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Pierre CHANDON
Vicki G. MORWITZ
Ronn J. SMITH
Eric R. SPANGENBERG
David E. SPROTT
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by

Pierre CHANDON*
Vicki G. MORWITZ**
Ronn J. SMITH***
Eric R. SPANGENBERG****
and
David E. SPROTT*****

* Assistant Professor of Marketing at INSEAD, Boulevard de Constance, 77300 Fontainebleau, France; +33 1 60 72 49 87 (phone), +33 1 60 74 61 84 (fax), pierre.chandon@insead.edu

** Professor of Marketing and Robert Stansky Faculty Research Fellow at the Leonard N. Stern School of Business, New York University, 40 West 4th Street, Room 807, New York, NY 10012; 212.998.0518 (phone), 212.995.4006 (fax), vmorwitz@stern.nyu.edu

*** Assistant Professor of Marketing at the Sam M. Walton College of Business, University of Arkansas, 302 Business Building, Fayetteville, AR 72701; 479.575.4632 (phone), 479.575.8407 (fax), rjsmith@walton.uark.edu

**** Dean and Maughmer Freedom Philosophy Chaired Professor of Marketing, College of Business, Washington State University, Pullman, WA 99164-4750; 509.335.8150 (phone), 509.335.3865 (fax), ers@wsu.edu

***** The Boeing / Scott and Linda Carson Chaired Associate Professor of Marketing and Associate Dean for Graduate Programs, College of Business, Washington State University, Pullman, WA 99164-4750; 509.335.6896 (phone), 509.335.3865 (fax), dsprott@wsu.edu

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The Role of Behavior Prediction and Personal Norms

ABSTRACT

Two laboratory studies investigate how behavior prediction and personal norms interact to influence whether or not people repeat their past behavior. We find that asking people about their future behavior increases their likelihood of repeating past behaviors when personal norms are weak but reduces it when personal norms are strong. By identifying a new consequence of asking question about future behavior (behavior repetition) and a new moderator (personal norm strength), our results contribute to the debate regarding the relative importance of habits and intentions in guiding behavior and reconcile some seemingly contradictory past findings in mere-measurement and self-prophecy research.

Considerable evidence supports the notion that many behaviors are repeated (Wood and Quinn 2005) and that these repeated behaviors are difficult to change (Verplanken and Wood 2006). Even interventions that successfully change intentions are frequently unable to change people's actual behavior patterns (Ouellette and Wood 1998). As a result, repeated unhealthy behaviors such as overeating and avoiding exercise are among the leading causes of preventable deaths in developed countries. The current research therefore addresses what can be done to disrupt, or reinforce, behavior repetition as an issue of social consequence.

Research on the question-behavior effect (also known as the mere-measurement or self-prophecy effect) has shown that asking people to predict whether or not they will engage in a future behavior (hereafter described as "behavior prediction") has large and long-lasting effects on the performance of a variety of normative and non-normative behaviors (for a review, see Sprott et al. 2006). While research suggests theoretical underpinnings for the general effect of behavior prediction (e.g., Morwitz and Fitzsimons 2004; Spangenberg et al. 2003), we do not know what effects, if any, behavior prediction may have on behavior repetition. Whereas some question-behavior studies have shown that behavior prediction may increase the likelihood of repeating past behavior (Fitzsimons and Morwitz 1996), others suggest the opposite (Smith, Gerber, and Orlich 2003; Spangenberg and Greenwald 1999)

We examine herein how behavior prediction and personal norms (defined as internal standards for a particular conduct, Schwartz 1973) interact to strengthen or weaken behavior repetition. Drawing from research on habits and the question-behavior effect, we hypothesize that asking people to predict their future behavior strengthens behavior repetition (i.e., it increases the strength of the relationship between past and future behavior) when personal norms about the behavior are weak, but disrupts behavior repetition when personal norms are strong. In other words, when personal norms about a behavior are weak, behavior prediction makes people more likely to repeat frequently-performed behaviors and less likely to repeat

infrequently-performed behaviors. When personal norms are strong, however, behavior prediction will lead people to change their behavior in the direction of their personal norm.

Studying how personal norms influence whether behavior prediction reinforces or disrupts behavior repetition is relevant to consumer research on habits. Although our focus is on the effects of behavior prediction (i.e., the effects of measuring intentions, not the effects of intentions per se), our framework and results provide new insights on the debate regarding the relative importance of past behavior and intentions in guiding future behavior (Ajzen 2002; Bargh and Chartrand 1999; Ouellette and Wood 1998; Webb and Sheeran 2006). Importantly, if the simple act of measuring intentions influences behavior repetition, the results of studies whose goal is to assess the unique contribution of past behavior (i.e., habits) and newly formed intentions on the performance of a subsequent behavior a) may not generalize to the general population of people whose intentions were not measured and b) may not generalize to other behaviors with weaker or stronger personal norms.

Our framework and findings also contribute to the question-behavior literature by demonstrating a new consequence of behavior prediction, namely that it affects whether past behaviors are repeated. They also help unify this literature by showing that some seemingly contradictory results can be explained by considering that some studies examined behaviors where personal norms regarding the appropriate behavior are typically weak (e.g., durable or nondurable purchasing), while other work looked at behaviors where personal norms are typically strong (e.g., exercising or voting). Finally, this work has important implications for public health because many research and prevention programs routinely include behavior prediction questions for screening purposes (Williams, Block, and Fitzsimons 2006), and may therefore unknowingly disrupt socially beneficial habits or reinforce socially harmful ones.

CONCEPTUAL BACKGROUND

In their review of the habits research, Wood, Quinn, and Kashy (2002, p. 1282) wrote that: "there is mounting evidence of the systematic, independent effects of past behavior on future behavior." Studies show that past behavior is an excellent and independent predictor of future behavior in contexts as varied as grocery shopping (Roy, Chintagunta, and Haldar 1996; Uncles, Ehrenberg, and Hammond 1995), durable purchasing (Lambert-Pandraud, Laurent, and Lapersonne 2005), media use (Ouellette and Wood 1998), eating (Ji Song and Wood 2006; Khare and Inman 2006), substance abuse (Laibson 2001), voting (Green and Shachar 2000), and choice of travel mode (Aarts, Verplanken, and Van Knippenberg 1998).

Considerable evidence also exists regarding the difficulty of changing complex repetitive behaviors which are initially guided by explicit intentions that become habitual through repetition. After habituation, behaviors fall under stimulus control and are initiated and executed without conscious intent (Bargh and Chartrand 1999; Neal, Wood, and Quinn 2006). For these reasons, even those interventions that successfully change people's intentions often fail to influence behavior repetition (Ouellette and Wood 1998; Verplanken and Wood 2006). For example, none of the four studies reviewed by Webb and Sheeran (2006) on interventions designed to change exercise behavior found statistically significant effect sizes for behavior change (with *d* values between 0 and .30) despite all four having significant effect sizes for intention change (with *d* values between .30 and .75).

Existing Evidence about Question-Behavior Effects on Behavior Repetition

In the context of the current work, it is interesting to examine whether the mere act of asking people to predict what they will do in the future—an intervention that has been shown

to have large and long-lasting effects on the likelihood that people will perform a variety of behaviors (Sprott et al. 2006)—may also influence their likelihood of repeating their past behavior. For simplicity, we call this intervention behavior prediction, regardless of whether it uses a binary yes/no scale (e.g., Spangenberg et al. 2003), a bipolar interval scale (e.g., Chandon, Morwitz, and Reinartz 2005), a unipolar time until behavior scale (e.g., Morwitz, Johnson, and Schmittlein 1993), or a unipolar behavior probability scale (e.g., Juster 1966).

We are aware of only two studies that empirically examined the effects of behavior prediction on behavior repetition. Fitzsimons and Morwitz (1996) found that measuring purchase intentions increased the likelihood that automobile owners would purchase the brand they had bought in the past from 39.4% to 51.7%. On the other hand, Smith, Gerber, and Orlich (2003) found that asking people to predict whether or not they will vote in a subsequent election decreased voting among people who had voted in all five prior elections (from 63.2% to 55.9%) but increased voting among people who had voted in zero to four of the five prior elections (from 33.5% to 38.1%). Reanalyzing their data, we find that the association between pre-study turnout level (measured via a binary variable: participation in five vs. less than five prior elections) and average post-study turnout is lower in the behavior prediction condition ($\chi^2(1, 298) = 8.3$, $\rho = .17$) than in the control condition ($\chi^2(1, 286) = 22.7$, $\rho = .28$). Thus, this study showed that behavior prediction made people less likely to repeat their past voting behavior.

Thus, these existing question-behavior studies found that behavior prediction can strengthen behavior repetition for automobile purchasing but can decrease repetition for voting. Accompanying these apparently conflicting results are some methodological shortcomings in these two studies. First, they rely on self-reported measures of behavior obtained long after the time of the behavior. Second, they measure single instances of post-study behavior (e.g., one automobile purchase and participation in a single election). To more

fully capture behavior repetition effects, one needs longer time horizons encompassing multiple behavior occasions and providing multiple measures of behavior intensity, such as the duration and frequency of the behavior.

Further, from a theoretical point of view, the existing literature does not make a clear prediction as to whether asking questions about future behavior increases, decreases, or has no effect on behavior repetition. As indicated by their robustness and persistence (Chandon, Morwitz, and Reinartz 2004; Dholakia and Morwitz 2002), question-behavior effects are probably driven by multiple causes (Janiszewski and Chandon 2007; Morwitz and Fitzsimons 2004). Still, one explanation supported in the literature (Chandon et al. 2005; Morwitz and Fitzsimons 2004) is that behavior prediction increases the accessibility of underlying cognitions about the behavior (e.g., past attitudes or intentions), resulting in an increased chance that people will act in a manner consistent with these cognitions. To the extent that past behavior is correlated with those cognitions, the accessibility explanation suggests that behavior prediction should increase the chances that people will repeat their past behavior instead of acting randomly or according to changing circumstances. However, another empirically-supported explanation for question-behavior effects, cognitive dissonance (Spangenberg and Sprott 2006; Spangenberg et al. 2003), makes the opposite prediction. This explanation argues that behavior prediction increases the accessibility of normative beliefs about performing the behavior. Inconsistencies between normative beliefs and how the person has behaved in the past leads to conflict in one's self view as a good person, giving rise to cognitive dissonance, which motivates changing future actions in a manner consistent with normative beliefs. The dissonance explanation therefore suggests that prediction may move individual behavior away from past behavior, thereby reducing the likelihood of behavior repetition.

A Framework of How Prediction and Personal Norms Influence Behavior Repetition

Taken together, question-behavior studies suggest that behavior prediction may influence behavior repetition but provide conflicting predictions regarding the direction of these effects. We propose a framework (see Figure 1) for explaining the effects of behavior prediction on behavior repetition. This framework highlights the moderating role of personal norms, and in doing so reconciles the apparently conflicting findings of prior research.

Prior work on question-behavior effects has shown that social norms moderate the effects of behavior prediction on the performance of socially-desirable behaviors such as healthy eating (Sprott, Spangenberg, and Fisher 2003). We hypothesize that personal norms also interact with behavior prediction in influencing the performance of future behavior and the likelihood of repeating the past. Following Schwartz {, 1973 #1677}, we define personal norms as internal standards for conduct. Prior research has shown that personal norms are strong influencers of helping behaviors and donation decisions (Schwartz 1973; 1977). Kallgren and Cialdini (2000) measured the strength of personal norms against littering by asking people to indicate whether they would feel a strong, moderate, weak, or no personal obligation against littering in a variety of contexts (e.g., "you are holding an empty soft drink can and there are no trash cans available," or "it is dark outside and nobody could have seen if you littered"). These authors found that people with strong personal norms were less likely to litter, but only when their attention was drawn toward their personal norms by making them watch themselves on a closed-circuit television. These results are consistent with a large body of research showing that personal and social norms are more likely to influence behavior when they are easily accessible (Cialdini and Goldstein 2004).

--- Insert Figure 1 about here ---

Consistent with prior research on behavior repetition, we hypothesize that past behavior influences future behavior, and therefore expect that the regression parameter labeled "a" in Figure 1 is positive. Drawing from question-behavior research, we hypothesize that behavior prediction influences the performance of future behavior (represented by parameter b) and that this effect is moderated by personal norms (parameter f). Prior work on behavior repetition provides the expectation that personal norms have a direct effect on future behavior (represented by parameter c). And, consistent with findings that strong norms reduce the strength of habits (Ajzen 2002; Webb and Sheeran 2006), we predict that personal norms will moderate the effect of past behavior on future behavior (represented by parameter d).

The central contribution of our framework lies in the analysis of the effects of behavior prediction. Building on question-behavior research, we hypothesize that behavior prediction has a main effect on behavior repetition. This hypothesis is represented by parameter e, which captures the interaction between the effects of prediction and past behavior on future behavior. This two-way interaction, however, is qualified by a three-way interaction among behavior prediction, personal norms, and past behavior (represented by parameter g) such that the effects of behavior prediction on behavior repetition (i.e., on habits) depend on the strength of personal norms (i.e., depends on whether people have strong and accessible internal standards prescribing whether and how often they should perform a behavior).

When consumers do not have strong personal norms regarding a behavior (e.g., for watching television or reading books), we expect that behavior prediction will reinforce behavior repetition (i.e., increase the impact of past behavior on future behavior). In other words, we expect that behavior prediction will lead to behavior polarization: It will increase behavior among those who have performed the behavior most often in the past and will decrease behavior among those who have performed it the least, as compared to a control

group of people who have not been questioned. In contrast, when consumers have strong personal norms for a behavior (e.g., exercising), we expect that behavior prediction will weaken behavior repetition (i.e., reduce the impact of past behavior on future behavior). In other words, we expect that behavior prediction will make people less likely to follow their prior behavioral routine. Instead of polarizing past behavior, as when personal norms are weak, predictions of behaviors associated with a strong personal norm will lead to regression toward that norm regardless of past behavior.

Summary and Overview of Experimental Studies

Simply stated, the key hypothesis of our framework is that behavior prediction weakens behavior repetition when personal norms are strong but strengthens behavior repetition when personal norms are weak. This would explain why Fitzsimons and Morwitz (1996) who studied automobile brand choice—a behavior for which personal norms are generally weak—found increased behavior repetition in the behavior prediction group; whereas Smith, Gerber, and Orlich (2003) who studied voting—a behavior for which people tend to have strong personal norms—found reduced behavior repetition in the behavior prediction group.

We test the predictions of our framework in two laboratory studies. Study 1, a longitudinal laboratory experiment, provides a comprehensive test of our framework by 1) using consistent interventions and diary measures of behavior repetition, 2) measuring the effects of prediction on behaviors with either high (exercising) or low (reading books or watching news) norms, and 3) directly examining the effects of each participant's normative beliefs for each behavior. In Study 2, we explore some potential mechanisms for the effects found in Study 1 by measuring the strength and availability of personal norms, as well as the experience of conflict between personal norms and actual behavior for these three behaviors. In the general

discussion, we briefly report the results of two field experiments that document the external validity of our findings as well as illustrate the size of the effects in two real-world settings, health club attendance and online grocery shopping.

STUDY 1: HOW PREDICTION AND PERSONAL NORMS INFLUENCE BEHAVIOR REPETITION WHEN EXERCISING, READING, AND NEWS WATCHING

Method

In Study 1, we measure the frequency and duration of three behaviors by asking students to fill out diaries. We manipulate behavior prediction (by either asking or not asking people to predict whether they will engage in the focal behavior in the future) and both manipulate personal norms (by asking people about behaviors with strong and weak personal norms) as well as measure them at the individual level. We used a 2 (behavior prediction vs. control) x 3 (behaviors: exercising vs. news watching vs. book reading) mixed design.

The three behaviors were chosen based on a pretest involving 68 undergraduate students similar to those participating in Study 1. We asked the participants to rate their agreement with two statements adapted from prior research on personal norms (Kallgren et al. 2000; Schwartz 1973). The two statements were: "I feel committed to [behavior]" and "[behavior] is an important part of my life" on a nine-point scale anchored by 1 = "Strongly Disagree" and 9 = "Strongly Agree." Among the behaviors tested, personal norms were stronger for exercising ($M = 6.7$) than for watching news ($M = 5.9$, $t = 2.6$, $p < .01$) or for reading books ($M = 6.1$, $t = 2.1$, $p < .05$). The difference between watching news and reading books was not statistically significant ($t = .5$, $p = .59$). We chose two behaviors with relatively low personal norms (watching news and reading books) because of concern that the norms for these behaviors

could change rapidly if a major news event occurred or if students received an important assignment during the time of our study. In the pretest, we also asked students to report how long they spend on each behavior per day. The results showed that the time students spend on each of these three behaviors per day is low enough to preclude cross-behavior dependencies in time allocations (i.e., that people trade off one of the behaviors for the other).

The study took place during class time over a three-week period. During the first week, we measured personal and social norms for the three behaviors as part of an unrelated study. One week later, participants provided behavior duration data for the three behaviors during each of the three days prior to that session. We told them that the purpose of the study was to examine how advances in technology have influenced students' daily time allocations. To increase the reliability of these data, participants were asked to list the time spent on specific behaviors that comprise the more general behaviors. For example, for the "exercising" behavior, participants estimated the number of minutes spent each day with a) indoor individual or class exercise (e.g., working out, swimming, fitness classes), b) outdoor individual or class exercise (e.g., running, biking, group running clinic), c) individual or team sports, and d) other fitness behaviors (e.g., walking). Approximately one hour after completing the behavior duration measures, participants were presented with an ostensibly unrelated survey wherein they answered a prediction question for one of the three behaviors. The measure (based on prior research; see Spangenberg et al. 2003) asked participants to make a prediction regarding the focal behavior: "Overall, do you predict that in the next six days: (a) "You will [exercise, or watch the news, or read books]" or (b) "You will NOT [exercise, or watch the news, or read books]." A full description of the appropriate behavior was provided in the prediction request, and the order of the two response alternatives was systematically varied across research participants.

In the third and last week of the study, we asked research participants to provide behavior frequency data using the same retrospective diary measures as those used to measure pre-study behavior duration. Retrospective diaries were used because time allocations studies have shown that they are more valid than simply asking people to estimate behavior duration for the total period (Juster and Stafford 1991). We collected these data twice during the final week of the study. In the middle of the week, we collected behavior duration data about each of the previous four days (i.e., the four days since the behavior prediction). We asked them again at the end of the week, at which time we collected data about the last three days of the week. We thus obtained daily behavior duration data for the seven days after the behavior prediction manipulation.

Fifty research participants were present during all phases of data collection. Following a procedure often used in question-behavior studies (Fitzsimons, Nunes, and Williams 2007; Levav and Fitzsimons 2006; Spangenberg et al. 2003; Williams et al. 2006), the control group for each behavior consisted of participants who provided a prediction for the other two behaviors and therefore did not make any prediction for the focal behavior. Thus, the total number of observations was 150, with 50 in the prediction condition and 100 in the control condition.

Results

Manipulation checks. We asked participants to rate their agreement on a nine-point scale (anchored by 1 = "Strongly Disagree" and 9 = "Strongly Agree") to two statements measuring personal norm importance ("[behavior] is an important part of my life" and "I feel committed to [behavior]") and to four statements measuring social norm importance ("Students I know [do this behavior]," "Students I know think it is important to [do this behavior]," "Professors I

know [do this behavior]," "Professors I know think it is important to [do this behavior]"). The statements measuring personal norms statements were the same as those used in the pretest. The statements measuring social norms were adapted from prior research (Fisher 1993; Spangenberg and Sprott 2006; Sprott et al. 2004). Both scales were reliable (r values for personal norms and Cronbach's α's for social norms were .96 and .84 for book reading, .94 and .64 for exercising, and .95 and .79 for news watching respectively).

As expected for this student sample, there were strong differences in personal norm strength for the three behaviors ($F(2, 144) = 21.5$, $p < .01$). Contrast tests show that personal norms were stronger for exercising ($M = 7.6$) than for reading books ($M = 5.2$, $t = 6.3$, $p < .01$) or for watching the news ($M = 5.8$, $t = 4.9$, $p < .01$). Reading books and watching news did not differ significantly ($t = -1.6$, $p = .12$). The results of the pretest about personal norm strengths were therefore replicated. In contrast, all three behaviors scored similarly on the social norm scales ($M = 6.4$ for exercising, $M = 6.6$ for book reading, and $M = 6.3$ for news watching, $F(2, 144) = .8$, $p = .46$) showing that any differences in the effects of behavior prediction across the three behaviors cannot be attributed to differences in social norms.

In each of the seven days following the prediction intervention, participants spent on average 20 minutes exercising or playing sports, 11 minutes reading books, and 15 minutes watching news. These relatively low amounts of time reduce the risk of cross-behavior dependencies. Almost all participants who answered each behavior prediction question predicted that they would exercise (94%), read books (83%), or watch news (94%), and the differences between these predictions were not statistically significant ($\chi^2(2, 50) = 1.4$, $p = .5$).

Comparison of behaviors. The simplest way to measure habits is to compute the correlation between the number of minutes spent on each behavior in the days before and after the question intervention in the control and behavior prediction conditions. We used the full seven-day window for the post-study time period because it improved the reliability of the

behavior duration data and because it is consistent with prior question-behavior studies (Fitzsimons et al. 2007; Levav and Fitzsimons 2006). To compare the effects of behavior prediction on these six correlations (two correlations for each of the three behaviors), we followed the procedure suggested by Games (1978) and conducted an ANOVA on the six z-transformed correlation scores with two factors (behavior prediction and behavior type) and their interaction. The two main effects were not statistically significant (for behavior prediction: $F(1, \infty) = .6$, $p = .44$; for behavior type: ($F(2, \infty) < .1$, $p = .97$). However, the interaction was statistically significant ($F(2, \infty) = 5.9$, $p < .01$), indicating that, as expected, the effects of behavior prediction differed across the three behaviors.

As shown in the top panel of Figure 2, the correlation between the number of minutes spent exercising before and after the intervention was lower in the prediction condition ($r = .30$) than in the control condition ($r = .76$). A simple test of comparison of correlations reveals that this reduction was statistically significant ($z = 2.6$, one-tailed $p < .01$). As expected, the opposite result emerged for the two behaviors with weak personal norms: The correlation between the number of minutes spent reading books before and after the intervention was higher in the prediction condition ($r = .76$) than in the control condition ($r = .27$, $z = 2.2$, one-tailed $p < .02$). Similarly, the correlation between the number of minutes spent watching news before and after the intervention was higher in the prediction condition ($r = .70$) than in the control condition ($r = .46$), although the difference is not statistically significant ($z = 1.2$, one-tailed $p = .12$). When the two non-normative behaviors (news watching and book readings) are combined, however, the difference between the control and prediction conditions becomes statistically significant ($z = 2.6$, one-tailed $p < .01$). Overall, the comparison of correlations supports our hypothesis that behavior prediction increases repetition for news watching and book reading but decreases it for exercising.

--- Insert Figure 2 about here ---

Unfortunately, the Games (1978) ANOVA-like method has statistical limitations. First, it arbitrarily uses one of many variance-stabilizing transformations (Fisher's z) and relies on its asymptotic properties. Second, it does not take into account the fact that each participant provided data for all three behaviors. Third, it does not provide point estimates and cannot incorporate continuous independent variables. For all these reasons, we also tested our hypothesis by estimating the following hierarchical model with random effects in the subject intercepts:

(1) $FUTURE_{ij} = \beta_0 + \beta_i + \beta_1 \times NEWS_{ij} + \beta_2 \times BOOKS_{ij} + \beta_3 \times PAST_{ij} + \beta_4 \times PRED_{ij}$
$+ \beta_5 \times PAST_{ij} \times PRED_{ij} + \beta_6 \times PAST_{ij} \times NEWS_{ij} + \beta_7 \times PAST_{ij} \times BOOKS_{ij} + \beta_8 \times PRED_{ij} \times NEWS_{ij}$
$+ \beta_8 \times PRED_{ij} \times BOOKS_{ij} + \beta_9 \times PAST_{ij} \times PRED_{ij} \times NEWS_{ij} + \beta_{10} \times PAST_{ij} \times PRED_{ij} \times BOOKS_{ij} + \varepsilon_{ij}$

where i denotes a study participant, j denotes one of the three behaviors (j =1, 2, 3), ε_{ij} are i.i.d. $N(0, \sigma^2)$, and β_i are i.i.d. $N(0, \tau^2)$. $FUTURE_{ij}$ is the square root of the number of minutes spent on the behavior in the seven days after the study (we used this transformation because duration data were highly skewed), $PAST_{ij}$ is the square root of the number of minutes spent on the behavior j in the three days before the study, $PRED_{ij}$ is a binary variable equal to 1/2 if consumers made a prediction for this behavior and -1/2 otherwise, $NEWS_{ij}$ is a binary variable equal to 2/3 if the behavior is watching news and -1/3 otherwise, and $BOOKS_{ij}$ is a binary variable equal to 2/3 if the behavior is reading books and -1/3 otherwise.

As expected, the coefficients of the three-way interactions are positive and statistically significant (see Table 1) showing that behavior prediction increases repetition more for reading books and watching news than for exercising. Table 1 also shows that past behavior is a strong predictor of future behavior on average across the three activities; that students spend less time reading books and watching news than exercising; and that, for those who did not

spend time on these behaviors, prediction has a more negative impact on book reading and news watching than on exercising. The hierarchical regression results therefore replicate the comparison of correlations, providing further support for our hypothesis.

--- Insert Table 1 and Figure 3 about here ---

To illustrate the effects of prediction on behavior duration, Figure 3 shows the average post-intervention number of minutes spent on each behavior for three equal sized groups of participants with low, medium, and high levels of pre-intervention behavior duration in the control and prediction conditions. Figure 3 shows that behavior prediction leads to the expected polarization for reading books and watching news but not for exercising. Specifically, asking questions about future behavior for the two behaviors with lower normative beliefs (reading books and watching news) increases the amount of time spent on the behavior for heavy users but reduces it for moderate and low users. In contrast, asking questions about future behavior reduces the time spent exercising among high exercisers but increases it for moderate and low exercisers.

Effects of measured personal norm strength. We further test our framework by measuring whether people with weak or strong personal norms about each behavior respond differently to the prediction intervention. As with the comparison of behaviors, we start by computing the correlation between pre- and post-intervention duration for people with weak and strong personal norms (categorized via a median split). Using the same ANOVA as for the comparison of behaviors, we found that the two main effects of behavior prediction and personal norm strength were not statistically significant (for behavior prediction: $F(1, \infty) = 1.0$, $p = .32$; for personal norm strength: $F(1, \infty) = .3$, $p = .58$) but that their interaction was statistically significant ($F(1, \infty) = 3.9$, $p < .05$). This shows that the effects of prediction on

behavior repetition are different for people with strong versus weak personal norms. As seen in Figure 4, prediction increased the correlation for people with weak personal norms (from r = .45 to r = .76, z = 1.8, one-tailed $p < .05$) but tended to decrease it for people with strong personal norms, although the latter effect was not statistically significant (from r = .62 to r = .51, z = -.5, one-tailed p = .27).

--- Insert Figure 4 about here ---

As for the comparison across the three behaviors, we estimated the following hierarchical linear model with random effects in the subject intercepts to overcome the limitations of Games' ANOVA method for the comparison of correlations:

(2) $FUTURE_{ij} = \beta_0 + \beta_i + \beta_1 \times NEWS_{ij} + \beta_2 \times BOOKS_{ij} + \beta_3 \times PAST_{ij} + \beta_4 \times PRED_{ij}$
$+ \beta_5 \times PNORM_{ij} + \beta_6 \times PAST_{ij} \times PRED_{ij} + \beta_7 \times PAST_{ij} \times PNORM_{ij} + \beta_6 \times PRED_{ij} \times PNORM_{ij}$
$+ \beta_7 \times PAST_{ij} \times PRED_{ij} \times PNORM_{ij} + \varepsilon_{ij}$

where $PNORM_{ij}$ is the mean-centered rating of personal norm strength regarding behavior j by consumer i and all other variables are the same as for equation 1. All results are in the expected direction (see Table 1). In particular, the three-way interaction is negative and statistically significant, showing that the effects of prediction on repetition depend on an individual's personal norm strength, even after differences across the three behaviors have been controlled for with the two behavior dummies. Overall, analyses with measured personal norm strength are consistent with the behavior comparison analyses in supporting our hypothesis.

--- Insert Figure 5 about here ---

Graphically illustrating the effects of personal norms, Figure 5 shows the effects of behavior prediction on the post-intervention behavior duration (averaged across the three behaviors) for three equal sized groups of participants with low, medium, and high levels of pre-intervention behavior duration and for participants with weak or strong personal norms (categorized via a median split). Figure 5 shows that prediction leads to the expected polarization for individuals with weak personal norms but not for individuals with strong personal norms. Consider people with weak personal norms first: Prediction increased duration for people with high levels of pre-intervention duration and decreased it for people with low or medium levels of pre-intervention behavior (prediction made this group more likely to repeat past behaviors and thus less homogenous). The opposite pattern manifests for people with strong personal norms: Prediction decreases duration for people with high levels of pre-intervention duration and increases it for those with low or medium levels of pre-intervention duration (prediction made this group less likely to repeat past behaviors and thus more homogenous).

Discussion

Study 1 provides evidence supporting our hypothesis that asking questions about future behavior strengthens the relationship between past and future behavior when personal norms are weak, but weakens it when personal norms are strong. The confidence in this effect reversal is strengthened by the fact that it is replicated regardless of whether personal norms were manipulated (by asking about three different behaviors) or directly measured at the individual level for each behavior, and because it holds across two different analyses (comparison of correlations and hierarchical regression of future behavior on past behavior).

Additionally, the effect sizes in Study 1 are remarkable. As Figure 3 shows, asking questions about future behavior increased the time spent getting informed about news by 31% (an increase by 47 minutes over the week) among top-tier news watchers but led to a 74% reduction (25 minutes) among the bottom tier. For reading books, the corresponding effects are a 10% (10 minutes) increase among the top tier of book readers and a 61% (25 minutes) reduction among the bottom tier. Finally, behavior prediction increased exercise duration by 69% (41 minutes) among the bottom tier of exercisers, but caused a 49% decrease (141 minutes) among the top tier.

These results raise the question of how prediction influences behavior repetition. Although it is beyond the scope of our research to determine the exact process by which personal norms interact with behavior prediction to increase or decrease behavior repetition, we can identify one possible route. Drawing from the literature on knowledge activation (Higgins 1996), we argue that personal norm strength can moderate the effects of prediction on repetition because it is linked with the accessibility of personal norms in memory, which in turn influences the potential for conflict between personal norms and past behavior that can arise when people are asked about future behavior.

Our basic argument is that weak personal norms are less likely to be accessible in memory than strong personal norms. In fact, personal norms may only be available in memory for people with strong personal norms about how much they should engage in the behavior. Personal norms are thus less likely to be primed by behavior prediction when they are weak than when they are strong. When personal norms are weak, behavior prediction should primarily activate memories of performing the behavior in the past and other correlated cognitions (i.e., pre-existing intentions), which will strengthen behavior repetition compared to people in the control condition. When personal norms are strong however, behavior prediction should activate both past behavior (what people have done) and personal norms

(what they think they should do). This increases the potential for conflict between norms and behavior and the likelihood that people will experience dissonance or feelings of attitude ambivalence. All of this will make people in the prediction condition less likely to repeat their past behavior compared to people in the control condition.

To see how prediction can increase behavior repetition and lead to the type of polarization shown in Figure 3 when personal norms are low, consider news watching. Because few people have formed a personal norm indicating how much time they should spend watching news, asking them to predict their future behavior will primarily activate memories of how much time they normally spend watching news (rather than memories of how much they think they should be watching news). As a result, behavior prediction will increase the time that high news watchers spend watching news and will decrease the time that low news watchers spend watching news.

To see how prediction can decrease behavior repetition when personal norms are high, consider exercising. Because most people have formed a personal norm about how much they should exercise, prediction will activate both these norms and memories about past behavior, which will reduce the chance that people simply repeat their past level of behavior. To know whether prediction will increase or decrease exercising for a specific individual or group, we therefore need to know whether past behavior is below, or above, the personal norm for that individual or group. For example, people who exercise infrequently are more likely to fall short of their personal norm than people who exercise moderately or a lot. By activating personal norms, prediction should reduce the likelihood that they repeat their past low level of exercise and should increase the amount of time they spend exercising. Conversely, people who exercise frequently are more likely to be above their personal norm than people who exercise moderately or infrequently. Even exercise fanatics recognize that they should not devote 100% of their time to it because it would have negative physiological and social

consequences (Sherwood and Jeffery 2000). Behavior prediction should therefore reduce the likelihood that high exercisers repeat their past high level of exercising and should reduce the amount of time they spend exercising.

STUDY 2: EXPLORING THE ROLE OF PERSONAL NORMS AVAILABILITY AND CONFLICT WITH PAST BEHAVIOR

The first goal of Study 2 is to measure the association between the strength and availability of personal norms at the individual level and for the three behaviors examined in Study 1: reading books, watching news, and exercising. We measure the availability of personal norms because it provides a stronger test of our hypotheses than measuring their accessibility. Availability being a necessary condition for accessibility, finding that weak personal norms are less likely to be available in memory than strong personal norms would necessarily mean that they are also less likely to be accessible in memory. The second goal of Study 2 is to test our prediction that, because of their lower accessibility, behavior prediction will produce less conflict between past behavior and personal norms when they are weak (for news watching and book reading) than when they are strong (for exercising).

Method

We conducted two parallel studies involving a total of 44 participants. Participants of both studies were undergraduate students of similar age and background as those in Study 1. In both studies, we first described the three behaviors with the detailed descriptions used in Study 1. In Study 2a, we then asked 18 participants to rate the availability and strength of their personal norms regarding exercising, news watching, and reading books. To measure the

availability of personal norms, we asked participants to rate their agreement with the following two statements on nine-point scales (anchored by 1 = "Strongly Disagree" and 9 = "Strongly Agree"): "I have set for myself a personal target of the amount of time that I should spend [exercising/reading books/watching news]," and "There is no clear norm about how much people should [exercise/ read books/watch news]. People should simply [exercise/read books/watch news] as much as they like" (reverse coded). These statements were derived from prior research on knowledge activation (Higgins 1996). Finally, we measured the strength of personal norms with the two items used in Study 1. We created two summary indices, one for personal norm availability and one for personal norm strength, by averaging the responses to the items measuring each construct.

In Study 2b, after describing the same three behaviors to 26 new participants, we asked them to predict whether or not they planned to exercise, watch news, and read books in the following six days. We then asked them to report the degree of conflict they experienced between their personal norms and past behavior while making their prediction. To measure this conflict, we asked participants to rate their agreement on a nine-point scale (anchored by 1 = "Strongly Disagree" and 9 = "Strongly Agree") with two statements: "When thinking about whether or not I would [exercise/read books/watch news] in the following six days, I felt a conflict between what I do and what I ought to do," and "When thinking about whether or not I would [exercise/read books/watch news] in the following six days, multiple reference points came to mind (e.g., what I normally do, what I should do, what I have to do next week, etc.)." As in Study 2a, responses were averaged for these two items.

Results and Discussion

Figure 6 shows the mean ratings of norm availability and strength for each of the three

behaviors obtained in Study 2a. As expected, an ANOVA showed statistically significant differences between the three behaviors for the availability of personal norms ($F(2,53) = 5.7$, $p < .01$). Personal norms were more available for exercising ($M = 5.1$) than for either book reading ($M = 3.5$, $t = 2.3$, $p < .05$) or news watching ($M = 2.9$, $t = 3.3$, $p < .01$), and the difference between book reading and news watching was not statistically significant ($t = 1.0$, $p = .32$). As expected, we also replicated the findings of Study 1 regarding the difference in personal norm strength across the three behaviors ($F(2,53) = 4.6$, $p < .02$). Personal norms were stronger for exercising ($M = 6.7$) than for either book reading ($M = 5.2$, $t = 2.2$, $p < .05$) or news watching ($M = 4.7$, $t = 2.9$, $p < .01$), and the difference between book reading and news watching was not statistically significant ($t = .7$, $p = .49$). As expected, the availability and strength of personal norms were positively and significantly correlated ($r = .54$, $p < .01$).

--- Insert Figure 6 about here ---

Figure 6 also shows mean ratings of conflict experienced after the behavior prediction intervention of Study 2b. As expected, an ANOVA revealed statistically significant differences between the three behaviors ($F(2,77) = 4.2$, $p < .02$). Contrast tests further showed that conflict was higher when participants were predicting their future exercising behavior ($M = 5.6$) than when they were predicting their future book reading ($M = 4.4$, $t = 2.2$, $p < .05$) or news watching ($M = 4.0$, $t = 2.8$, $p < .01$), and the difference between book reading and news watching was not statistically significant ($t = .6$, $p = .53$).

Overall, Study 2 provides initial evidence about the role of personal norm availability and about the role of conflict between personal norms and people's past behavior in explaining the results of Study 1. Specifically, it shows that personal norms are more available for exercising than for either book reading or news watching and are more likely to conflict with past

behavior when people are asked to predict their future behavior for exercising than for either book reading or news watching. It also shows that the strength and availability of personal norms are correlated at the individual level. Taken together, these findings are consistent with the argument that personal norms strength interacts with behavior prediction because of the different accessibility of strong and weak personal norms and because of the resulting conflict with past behavior. Of course, these results cannot rule out other possible mechanisms that could explain the results of Study 1. In the general discussion, we review these other mechanisms, briefly present the results of two field experiments that provide further evidence supporting our hypothesis, and discuss the implications of our results for research and public policy.

GENERAL DISCUSSION

The objective of this research was to examine how predictions and personal norms influence the likelihood that people will repeat past behavior. To achieve this objective, we drew from research on habits and question-behavior effects to develop our theoretical framework. Our empirical studies provided converging evidence that supports the predictions derived from this framework. In study 1, we found that asking questions about a future behavior reinforces behavior repetition for behaviors with weak personal norms (reading books and watching the news), but weakens behavior repetition for exercising, a behavior for which our participants held strong personal norms. Further, we demonstrated that at the individual level, asking questions about future behavior strengthens the relationship between past and future behavior when personal norms are weak, but weakens this relationship when personal norms are strong. Initial support for one proposed process explanation for these findings is provided in the second study. Study 2a showed that people hold stronger and more

available personal norms for exercising than for either reading or watching the news and that the availability and strength of personal norms are correlated at the individual level. Study 2b demonstrated that people making a prediction about a behavior with strong (versus weak) personal norms experience greater conflict when thinking about the performance of the behavior. Taken together, our findings support the proposed framework and have implications for research well beyond what we have discussed here, as well as having practical implications for public policy.

Implications for Future Research

The most important issue for future research is to shed more light on the process underlying the effects documented in our studies. Although Studies 1 and 2 provide empirical evidence supporting the role of personal norm availability and of conflict between norms and behavior, more work is needed to rule out competing explanations. In particular, it would be useful to examine whether our results can be explained by differences in the judged usability (or applicability) of personal norms for different behaviors. As defined by Higgins (1996), judged usability is "the judged appropriateness or relevance of applying stored knowledge to a stimulus." The notion of judged usability is therefore closely related to the notion of perceived diagnosticity, which constitutes, along with accessibility, the basis of self-generated validity theory (Feldman and Lynch 1988), one of the proposed explanations for question-behavior effects (Chandon and Morwitz 2005). Even if one assumes that the strength of personal norms does not influence their accessibility, personal norms are still more likely to be perceived as appropriate guides of future behavior when they are strongly held than when they are not. The higher judged usability of strongly-held personal norms would therefore suggest that prediction would be more likely to increase the likelihood that people follow their personal

norms (rather than their past behavior) when personal norms are strong than when they are weak. Our results also have implications for research on habits and the question-behavior effect.

Habits research. If we agree that most behaviors are non-normative, our findings suggest that we may be overestimating the importance of habits and underestimating the importance of intentions in driving everyday behaviors (Wood and Quinn 2005). This is because the studies that have investigated the relative importance of intentions and habits have often measured habits among people whose intentions were also measured. Because the mere act of measuring intentions (a type of prediction) artificially increased behavior repetition among study participants, these studies may be overestimating the true level of repeat behavior in the population (i.e., the level of repetition among people who were not involved in these studies).

Our framework and results also enable us to reexamine prior empirical results and to make predictions regarding the direction of the biases that prediction may have created in these studies. For example, Ji Song and Wood (2006) documented the strength of behavior repetition for buying fast food, watching news on TV, and taking the bus. If one assumes that personal norms are stronger for buying fast food than for the latter two behaviors, our results suggest that the true strength of habits may be stronger than reported for fast food and may be weaker than reported for watching news and taking the bus.

Question-behavior research. Our framework and findings suggest that asking questions about future behavior not only influences the performance of future behavior, but also influences the likelihood of repeating past behavior. Unpublished fieldwork conducted by the authors provides evidence that these findings generalize to real-world settings. In the context of a behavior with low normative beliefs, one field study found that asking people about their future online grocery shopping intentions significantly increased both the number of transactions and total expenditures among frequent shoppers, but decreased these behaviors

for those with medium and low pre-intervention usage. The opposite results were obtained for exercising, a high-normative behavior, in different field study. In particular, asking people about their future exercising behavior significantly reduced attendance at a health and fitness club among the top tier of its most assiduous members while increasing attendance among the more intermittent users.

The novel findings of the current work raise several avenues for future research. First, it would be interesting to examine whether other factors beyond the preexisting strength of personal norms influences which route predominates regarding behavior repetition. For example, we would expect that prediction would be more likely to strengthen behavior repetition among people low on the susceptibility to interpersonal (i.e., normative) influence scale (Bearden, Netemeyer, and Teel 1989). Second, our results provide new insights regarding the boundaries of the question-behavior effect. Existing studies (e.g., Morwitz et al. 1993; Spangenberg and Greenwald 1999) suggest that predictions lead to more behavior change for people with low or moderate amounts of experience with the behavior. Our results, however, suggest that predictions lead to greater change in behavior repetition among people with either very low or very high levels of past behavior. Future research is necessary to determine whether these inconsistencies are caused by differences in how the amount of experience is defined, or the nature of the focal behavior. For example, all participants in our studies had experience with the focal behaviors, whereas Morwitz et al. (1993) defined experience as actual past product ownership.

Finally, it would be interesting to examine whether social norms, like personal norms, can moderate the effects of prediction on repetition. Prior research has established that asking question influences the performance of both socially normative and non-normative behaviors (Fitzsimons et al. 2007; Williams et al. 2006). Although social norms did not explain our results, Sprott et al. (2004) found that prediction had a stronger effect on the performance of

two socially-desirable behaviors (selecting a low-fat snack and getting a health and fitness assessment) for people with stronger norms than for people with weaker norms. Unfortunately, these authors did not measure personal norms (nor explore the effect of prior behavior), thus a direct comparison of the work is not possible. In this context, it would be particularly interesting to examine the effects of prediction on behavior repetition when personal and social norms conflict.

More generally, our results reinforce the argument that prediction may influence behavior through at least two routes: 1) by increasing the accessibility of existing cognitions associated with the behavior and 2) by increasing the accessibility of the normative beliefs associated with the behavior. An interesting avenue for future research would be to explore how question-behavior effects caused by other mechanisms, such as fluency (Janiszewski and Chandon 2007), may bear upon behavior repetition. Doing this would allow us to better delineate the range of question-behavior effects while also providing new insight into the important issue of what may cause the past to repeat itself.

Implications for Public Policy

Identifying interventions that reinforce socially beneficial behaviors and weaken socially harmful behaviors is important to public policy and societal welfare. It is particularly important with regard to habitual behaviors such as smoking, overeating, and lack of exercise, which account for a large number of preventable deaths in well-developed countries and are hard to change, even when persuasion attempts have successfully changed people's intentions (Verplanken and Wood 2006; Webb and Sheeran 2006). In this context, it is encouraging to see that a seemingly innocuous (and easily implemented) technique—asking questions regarding future behavior—can lead to significant levels of change in exercising behavior in

comparison to prior behavior. This result is all the more impressive as prediction requests can be included in routine auto-administered questionnaires and have been shown to work even in mass communication settings, where people do not actually respond to someone else regarding the prediction question but are prompted to predict to themselves through an advertisement (Spangenberg et al. 2003).

Similarly, it would be valuable to examine whether the wording of the prediction request matters. For example, some researchers (e.g., Sprott et al. 2006) have postulated that there may be systematic differences between prediction requests focusing on intentions and those focusing on expectations of engaging in a behavior. Compared to intentions, expectations are assumed to capture factors that might facilitate or inhibit the performance of a behavior. In general, studies find that expectations predict future behavior better than intentions (e.g., Sheppard, Hartwick, and Warshaw 1988). This does not imply for certain, however, that expectations influence behavior repetition differently than intentions. More generally, this discussion raises the question of whether related interventions may not also influence the strength of behavior repetition. In particular, further research is necessary to examine whether simply priming personal norms might not be sufficient to influence behavior repetition.

On the other hand, our findings that the direction of the effects depends on an individual's personal norms and the person's prior behavior indicate that care is warranted in application of the current work to public policy and improving society. When personal norms are weak, the effects of behavior prediction may be more uniformly beneficial from a social welfare point of view. Consider sleep duration. Recent research (Aeschbach et al. 2003) has argued that, beyond a certain threshold, there is not an optimal number of hours of sleep for all people and that individuals should do what works for them. In this context, asking people to predict how long they would sleep in the future could increase overall sleep quality because it would lead people to repeat what they normally do rather than following sleep patterns

recommended for others. When personal norms are strong, however, it is important to weigh the costs and benefits that behavior prediction may have for frequent and infrequent users. In some instances, prediction is likely to be beneficial to those with high and low levels of frequency of engaging in the behavior. For example, it is probably good at a broad societal level that low exercisers exercise more and that people who exercise excessively exercise less. In other contexts, like donating to charities for example, it may be that the positive effect of behavior prediction among low contributors may be more than offset by any possible negative effects among high contributors (i.e., reducing the level of their contribution to the charity). When personal norms are strong, asking questions about future behaviors will increase overall behavior if the behavior of most people in the sample is below their personal norm, but will reduce overall behavior if most people are above their personal norm. Clearly, policy makers and others interested in influencing behaviors associated with strong personal norms should consider segmenting the market using measures of past behavior or closely related variables.

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TABLE 1

REGRESSION RESULTS

Factor	*B*	*Std. Error*
Model with Behavior Dummies		
INTERCEPT	3.63	.80
NEWS	-5.20*	2.11
BOOKS	-3.54*	1.83
PAST	.76**	.10
PRED	-1.35	1.60
PRE×SP	.17	.20
PAST×NEWS	.45*	.23
PAST×BOOKS	.35	.24
PRED×NEWS	-11.85**	4.23
PRED×BOOKS	-7.19*	3.66
PAST×PRED×NEWS	1.34**	.45
PAST×PRED×BOOKS	1.28**	.48
Model with Personal Norm Importance		
INTERCEPT	4.75	.81
NEWS	-.11	1.02
BOOKS	-.23	1.09
PAST	.63**	.10
PRED	-.79	1.62
PNORM	1.30**	.37
PAST×PRED	.17	.20
PAST×PNORM	-.11	.05
PRED×PNORM	1.17	.75
PAST×PRED×PNORM	-.27*	.09

**: $p < .01$, *: $p < .05$ (two-tailed)

Note: The dependent variable is the square root of the number of minutes spent on the behavior in the seven days following the prediction intervention.

FIGURE 1

HOW BEHAVIOR PREDICTION AND PERSONAL NORM STRENGTH INFLUENCE THE RELATIONSHIP BETWEEN PAST AND FUTURE BEHAVIOR

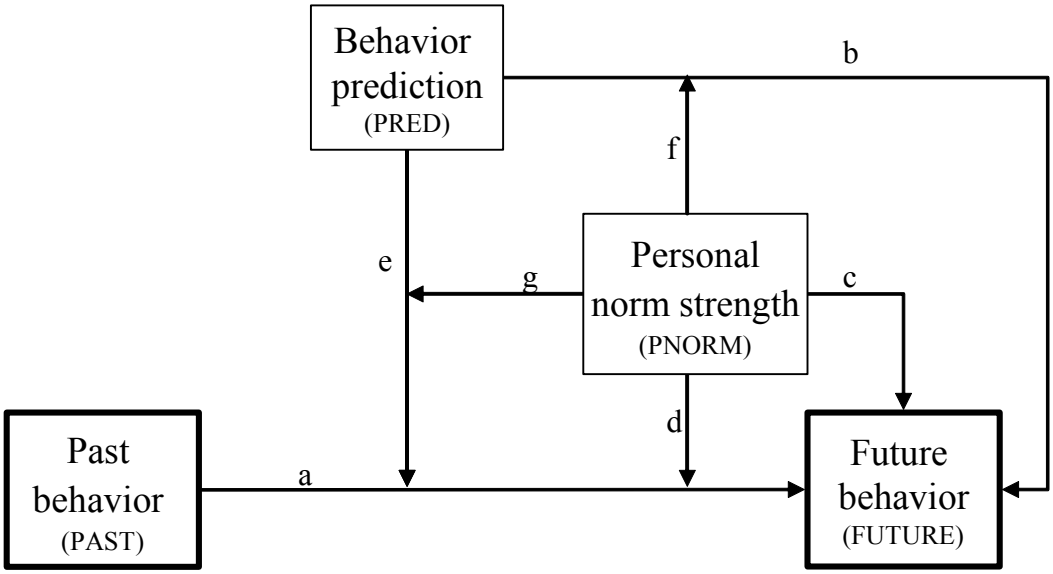


FIGURE 2

STUDY 1: EFFECTS OF PREDICTION ON THE CORRELATION BETWEEN PRE- AND POST-INTERVENTION BEHAVIOR DURATION FOR THREE BEHAVIORS

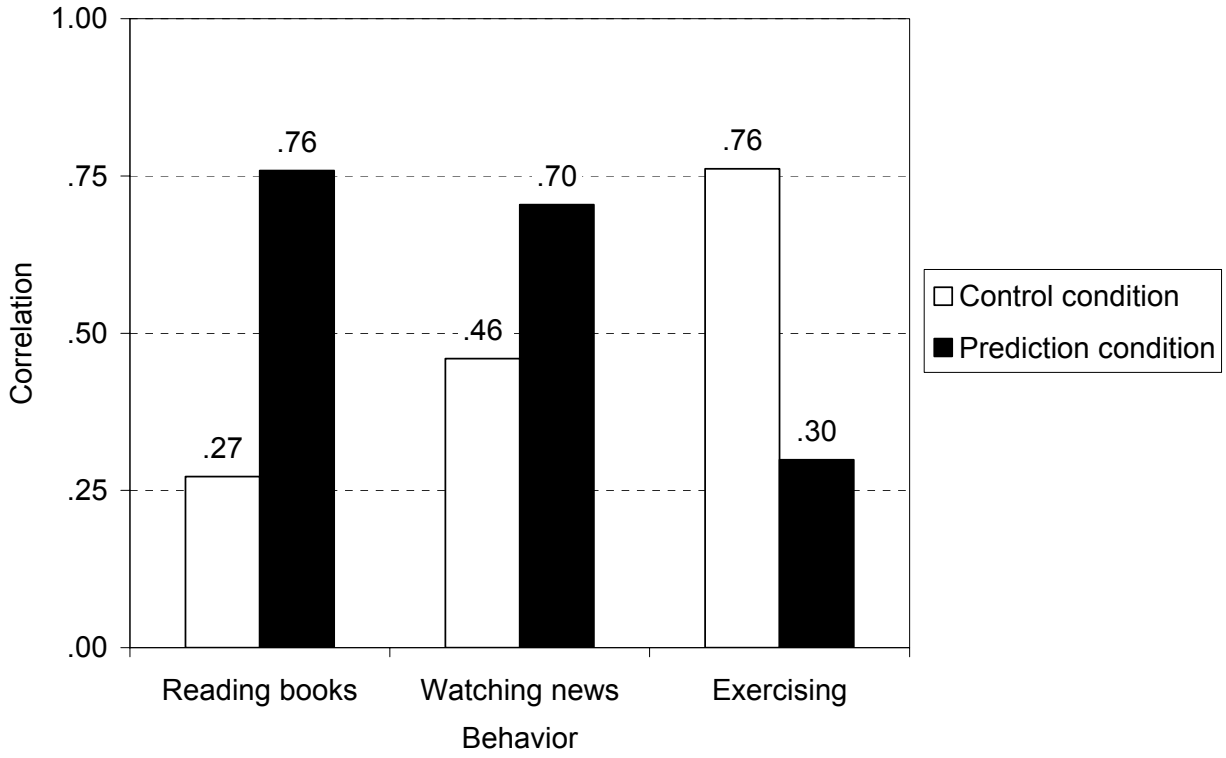


FIGURE 3

STUDY 1: EFFECTS OF PREDICTION ON BEHAVIOR DURATION

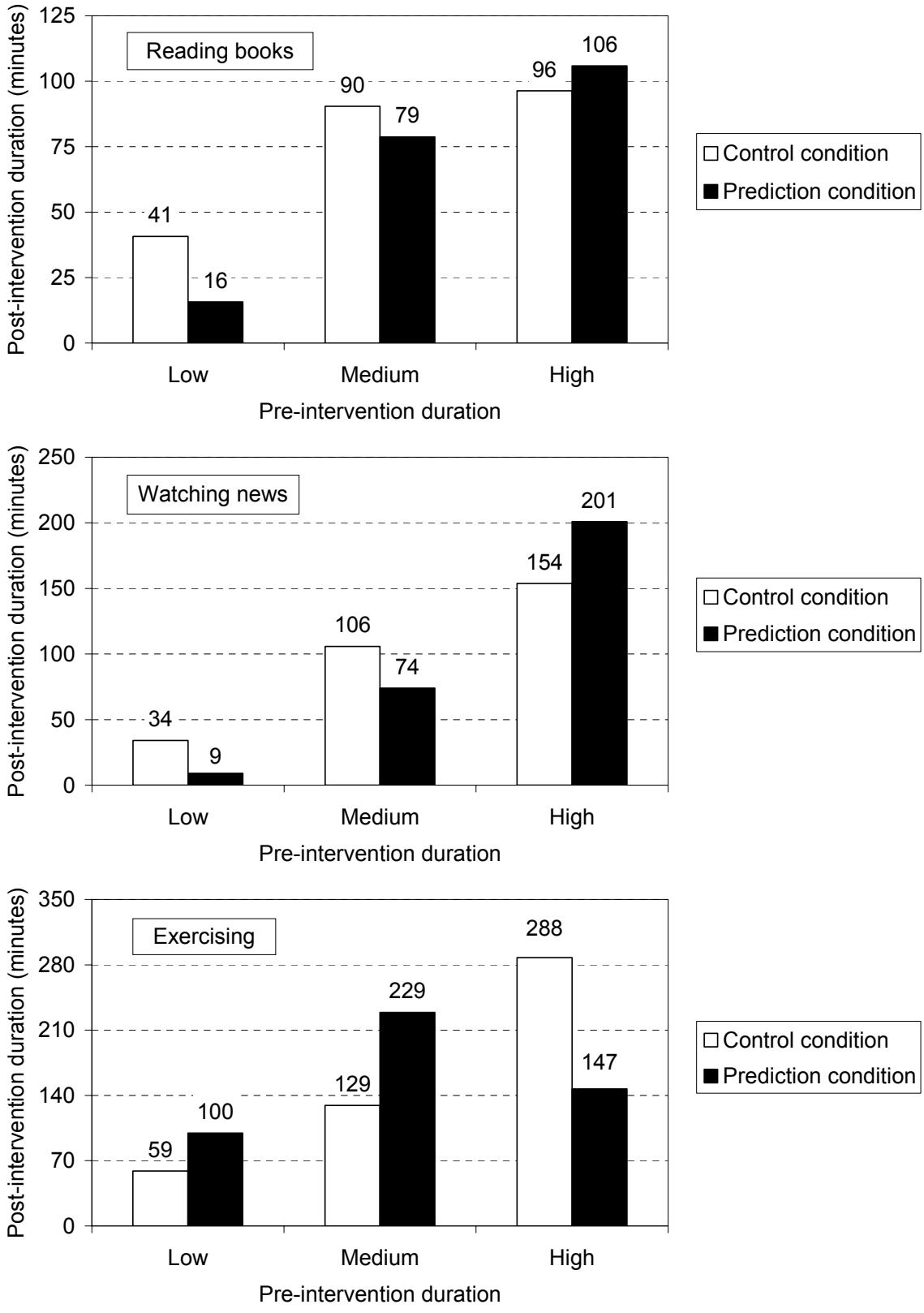


FIGURE 4

STUDY 1: EFFECTS OF PREDICTION ON THE CORRELATION BETWEEN PRE- AND POST-INTERVENTION BEHAVIOR DURATION FOR PEOPLE WITH WEAK OR STRONG PERSONAL NORMS

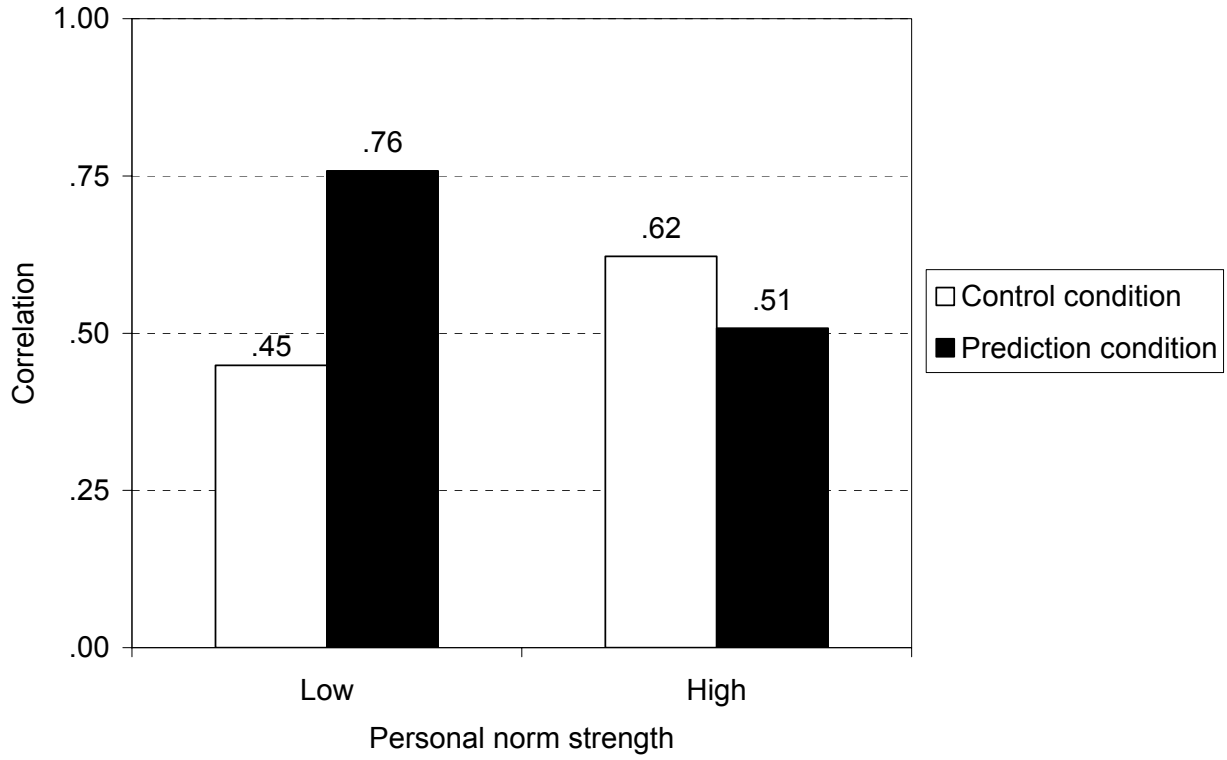


FIGURE 5

STUDY 1: EFFECTS OF PREDICTION AND PERSONAL NORM STRENGTH ON POST-INTERVENTION BEHAVIOR DURATION

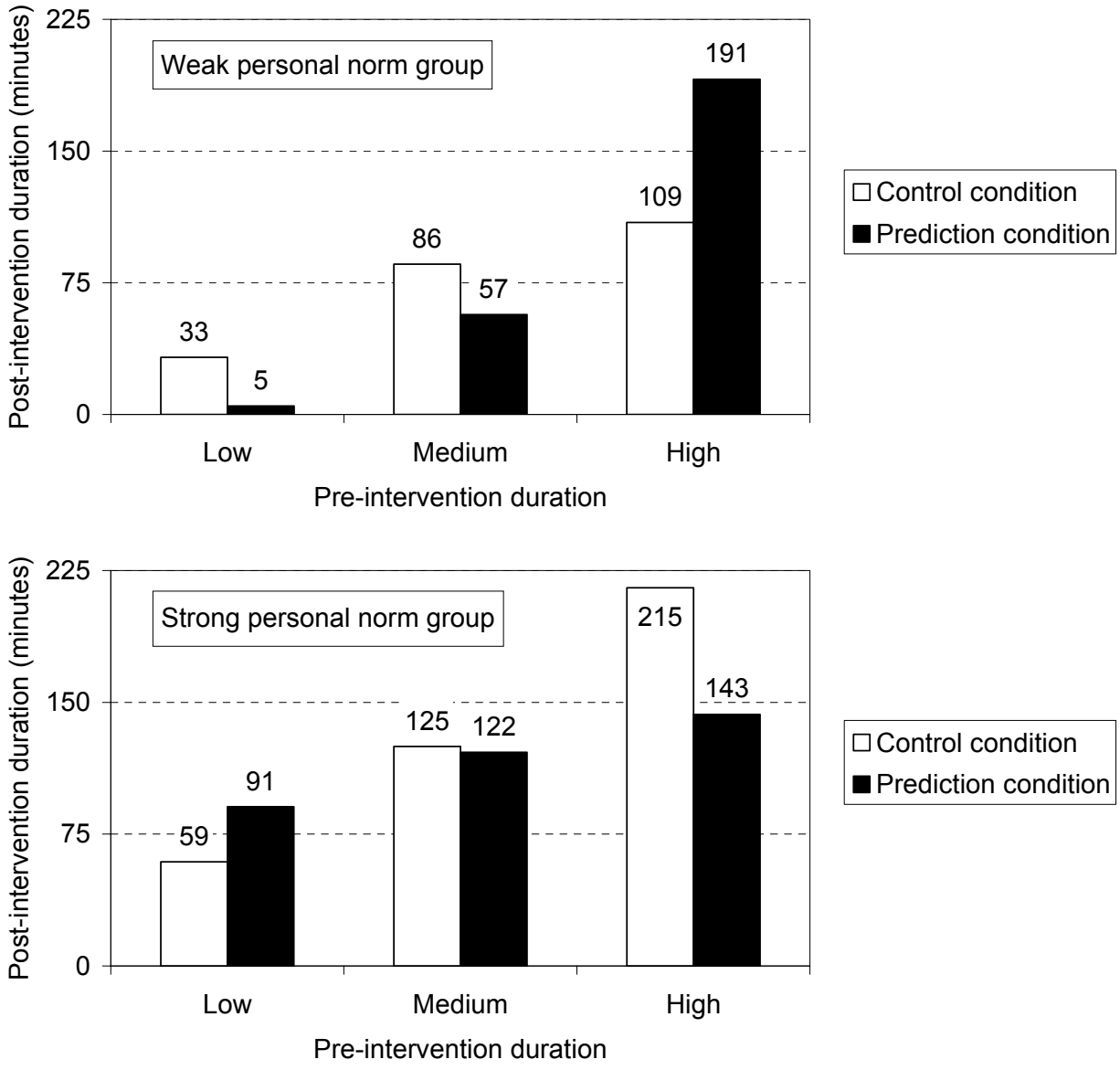
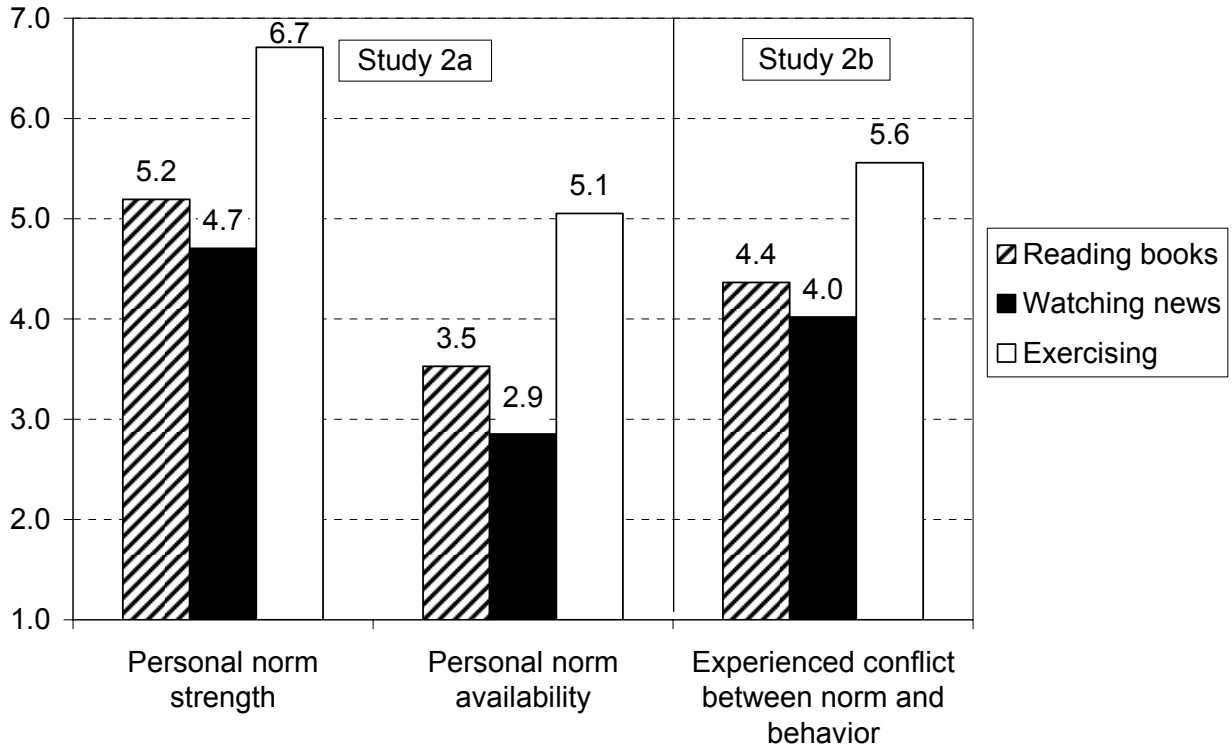


FIGURE 6

STRENGTH AND AVAILABILITY OF PERSONAL NORMS (STUDY 2A), AND EXPERIENCED CONFLICT BETWEEN NORM AND PAST BEHAVIOR (STUDY 2B) FOR THREE BEHAVIORS



Europe Campus
Boulevard de Constance,
77305 Fontainebleau Cedex, France
Tel: +33 (0)1 6072 40 00
Fax: +33 (0)1 60 74 00/01

Asia Campus
1 Ayer Rajah Avenue, Singapore 138676
Tel: +65 67 99 53 88
Fax: +65 67 99 53 99

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