M_B = 4.67$ (1.05) vs. $M_{NB} = 4.76$ (1.03); $F < 1$). Overall, these findings indicate that health perceptions and importance beliefs are influenced by consumer schemata for drugs and supplements. Specifically, respondents who hold certain beliefs—identifying supplements with enhancing and natural properties or associating drugs with illness—are more inclined to (*a*) judge that healthy lifestyle behaviors are less important for drugs than supplements and (*b*) perceive that taking drugs is less healthy than taking supplements.

Overall, the results of experiment 2 provide support for hypotheses 1–3. Compared to supplements, OTC drugs 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 a 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 day care parents that utilized a quantitative measure of drug and supplement knowledge and that included additional scenario-based measures for the mechanisms proposed to underlie the boomerang effect. Consistent with hypothesis 2, drugs (vs. supplements) were associated with lower perceptions of health, self-efficacy, ability, and motivation to engage in health-protective behavior. 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 medical background in drugs and supplements—appeared sufficient to eliminate it. Thus, even otherwise highly educated consumers (60% of the sample held master's or PhD-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 3

Overall, the results of experiment 2 provide preliminary support for hypotheses 1–3. Specifically, we demonstrate how drugs and supplements affect consumer perceptions of health and the importance of complementary behaviors that, in turn, influence a healthy lifestyle. In the present experiment, we turn our attention to the roles of self-efficacy, ability, and motivation. Moreover, experiment 3 will also examine prescription drugs and include a control group for comparisons against a no-remedy baseline. (In experiment 2, analyses relied in part upon comparisons against a scale midpoint labeled "no difference," which we argue is sufficient for demonstrating a bias—but which is not without its critics.) By employing a between-subjects design and including additional measures of the mechanisms that drive the boomerang effect, the present experiment provides a more expansive test of hypotheses 1–3.

Method

Participants and Design. The experiment was a four-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 self-efficacy.

Results

For ease of reporting, indexes were constructed to reflect (1) healthy lifestyle behaviors, by averaging the two items measuring the extent of low-fat eating and exercise (coefficient $\alpha = 0.80$); (2) motivation, by averaging the two items measuring motivation to engage in low-fat eating and exercise (coefficient $\alpha = 0.91$); (3) ability, by averaging the two items measuring ability to engage in low-fat eating and exercise (coefficient $\alpha = 0.79$); and (4) self-efficacy, by averaging the six-item efficacy scale (coefficient $\alpha = 0.93$). 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.

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 hypothesis 1.

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 self-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 self-efficacy was lower in the drug conditions ($F(1, 209) = 40.75$, $p < .01$). Third, a similar pattern of results was also evident for ability. 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 ($F(1, 209) = 9.17$, $p < .01$). 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 hypotheses 2a and 2b.

Mediation. A mediational analysis was conducted to test whether motivation and ability together mediate drug/supplement differences for healthy lifestyle behaviors. 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 ability) is lower ($F(1, 210) = 18.28$, $p < .01$) for OTC and prescription drug conditions (which do not differ, $F < 1$) than supplement and no-product 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 ($F(1, 204) =$

TABLE 3

SCENARIO TARGET RATINGS AS A FUNCTION OF HEALTH REMEDY (EXPERIMENT 3)

Product	*N*	Behavioral index	Health perceptions	Motivation index	Ability index	Self-efficacy index
OTC drug	57	4.10 (1.27)[a]	4.20 (1.35)[b]	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 (.99)	4.51 (1.43)	5.08 (1.16)	4.61 (.98)
No product	54	4.59 (.75)	4.96 (.93)	4.40 (1.00)	5.27 (1.37)	4.93 (.84)

[a]Data missing from two respondents.
[b]Data missing from one respondent.

2.11, $p = .15$), and the mediator is a significant predictor ($F(1, 204) = 92.83$, $p < .01$). These results support mediation and are consistent with hypothesis 3.

Overall, these findings support hypotheses 1–3. 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. Findings were consistent with the experiment reported herein.

EXPERIMENT 4

Thus far, we have provided evidence that the boomerang effect of drug (vs. supplement) marketing arises from two mechanisms: (*a*) consumer perceptions of reduced risk that undermine perceived importance of, and motivation to engage in, complementary health-protective behaviors and (*b*) associations with poor health that undermine perceptions of self-efficacy and perceived ability to engage in complementary health-protective behaviors. The present study will provide further evidence for these mechanisms via a corrective intervention designed to mitigate the drug boomerang.

As we have previously argued, both motivation and ability need to be high before consumers will engage in health-protective behaviors. (If motivation is high and ability is not, consumers will perceive themselves as unable to engage in health-protective actions, thereby undermining any positive effects of motivation. If ability 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.) We now consider interventions that target these psychological mechanisms by (*a*) increasing the perceived importance of, and motivation to engage in, complementary health-protective behaviors and/or (*b*) increasing the perceived health, self-efficacy, and ability 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 ability to engage in health-protective behaviors) will increase healthy lifestyle intentions for a drug remedy (vs. no intervention or a single-mechanism intervention).

In a pilot study (omitted for brevity's sake), we first examined whether a combined intervention that accompanies a drug remedy mitigates the boomerang effect and elevates healthy lifestyle intentions to supplement levels. We utilized a weight management context and examined a fat-fighting drug and supplement; in a drug plus intervention condition, participants were reminded of "the importance of continuing with other fat-fighting behaviors, like daily exercise and low-fat eating" and warned against believing "they are in poor health and therefore incapable of carrying out activities like daily exercise and low-fat eating." Pilot results were consistent with predictions: the drug no longer boomeranged when accompanied by an intervention. While the intervention appeared successful, the pilot design is susceptible to demand criticisms and does not test whether motivation and ability components are both essential to the intervention. Therefore, experiment 4 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 undermine motivation and ability to engage in health-protective behaviors.) Hypothesis 4 is tested in the context of an OTC drug scenario, where the no-intervention condition serves as a baseline control group.

Method

Participants and Design. The experiment was a 2 (ability component: present/absent) × 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 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 ability 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 self-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, indexes 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) self-efficacy, the average of the six-item efficacy scale (coefficient $\alpha = 0.94$). (Health perceptions are reported separately due to low reliability.) Descriptive results are shown in table 4.

Behavioral Index. As expected, the behavioral index was a function of the motivation component ($F(1, 88) = 5.11$, $p < .05$) and the ability 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 ability component ($F(1, 88) = 8.32$, $p < .01$); otherwise, it had no effect ($F < 1$). Looked at another way, the ability 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 hypothesis 4—a combined intervention increased healthy lifestyle behaviors.

Psychological Mechanisms. As expected, health perceptions were higher when the ability 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 ($F(1, 88) = 3.91$, $p = .05$). Also as expected, the ability component of the intervention also increased perceived ability and self-efficacy indexes (respectively, $F(1, 88) = 9.99$, $p < .01$; $F(1, 88) = 6.10$, $p < .05$). These results indicate that the ability 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 ability component ($F(1, 88) = 7.46$, $p < .01$). Specifically, the motivation component of the intervention increased the motivation index when accompanied by an ability component ($F(1, 88) = 8.96$, $p < .01$); otherwise, it had no effect ($F < 1$). This result is consistent with the drug boomerang: motivation will be low unless consumers taking a drug are reminded of the importance of engaging in health-protective behaviors and believe they are able to perform such behaviors.

Mediation. A mediational analysis was conducted to test whether motivation and ability together mediate the effects of the intervention components 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 ability) is also a function of the interaction ($F(1, 88) = 4.87$, $p < .05$). 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 ($F(1, 87) = 78.69$, $p < .01$). These results support mediation.

Together, these findings support hypotheses 1–4 as follows: drug remedies reduce perceptions of health, self-efficacy, and ability and lower the 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 ability and motivation, healthy lifestyle practices increase, and the drug boomerang effect is mitigated. When the intervention targets only one mechanism (i.e., ability or motivation), healthy lifestyle practices are unaffected. Hence, these data indicate that a combined intervention is necessary to undo the boomerang effect of drug marketing. Recalling our speculation in experiment 1 that consumers taking cholesterol medication were less susceptible 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 ability to engage in healthy lifestyle practices.

TABLE 4

CONSUMER RESPONSE TO A DRUG REMEDY AS A FUNCTION OF INTERVENTION COMPONENT (EXPERIMENT 4)

Motivation component	Ability component	*N*	Behavioral index	Health perceptions	Motivational index	Ability index	Self-efficacy index
Absent	Absent	25	3.56 (1.65)	3.32 (.92)	3.60 (1.83)	3.46 (1.77)	3.24 (1.42)
Absent	Present	22	3.44 (1.65)	3.66 (.92)	3.59 (1.46)	4.27 (1.60)	3.59 (1.31)
Present	Absent	25	3.64 (1.18)	3.34 (.86)	3.26 (1.56)	3.74 (1.57)	3.31 (1.20)
Present	Present	20	4.83 (1.16)	4.33 (.95)	5.03 (1.21)	4.95 (.94)	4.25 (.95)

GENERAL DISCUSSION

The present research investigated the effects of drug and supplement marketing on intentions to live a healthy lifestyle. In experiment 1, healthy lifestyle intentions declined for a drug (vs. supplement) as effectiveness increased. In experiment 2, drugs were associated with poorer health and reduced importance of healthy lifestyle practices than supplements; cognitive schemata about drugs and supplements were shown to influence such judgments. In experiment 3, 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, self-efficacy, ability, and motivation to engage in healthy lifestyle behaviors. Finally, in experiment 4, a combined intervention accompanying a drug remedy that targeted ability and motivation increased a healthy lifestyle; single-component interventions targeting motivation or ability alone did not.

Taken together, these studies account for how drug marketing boomerangs and undermines a healthy lifestyle for consumers. First, boundary conditions are demonstrated for past remedy boomerang effects—the type of remedy (drug vs. supplement) and the remedy's effectiveness (experiment 1). Second, evidence is established for two mechanisms driving the boomerang effect (experiments 2–4): (*a*) drugs reduce risk perceptions and the perceived importance of, and motivation to engage in, complementary health-protective behaviors, and (*b*) drugs are associated with poor health and thereby reduce self-efficacy and perceived ability 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.) Third, based on these psychological mechanisms, interventions that heighten motivation and ability perceptions are shown to mitigate the drug boomerang and increase healthy lifestyle intentions (experiment 4).

Our evidence for the psychological mechanisms (risk → importance → motivation and health → self-efficacy → ability) underlying the boomerang effect is threefold: (1) drugs (vs. supplements) boomerang, and supplements are a conceptually relevant control group that differs from drugs on the characteristics (i.e., risk and health) that activate the two mechanisms, (2) qualitative and quantitative evidence directly support differences in consumer perceptions of drugs and supplements (e.g., perceived importance, motivation, self-efficacy, and ability to engage in health-protective behaviors) that drive the boomerang effect, and (3) corrective interventions that target both mechanisms together undo the boomerang effect of drug marketing. Indeed, mediation by the combined mechanisms (i.e., motivation × ability) is supported throughout. We acknowledge that such mediational process evidence must be treated with caution but note that it is consistent with, and complementary to, the consequences of such a process—namely, the boomerang of drug (vs. supplement) marketing and its mitigation by a combined intervention (cf. Spencer, Zanna, and Fong 2005). Overall, the evidence supports our hypotheses and the conceptual framework in figure 1.

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 ability and motivation, etc.) rather than relying on observed behavior only. Second, experiment 1 provides a specific instantiation for the drug and supplement that may not generalize to other domains and stimuli. However, 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 2, 3, and 4 used an impoverished set of scenario stimuli (that provided only minimal information about the drug and supplement) and may not generalize to other domains and more specific instantiations. However, using impoverished stimuli was deliberate because it allowed us to examine consumers' spontaneous reactions relatively uncontaminated by specific aspects of the stimuli. (We also note that consumers may be less likely to lower their own health, self-efficacy, and ability perceptions following random assignment to a drug condition in a laboratory experiment—a pragmatic difficulty that is overcome using projective scenario-based techniques that ask for judgments of others.) Fourth, in these experiments we utilized convenience samples that make no claims for representativeness to the general population. 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.

Future Research

Psychological Mechanisms. Future research might further examine the psychological mechanisms underlying the drug boomerang effect. For example, does the reduction in motivation and ability spill over to other healthy lifestyle behaviors beyond healthy eating and exercise? Extant research on self-efficacy would suggest that the response may generalize to a broad array of behaviors. (Indeed, the boomerang may generalize even to nonhealth remedies that undermine self-efficacy by creating a sense of dependence on the remedy.) 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 (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 ability are 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 (vs. 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). (By the same argument, other nondrug health remedies—for example, bariatric surgical procedures—may promise to reduce risk but at great cost.) 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 health remedy as a "get out of jail free" card and thereby reduce or enhance the boomerang effect. Consumers who perceive that a health remedy is costly or 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 remedy marketing. Moreover, puffery by marketers—and, more seriously, deceptive claims and false advertising—that makes a health remedy 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. Notably, such lay beliefs do not reflect regulatory differences for health remedies and are shown to drive the boomerang effect on a healthy lifestyle. 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 are nonetheless susceptible to the boomerang effect for drugs. However, educational interventions to undo the boomerang effect can be successful—if they utilize a combined approach that targets both motivation and ability to engage in healthy lifestyle practices. That is, a better understanding of the lay theories behind drug and supplement effects can lead to 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 remedy 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 (Hoch 2002) and reinforce their existing schema about such products?

CONSUMER HEALTH AND 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 health remedy 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., Bowman, Heilman, and Seetharaman 2004; Dellande, Gilly, and Graham 2004; McDonald, Garg, and Haynes 2002). 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) 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?). Of course, drugs do, in fact, lower specific health risks (e.g., hypercholesterolemia), but consumers will lose 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 demarketing efforts to reduce risky consumption. Specifically, our research suggests that drugs boomerang on consumers by undermining their perceived motivation and ability 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.

REFERENCES

Alba, Joseph W. and J. Wesley Hutchinson (1987), "Dimensions of Consumer Expertise," *Journal of Consumer Research*, 13 (March), 411–54.

American Heart Association (2005), "Why Should I Care? Cardiovascular Disease Is America's No. 1 Killer," http://www.americanheart.org/presenter.jhtml?identifier=1502.

Arnett, Donna K., David R. Jacobs, Russel V. Luepker, Henry Blackburn, Christopher Armstrong, and Steven A. Claas (2005), "Twenty-Year Trends in Serum Cholesterol, Hypercholesterolemia, and Cholesterol Medication Use: The Minnesota Heart Survey, 1980–1982 to 2000–2002," *Circulation*, 112, 3884–91.

Bandura, Albert (1977), "Self-Efficacy: Toward a Unifying Theory of Behavioural Change," *Psychological Review*, 84, 191–215.

——— (1986), *Social Foundations of Thought and Action: A Social Cognitive Theory*, Englewood Cliffs, NJ: Prentice-Hall.

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*, 33 (June), 71–81.

Bowman, Douglas, Carrie M. Heilman, and P. B. Seetharaman (2004), "Determinants of Product-Use Compliance Behavior," *Journal of Marketing Research*, 41 (3), 324–38.

Brandweek (2007), "Gulping the Profit: The Unusual, Lucrative Life of the Supplement Business," April 2.

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.

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

FDA Consumer (2005), "How to Keep Your Heart Healthy," 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," *Journal of Consumer Affairs*, 39 (1), 27–51.

Galloway, Chester S. (2003), "The First Amendment and FTC Weight-Loss Advertising Regulation," *Journal of Consumer Affairs*, 37 (2), 413–23.

Haard, Jenifer, Michael D. Slater, and Marilee Long (2004), "Scientese and Ambiguous Citation in the Selling of Unproven Medical Treatments," *Health Communication*, 16 (4), 411–26.

Hagger, Martin S. and Sheina Orbell (2003), "A Meta-Analytic Review of the Common-Sense Model of Illness Representations," *Psychology and Health*, 18 (2), 141–84.

Hoch, Stephen J. (2002), "Product Experience Is Seductive," *Journal of Consumer Research*, 29 (December), 448–54.

Langreth, Robert and Matthew Herper (2006), "Pill Pushers," *Forbes*, 177 (10), 94–102.

Lau-Walker, Margaret (2006), "Predicting Self-Efficacy Using Illness Perceptions Components: A Patient Survey," *British Journal of Health Psychology*, 11, 643–61.

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

McDonald, Heather P., Amit X. Garg, and R. Brian Haynes (2002), "Interventions to Enhance Patient Adherence to Medication Prescriptions: Scientific Review," *Journal of the American Medical Association*, 288 (22), 2668–79.

Merriam-Webster Online (2005), http://www.m-w.com/.

Mitka, Mike (2004), "Are OTC Statins Ready for Prime Time?" *Journal of the American Medical Association*, 292 (3), 317–18.

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), 106–17.

Molden, Daniel C., and Carol S. Dweck (2006), "Finding 'Meaning' in Psychology: A Lay Theories Approach to Self-Regulation, Social Perception, and Social Development," *American Psychologist*, 61, 192–203.

Moorman, Christine and Erika Matulich (1993), "A Model of Consumers' Preventive Health Behaviors: The Role of Health Motivation and Health Ability," *Journal of Consumer Research*, 20 (2), 208–28.

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 and Marketing*, 23 (2), 153–69.

Spencer, Steven J., Mark Zanna, and Geoffrey Fong (2005), "Establishing a Causal Chain: Why Experiments Are Often More Effective than Mediational Analyses in Examining Psychological Processes," *Journal of Personality and Social Psychology*, 89 (6), 845–51.

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 and Marketing*, 13 (1), 1–19.

U.S. Department of Health and Human Services (2006), "Public Health Priorities: Disease Prevention," 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 and Marketing*, 19 (1), 132–38.

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

Weinstein, Neil D. (1993), "Testing Four Competing Theories of Health-Protective Behavior," *Health Psychology*, 12 (4), 324–33.

West, Patricia M., Christina L. Brown, and Stephen J. Hoch (1996), "Consumption Vocabulary and Preference Formation," *Journal of Consumer Research*, 23 (2), 120–35.