When Does the Past Repeat Itself? The Interplay of Behavior Prediction and Personal Norms

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Does asking people about their future behavior increase or decrease the likelihood that they will repeat their past behavior? In two laboratory and two field experiments, we find that behavior prediction strengthens behavior repetition, making people more likely to do what they normally do, when personal norms regarding engaging in a behavior are weak or not easily accessible. However, when personal norms are strong or made accessible at the time of the prediction request, behavior prediction weakens behavior repetition and increases the likelihood that people do what they think they should do—even if it's not what they normally would do. These findings provide new tools for influencing behavior repetition, reconcile some seemingly contradictory past findings, and contribute to the debate regarding the relative importance of habits and intentions in guiding behavior.

The repetition of unhealthy behaviors (such as overeating) and the lack of repetition of healthy behaviors (such as exercising) are leading contributors to preventable deaths in developed countries (Mokdad et al. 2004). Unfortunately, there is considerable evidence that repetitive behaviors such as these are very difficult to change, even when people intend to do so (Ouellette and Wood 1998; Verplanken and Wood 2006). So what can be done to strengthen or disrupt behavior repetition?

A number of recent studies have demonstrated the effectiveness of a simple intervention for behavior change: asking people to predict whether or not they will engage in a future behavior (for recent reviews of the effects of this intervention, hereafter referred to as "behavior prediction," see Dholakia 2010; Fitzsimons and Moore 2008; Sprott et al. 2006). Studies examining this question-behavior effect (also known as the "mere measurement" or self-prophecy effect) have shown that behavior prediction can have large and long-lasting effects on the performance of a variety of desirable and undesirable behaviors, but they have not examined whether it influences behavior repetition. Behavior prediction requests occur naturally and frequently in the context

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of commercial surveys, for screening purposes in research and prevention programs, or simply when friends and family ask about our future behavior. It is therefore important to know whether these requests may unwillingly influence behavior repetition and, if so, in what direction.

The primary goal of this research is to examine whether behavior prediction can be used to disrupt undesirable behavior repetition or to strengthen desirable behavior repetition. We do this by examining whether asking a behavioral question interacts with past behavior to influence future behavior. In other words, does a behavior prediction make people more or less likely to repeat their past behavior? This is an important issue because, if behavior prediction does interact with past behavior, it means that the effects of asking questions on future behavior depend on how much people have engaged in the behavior in the past. For example, a positive crossover interaction between behavior prediction and past behavior (i.e., stronger likelihood of behavior repetition) would imply that asking questions would increase behavior among high users but would actually reduce behavior among low users (and conversely if the interaction is negative). With two notable exceptions (Fitzsimons and Morwitz 1996; Smith, Gerber, and Orlich 2003), these issues have not yet been empirically studied in prior research. In a related study, Williams, Block, and Fitzsimons (2006) showed that the effects of asking questions on exercising and drug usage were stronger when restricting analysis only to people who had engaged in the behavior at least once after the time of the intervention. However, this study did not measure behavior both before and after the time of the intervention and hence did not examine whether asking questions may have changed the association between past and future behavior.

The secondary goal of this research is to examine whether the interaction between behavior prediction and past behavior is itself influenced by the strength and accessibility of personal norms. Unlike previous research on question-behavior effects, which has studied the role of social norms (Sprott, Spangenberg, and Fisher 2003), we focus on the role of personal norms, which, following Schwartz (1973), we define as internal standards for conduct. Our key hypothesis is that, when personal norms about how much one should engage in a behavior are weak or not accessible at the time of the prediction request, asking people about their future behavior strengthens behavior repetition (i.e., people become more likely to repeat what they normally do). However, when personal norms are strong or made accessible at the time of the prediction request, behavior prediction weakens behavior repetition (people become less likely to repeat what they normally do).

Studying the interplay of personal norms and behavior prediction is important because existing evidence regarding the effects of asking questions on behavior repetition is sparse and sometimes conflicting. On the one hand, Fitzsimons and Morwitz (1996) found that behavior prediction increased the likelihood that automobile owners would repurchase the automobile brand they bought on their last purchase occasion from 39% to 52%. On the other hand, Smith et al. (2003) found that asking people to predict whether or not they would vote in a subsequent election decreased their likelihood of repeating their past voting pattern. Specifically, behavior prediction decreased voting turnout from 63% to 56% among regular voters (who had voted in all five prior elections) and increased turnout from 34% to 38% among irregular voters (who had not voted in all five prior elections). These opposite findings fit our theory to the extent that personal norms are stronger for voting than for automobile purchasing. However, it is difficult to draw strong conclusions from these studies because personal norms were neither measured nor manipulated. In addition, both studies relied on self-reported measures of a single behavior (one automobile purchase and participation in a single election) measured long after the behavior in question was performed. To capture the effects of behavior repetition more fully requires longer time horizons encompassing multiple behavior occasions that, ideally, are unobtrusively measured.

CONCEPTUAL BACKGROUND

When asked to make predictions about their future behavior, people can think about what they normally do (past behavior) and/or what they think they should do (personal norms), among other inputs. Because we focus on repeated behaviors, we assume that information about past behavior or personal norms is available in memory at the time of the behavior prediction request.

A number of studies have demonstrated that behavior prediction increases the accessibility of thoughts related to past behavior, such as past attitudes or intentions about the behavior (Chandon, Morwitz, and Reinartz 2005; Fitzsimons and Morwitz 1996; Fitzsimons, Nunes, and Williams 2007; Morwitz and Fitzsimons 2004; Morwitz, Johnson, and Schmittlein 1993). In this case, behavior prediction may increase the chances that people will repeat their past behavior rather than acting randomly or according to changing circumstances. Other work has shown that behavior prediction primes what people think they should do, not just what they normally do (Spangenberg and Greenwald 1999; Spangenberg, Greenwald, and Sprott 2008; Spangenberg and Sprott 2006; Spangenberg et al. 2003). In this case, behavior prediction may move people away from their past behavior and instead toward their personal norm, thereby reducing the likelihood of behavior repetition. Thus, because there is disagreement in the literature regarding what specific cognitions are made accessible through behavioral prediction, existing studies result in conflicting predictions as to whether asking questions about future behavior will increase, decrease, or have no effect on the repetition of behavior.

Role of the Preexisting Accessibility of Personal Norms

We argue that the effects of prediction on behavior repetition depend on what information (i.e., about past behavior

or about personal norms) is already accessible in memory at the time of the prediction request. This is because the type of information that is most accessible will likely be further primed by the prediction request and so will be most likely to influence behavior. This hypothesis is consistent with research showing that personal norms are strong influencers of various behaviors, but only when they are already easily accessible (Cialdini and Goldstein 2004; Kallgren, Reno, and Cialdini 2000).

Specifically, we expect that—if personal norms are not easily accessible and information about past behavior is easily accessible—then asking people about their future behavior will further prime past behavior and thereby increase the chances that people will repeat what they normally do. Conversely, when personal norms are easily accessible, asking questions will further prime norms and therefore increase chances that people will do what they think they should do, rather than what they normally do (assuming that these are different). 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.

Our theorizing thus far raises the question of just what determines the relative accessibility of personal norms. There is considerable evidence that the strength and extremity of attitudes improve their accessibility (Fazio 2001; Fazio, Powell, and Williams 1989). In fact, personal norms may be available in memory only for those with strong personal norms regarding how much they should engage in a particular behavior. Personal norms are thus more likely to be accessible after making a behavioral prediction when those norms are strong rather than weak. Personal norm strength obviously varies across people for a given behavior and varies across behaviors. Therefore, we expect that prediction will increase behavior repetition for consumers with weak personal norms or for behaviors for which people generally have weak personal norms (e.g., watching television or reading books). In contrast, we expect that behavior prediction will weaken behavior repetition for those with strong personal norms or for behaviors, such as exercising, for which people generally have strong personal norms.

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, behavior prediction will activate these norms and not merely recollections of past behavior. For this reason, behavior prediction will reduce the chance that people simply repeat their past level of behavior. As a result, those who exercise infrequently are less likely to repeat their low level of exercising, and people who frequently exercise are similarly less likely to repeat as high a level of exercising. Although exercising a lot seems to be a worthy goal and personal norm, we expect that at least some of those who exercise a lot may realize, when asked about their future behavior, that they would rather not exercise as much. In fact, except for people who are addicted to exercising, personal norms about exercising do not extend to continuous, all-day exercising (Hausenblas and Downs 2002).

EXPERIMENT 1: EFFECTS OF BEHAVIOR PREDICTION ON BEHAVIOR REPETITION WHEN PERSONAL NORMS ARE STRONG VS. WEAK

Method

In experiment 1, we measured the frequency and duration of three behaviors by asking participants to complete diaries. We manipulated behavior prediction by asking or not asking participants to predict whether or not they would engage in the focal behavior in the future. We also manipulated personal norms (by asking people about behaviors with strong and weak personal norms) and measured them at the individual level. A 2 (behavior prediction vs. control) × 3 (behaviors: exercising vs. news watching vs. book reading) mixed design was implemented.

Three focal behaviors were chosen based on a pretest of 68 undergraduate students from a population similar to those participating in experiment 1. Pretest participants were asked to rate their agreement with two statements adapted from prior research on personal norms, which has often used single-item measures of personal norms (Kallgren et al. 2000; Schwartz 1973), "I feel committed to [behavior]" and "[behavior] is an important part of my life," on a 9-point scale ranging from 1 = "strongly disagree" to 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) instead of one 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 period of our study. Pretest participants were also asked to report how long they spend on each behavior per day. Results showed that the time students spend on each of these three behaviors per day is low enough to preclude trade-offs between them.

Experiment 1 took place over a 3-week period during the semester. In the first week, we measured personal and social norms for the three behaviors as part of an ostensibly unrelated study. One week later, participants provided behavior duration data for the three behaviors during each of the 3 previous days. Participants were told 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 actions. For the "exercising" behavior for example, participants estimated the number of minutes spent each day on indoor individual or class exercise (e.g., working out, swimming, fitness classes); outdoor individual

or class exercise (e.g., running, biking, group running clinic); individual or team sports; and other fitness behaviors (e.g., walking).

Approximately one hour after completing these behavior duration measures, participants were presented with an ostensibly unrelated survey wherein they answered a prediction question concerning one of the three focal 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 presentation order of the two response alternatives was systematically varied across participants.

In the third and final week of the study, participants provided behavior frequency data using the same retrospective diary measures as those used to measure prestudy behavior duration. Retrospective diaries were used because time allocation studies have shown them to be more valid than simply asking people to estimate behavior duration for the total period (Juster and Stafford 1991). These data were collected twice during the final week of the study. In the middle of the week, we collected behavior duration data about each of the previous 4 days (i.e., the 4 days since the behavior prediction). We asked participants again at the end of the week, at which time we collected data for the last 3 days of the week. We thus obtained daily behavior duration data for the 7 days after the behavior prediction manipulation.

There were 50 research participants present during all phases of data collection. Following a procedure often used in question-behavior studies (e.g., Levav and Fitzsimons 2006), the control group for each behavior was composed of participants who provided a prediction for the other two behaviors but did not make any prediction for the focal behavior.

Results

Manipulation Checks. Nearly all participants answering each behavior prediction question predicted that they would exercise (94%), read books (83%), or watch news (94%); the differences between these predictions were not statistically significant ($\chi^2(2, 50) = 1.4$, $p = .5$). As a manipulation check, participants were asked to rate their agreement on a 9-point scale (where 1 = "strongly disagree" and 9 = "strongly agree") with two statements measuring personal norm importance ("[behavior] is an important part of my life" and "I feel committed to [behavior]") and with four statements adapted from prior research (Fisher 1993; Spangenberg and Sprott 2006; Sprott et al. 2004) 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 were the same as those used in the pretest. Despite comprising only two or four items, the scales were reliable: *r*-values for personal norms and the Cronbach's alphas for social norms were respectively .96 and .84 for book reading, .94 and .64 for exercising, and .95 and .79 for news watching.

There were strong differences in personal norm strength across the three behaviors ($F(2, 144) = 21.5$, $p < .01$). As could be anticipated for a student sample, contrast tests showed 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 regarding personal norm strength were therefore replicated. In contrast, all three behaviors scored similarly on the social norm scale ($M = 6.4$ for exercising, $M = 6.6$ for book reading, and $M = 6.3$ for news watching; $F(2, 144) = 0.8$, $p = .46$).

Comparison of Behaviors. The simplest way to test our hypotheses was to use as dependent variable the correlation between number of minutes spent on each behavior (*a*) in the 3 days before the question intervention and (*b*) in the 7 days after the question intervention. We used the full 7-day window for the poststudy time period, not only because doing so improved the reliability of the behavior duration data but also because it is consistent with prior question-behavior studies (Fitzsimons et al. 2007; Levav and Fitzsimons 2006). Confirming pretest results that personal norms are similarly low for news watching and book reading, the behavior prediction intervention had the same effects on the two behaviors ($F(1, \infty) = .6$, $p = .44$). These two behaviors were therefore combined in all subsequent analyses.

Table 1 shows the four correlations (one correlation per experimental condition for exercising and for the combination of watching news and reading books). After *z*-transforming these four correlations, we used Games's (1978) modified analysis of variation (ANOVA) with two factors—behavior prediction and behavior type—and their interaction. The two main effects were not statistically significant (for behavior prediction: $F(1, \infty) = .2$, $p = .70$; for behavior type: $F(1, \infty) < .1$, $p = .88$). However, their interaction was statistically significant ($F(1, \infty) = 13.5$, $p < .01$); this indicates that, as anticipated, the effects of behavior prediction differed across the two types of behaviors.

As shown in table 1, the correlation between the number of minutes spent watching the news or reading books before and after the time of the intervention was higher in the behavior prediction condition ($r = .74$), than in the control condition ($r = .38$). Comparing correlations within each behavior type revealed that this increase was statistically significant ($z = 2.6$, one-tailed $p < .01$; we use one-tailed tests for the contrast tests and two-tailed tests for the ANOVA). As expected, the opposite result emerged for exercising. The time spent exercising before and after the intervention was significantly lower in the prediction condition ($r = .30$), than in the control condition ($r = .76$; $z = -2.1$, $p < .01$). Overall, comparisons of correlations support our

TABLE 1

EXPERIMENTS 1–3: CORRELATION BETWEEN PAST AND FUTURE BEHAVIOR ACROSS EXPERIMENTAL CONDITIONS

Experiment	Intervention or group	Behavior and measure	Control condition	Prediction condition	*z*-score of difference
1 ($n = 50$)	All participants	Time spent watching the news or reading books	.38	.74	2.6**
		Time spent exercising or playing sport	.76	.30	$-2.1^{++,*}$
	Weak personal norm group	All behaviors combined	.45	.76	1.8*
	Strong personal norm group	All behaviors combined	.62	.51	-0.6^{+}
2 ($n = 150$)	Control priming condition	Time spent watching the news	−.12	.77	4.1**
		Time spent exercising or playing sport	.75	.59	-1.0^{++}
	Past behavior prime condition	All behaviors combined	.18	.65	2.8*
	Personal norm prime condition	All behaviors combined	.79	.42	$-3.0^{++,**}$
3a ($n = 391$)	All participants	Number of transactions with online grocer	.42	.61	2.5**
3b ($n = 1,179$)	All participants	Number of visits to fitness club	.85	.80	$-2.3^{++,**}$

$^{+}$Statistically different (two-tailed) from *z*-score in the other intervention or group at $p < .05$.
$^{++}$Statistically different (two-tailed) from *z*-score in the other intervention or group at $p < .01$.
*Statistically different (one-tailed) from zero at $p < .05$.
**Statistically different (one-tailed) from zero at $p < .01$.

hypothesis that behavior prediction increases behavior repetition for news watching and book reading but decreases it for exercising.

Effects of Measured Personal Norm Strength. We further tested our framework by assessing whether people with weak or strong personal norms regarding each behavior responded differently to the prediction intervention. To be able to use the same ANOVA as with the comparison of behaviors, we computed the correlation between pre- and postintervention duration for people with weak and strong personal norms (categorized via a median split). Due to the shortcomings of dichotomization (Fitzsimons 2008; Irwin and McClelland 2001), and to take into account that each participant provided data for all three behaviors, we also analyzed these data using a random-effects hierarchical regression. We regressed postintervention behavior duration on preintervention behavior duration, a binary variable for behavior prediction, a continuous variable for personal norms, and all of the two- and three-way interactions. The hierarchical regressions confirmed all the results from the ANOVA and are available from the authors upon request.

Based on Games's analysis, we found the two main effects to be not statistically significant (behavior prediction: $F(1, \infty) = 1.0$, $p = .32$; personal norm strength: $F(1, \infty) = .3$, $p = .58$), but their interaction to be statistically significant ($F(1, \infty) = 3.9$, $p < .05$). This confirms that the effects of prediction on behavior repetition differ for people with strong versus weak personal norms. As shown in table 1, behavior prediction increased the correlation for people with weak personal norms (from $r = .45$ to $r = .76$; $z = 1.8$, $p < .05$) but tended to decrease the correlation for people with strong personal norms, although this latter effect was not statistically significant due to dichotomization (from $r = .62$ to $r = .51$; $z = -.6$, $p = .27$). A spotlight analysis conducted with the continuous measure of personal norm and results of the hierarchical regression found statistically significant effects at high levels of personal norms (three points above the mean) as well as at low levels of personal norms (three points below the mean, results available from the authors upon request). Overall, analyses of the effects of measured personal norm strength are consistent with behavior comparison analyses in supporting our hypothesis.

Discussion

Experiment 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. Our confidence in this effect reversal is strengthened by two factors: (*a*) the reversal is replicated regardless of whether personal norms were manipulated (by asking about different behaviors) or directly measured at the individual level for each behavior; and (*b*) the effect holds across two different analyses (i.e., comparison of correlations and hierarchical regressions of future behavior on past behavior).

In addition, the results of experiment 1 suggest that these effects were driven by personal, not social norms. First, all three behaviors scored similarly on the social norm scales, and therefore the different effects of asking questions across these behaviors cannot be attributed to differences in social norms. Second, in an ANOVA with the correlation between past and future behavior, the interaction between social norms strength and behavior prediction was clearly insignificant ($F(1, \infty) = .2$, $p = .63$). Overall, even though our measure of personal norms had only two items, it behaved very differently from our four-item measure of social norms, indicating that both measures were not tapping into the same construct and that the distinction between social norms and personal norms is potentially an important one.

To help us visualize the effects of prediction on behavior

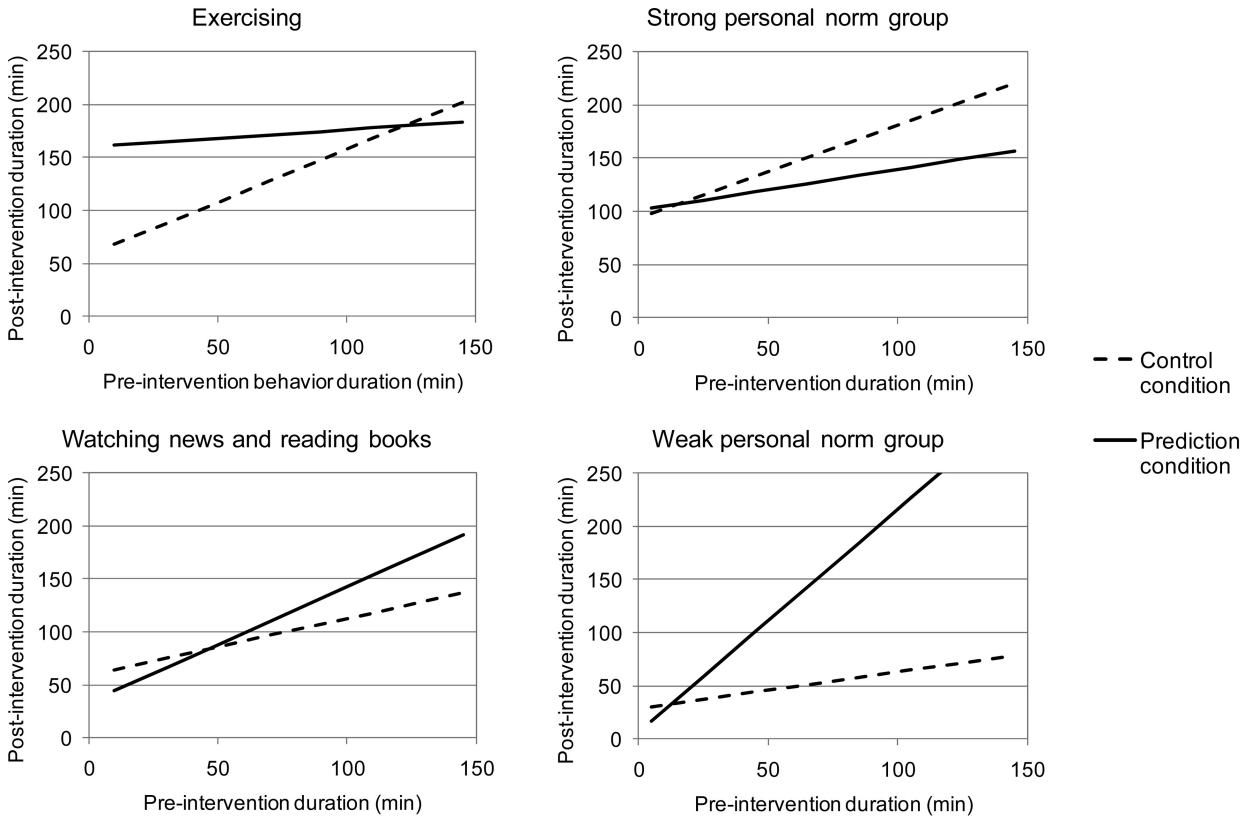
repetition, figure 1 shows the slopes obtained from the regression analyses of future behavior duration on past behavior duration in the control and prediction conditions. The left column shows that asking questions strengthened the association between past and future behavior (steeper slope) for watching news and reading books and led to the opposite effect (flatter slope) for exercising. Figure 1 also shows that the effect sizes in experiment 1 are remarkable. For example, asking questions led to an estimated 94 additional minutes of exercising (+138%) in the week after the intervention for people who had only exercised for 10 minutes in the week before the intervention. However, asking questions led to an estimated 23 fewer minutes (−11%) of exercising among people who had exercised for 150 minutes in the week before.

The right column of figure 1 shows that the same pattern of effects occurs when comparing people with weak and strong personal norms across all behaviors combined. Specifically, asking questions increased the slope of the association between past and future behavior for people with weak personal norms, but reduced it for people with strong personal norms. Figure 1 illustrates the potential biases that would occur if one fails to take into account the interaction between asking questions and personal norm strength. For example, consider people who spend 15 minutes per day or 105 minutes per week watching news, reading books, or exercising (i.e., those in the top 50% for our sample). If these people hold weak personal norms about their behavior, asking questions leads to an additional estimated 161 minutes (+249%) spent on this behavior in the week after the intervention. If these people hold strong personal norms, however, asking the questions leads to an estimated 44 minute (−24%) reduction in behavior duration.

Overall, the results of experiment 1 raise the question of why personal norm strength moderated the effects of prediction on behavior repetition. Our hypothesis is that behavior prediction strengthens or weakens behavior repetition depending on the relative accessibility of personal norms and past behavior at the time of questioning about future behavior. We test this hypothesis in the following experiment by manipulating the accessibility of personal norms and past behavior before measuring the impact of behavior prediction on behavior repetition.

FIGURE 1

EXPERIMENT 1: EFFECTS OF PREDICTION ON THE RELATIONSHIP BETWEEN PAST AND FUTURE BEHAVIOR BY BEHAVIOR TYPE (LEFT) AND PERSONAL NORM STRENGTH (RIGHT)



EXPERIMENT 2: EFFECTS OF PRIMING PERSONAL NORMS AND PAST BEHAVIOR

Method

Experiment 2 used a 2 (behavior prediction: yes or no) × 3 (priming: personal norm, past behavior, or neither = control) between-participant design with two within-participant replications (behavior type: with weak or strong personal norms). As in experiment 1, the behavior with high personal norms was exercising. Because we found no differences between watching news and reading books in experiment 1 or in any of the pretest studies, we chose only one behavior—watching news—as the weak personal norm behavior.

The study was conducted in a behavioral lab over the course of 5 days with 150 research participants, who each entered the lab at prearranged times. Upon arrival, detailed information was collected (regarding the time participants spent exercising and news watching in the 3 days before the session) via the same detailed questionnaire and guise used in experiment 1. Following this portion of data collection, all participants were given a "word puzzle" sheet adapted from Bargh and Chartrand (2000) with 15 sets of scrambled words, five words to a set. Participants were instructed to compose a grammatical four-word sentence from each word set and were all given the following example: "If the words were *flew eagle the plane around*, you could write the sentence *the eagle flew around*." In the personal norm priming condition, 10 of the word sets included pretested sentences such as "give your best work," or "meet your own target." In the past behavior priming condition, ten word sets included pretested sentences such as "I previously did it," or "use the prior version." In the control condition, no word set included words related to either norms or past behavior. This procedure was inspired from an existing study which primed personal and social norms separately (Stone 2003) but the sentences were modified to be applicable to the behaviors studied in experiment 2.

Participants were then asked to predict whether or not they would engage in one of the two behaviors (exercising or news watching) in the next 3 days. After the behavior prediction question, participants spent approximately 20 minutes completing an unrelated filler task. Finally, participants were asked to forecast the number of minutes that they would spend on both behaviors in the 3 days after the intervention (using the same scales as for the past behavior data collection). As in experiment 1, data from the behavior for which participants were not asked to make a prediction request were used as the control, providing a total of 300 observations. A funneled debriefing (Bargh and Chartrand 2000) indicated that none of the respondents correctly guessed the general purpose of the study or believed that incidental exposure to words might have altered their choices.

Results

Control Condition. As in experiment 1, we measure behavior repetition as the correlation between pre- and postintervention behavior duration (number of minutes over three days) and use z-transformed correlations with Games's (1978) ANOVA. Results are provided in table 1. Consider first the effects of behavior prediction in the control condition of no priming. As expected, there is a significant interaction between behavior prediction and behavior type ($F(1, \infty) = 12.9$, $p < .01$). The main effect of behavior prediction is also statistically significant ($F(1, \infty) = 4.7$, $p < .05$), although the main effect of behavior type is not ($F(1, \infty) = 2.2$, $p = .07$). In the no-prime condition, behavior prediction increases the correlation between past behavior and future intentions for watching news (from $r = -.12$ to $r = .77$; $z = 4.1$, $p < .01$), but reduces the correlation for exercise, although this last effect is not reliable owing to low statistical power (from $r = .75$ to $r = .59$; $z = -1.0$, $p = .16$, $n = 25$ per cell).

To illustrate the effects of prediction in the control condition, we compared the effects of asking question for people with low and high levels of past usage (dichotomized via a median split for each behavior). Asking questions increased the time that the top half of news watchers plan to spend watching news by 86 minutes but had little effect (i.e., +6 minutes) for the bottom half of news watchers. In contrast, the same question reduced the amount of time that the top half of exercisers planned to spend exercising (−16 minutes) but increased exercising intentions for the bottom half (+15 minutes). Thus, the results of the control condition replicate those of experiment 1 while using a different method to measure postintervention behavior.

Effects of Priming Personal Norms or Past Behavior. The priming manipulations were so effective that there were no differences between exercising and news watching within each priming condition. The effects of behavior prediction on behavior repetition are similar for exercising and news watching in the "past behavior" prime condition ($F(1, \infty) = .17$, $p = .73$) and in the "personal norm" prime condition ($F(1, \infty) = 2.1$, $p = .14$). Therefore, we analyzed the effects of priming for both behaviors combined.

The main effects of behavior prediction and of priming were not statistically significant ($F(1, \infty) = 2.5$ with $p = .11$ and $F(2, \infty) = 1.9$ with $p = .14$, respectively), but the interaction between behavior prediction and priming was statistically significant ($F(1, \infty) = 12.0$, $p < .01$). As shown in table 1, behavior prediction increased the correlation between past and future behavior (from $r = .18$ to $r = .65$; $z = 2.8$, $p < .01$) when past behavior was primed. When personal norms were primed, however, behavior prediction decreased the correlation between past and future behavior (from $r = .79$ to $r = .42$; $z = -3.0$, $p < .01$). In addition, the effects of behavior prediction in the personal norm prime condition were statistically different from its effect in both the control and past behavior prime conditions ($F(1, \infty) = 18.9$, $p < .01$ and $F(1, \infty) = 16.8$, $p < .01$, respectively).

Just like in the control condition, comparing the effects of asking questions for people with low and high levels of past usage (dichotomized via a median split for both behaviors within each priming condition) helps gauge the strength of the interaction. When past behavior is activated, behavior prediction has the expected polarization effect for both behaviors: it reduced behavior duration among low users (−25 minutes) but slightly increased it among high users (+3 minutes). However, when personal norms are activated, behavior prediction had the opposite effects: it increased behavior duration for low users (+10 minutes) but reduced it for high users (−22 minutes).

Discussion

The main contribution of experiment 2 was to show how the priming manipulations reversed the effect of behavior prediction and blocked the differences between exercising and news watching. When past behavior was primed through a scrambled sentence task, behavior prediction reinforced the likelihood of repeating the past for both behaviors; when personal norms were primed, behavior prediction had the opposite effect and reduced the likelihood of repeating the past. One of the limitations of experiment 2 is that the priming manipulation could have made social norms, and not just personal norms, more accessible. However, the fact that experiment 2 replicated the results of experiment 1 pertaining to measured personal norms, but not with measured social norms, suggests that our manipulation was successful.

Another limitation of experiment 2 is that we used behavioral intentions to measure postintervention behavior. There is, however, a large body of literature showing that there is a strong positive correlation (about .50 on average) between intentions and behavior (Morwitz, Steckel, and Gupta 2007; Sheppard, Hartwick, and Warshaw 1988). It is also not uncommon in the question-behavior literature to use behavioral intentions as the dependent variable, especially when the goal of the study is to gain insight into the mechanisms leading to the effect (e.g., Janiszewski and Chandon 2007). Finally, it is reassuring that the control condition replicated the results of experiment 1.

Still, it would be useful to examine whether these results hold over longer time periods, in a noisier environment, and for a broader cross section of the population. In addition, it would be important to rule out any possible self-presentation or demand effects by having access to unobtrusive measures of actual behavior. Further, it remains to be seen whether similar effects would result if the behavior prediction request were to come from a commercial organization, since prior research has shown that the source of the request can influence its effects (Dholakia 2010). These issues are addressed in the field studies reported next.

FIELD EXPERIMENTS 3A AND 3B: ONLINE GROCERY SHOPPING AND FITNESS CLUB ATTENDANCE

In addressing the aforementioned questions resultant to our lab studies, two field experiments were conducted: one for a behavior with weak personal norms (i.e., online grocery shopping in collaboration with a major online grocer) and one for a behavior with strong personal norms (i.e., exercising). Our target choices are supported by data from the pretest of 68 consumers reported in experiment 1 that showed personal norms to be weaker for online grocery shopping ($M = 5.0$) than for exercising ($M = 6.7$; $t = 5.0$, $p < .01$).

Experiment 3a: Online Grocery Shopping

In this experiment we utilized data obtained by Chandon, Morwitz, and Reinartz (2004) from a large prepost field experiment in collaboration with a leading French online grocer. In their study, 251 customers of the online grocer, chosen randomly from a cohort of customers, were contacted by telephone and answered three questions regarding their intentions to shop again with the company; another 140 consumers, randomly selected from the same cohort to serve as the control group, were not asked to predict their behavior (for a detailed description, see Chandon et al. 2004). The company provided information about the number of transactions (orders) during the 9 months before the time of the behavior prediction and for the 9 months following the time of the request. Analyzing total expenditures yielded the same results.

As expected, the correlation between the number of transactions before and after the time of the behavior prediction was higher in the behavior prediction group ($r = .61$) than in the control group ($r = .42$; $z = 2.5$, $p < .01$). To help gauge the magnitude of the interaction, we computed the average postintervention number of transactions for customers with low, medium, and high numbers of preintervention transactions. Behavior prediction increased the number of transactions among the top tier of customers by 15% (from 2.48 to 2.84 visits in the 9 months following the time of the intervention) but decreased the number of transactions in the medium tier by 24% (from 1.10 to 0.84 visits) and reduced the number of transactions in the bottom tier by 61% (from 0.10 to 0.04 visits), leading to the expected polarization effect.

Experiment 3b: Fitness Club Attendance

Experiment 3b was a replication of a field experiment conducted by Spangenberg et al. (2003) in collaboration with a large health and fitness facility in Montana. Behavior prediction was manipulated by adding a flyer to the monthly mailing containing the club newsletter and billing statement. To increase the likelihood that the health club members processed the advertising manipulation, drawings for $25 gift certificates at the club's café were advertised on the outside of the mailing envelope as well as next to the focal prediction in the newsletter itself. Participants in the control condition ($n = 589$) received a flyer with the words "Are you enjoying Spring?" Participants in the behavior prediction condition ($n = 590$), received a flyer with the words "Will you work out at the [name of club]?" People were

randomly assigned to conditions, and there were no significant differences across assignments regarding demographic variables.

Information on the number of visits to the health and fitness facility was obtained for 14 weeks before and after time of the newsletter mailing. Attendance was automatically collected when members swiped their membership cards at a turnstile entrance into the facility. Following Spangenberg et al. (2003), weekend visits were not counted because various athletic competitions and events are typically held on weekends, and members often enter the club on these days for reasons other than exercising (e.g., to change or pick up clothes).

As expected, the correlation between the number of visits before and after the mailing was lower in the behavior prediction group ($r = .80$) than in the control group ($r = .85$; $z = -2.3$, $p < .01$); see table 1. As with the grocery shopping experiment, we computed the mean postintervention number of visits for three equal-sized groups of club members categorized according to their prior number of visits. We found that behavior prediction decreased the number of visits for the top tier of most frequent customers by 10% (from 23.4 to 21.1 visits in the 2 weeks after the time of the intervention) but increased the number of visits for the medium tier of customers by 11% (from 4.7 to 5.2 visits) and increased the number of visits for the bottom tier of customers by 21% (from 0.9 to 1.1 visits).

Discussion

Overall, the two field experiments show that the effects of behavior prediction found in experiments 1 and 2 are robust enough to influence the association between past and future behavior over extended time periods (9 months in experiment 3a and 14 weeks in 3b) in natural settings. Furthermore, the effects of behavior prediction were in the expected direction, increasing the likelihood of behavior repetition for the behavior with weak personal norms (grocery shopping) and reducing it for the behavior with strong personal norms (exercising).

To compare the effects of behavior prediction for grocery shopping and exercising, we implemented a Games ANOVA using two factors, behavior prediction and behavior type, and tested their interaction. The main effect of behavior prediction was not statistically significant ($F(1, \infty) = 3.4$, $p = .07$) whereas the main effect of behavior type was significant ($F(1, \infty) = 76.6$, $p < .01$). More important, the interaction was statistically significant ($F(1, \infty) = 45.9$, $p < .01$). Although it is clearly impossible to compare the two experiments directly or to attribute these results entirely to differences in the strength of personal norms, the results are consistent with those of experiments 1 and 2 and, taken together, provide additional support for our hypotheses.

GENERAL DISCUSSION

The objective of this research was to examine how predictions and personal norms influence the likelihood that people will repeat past behavior. Our empirical studies provide converging evidence that supports the predictions derived from our framework. In experiment 1, we find that asking questions about a future behavior reinforces behavior repetition for behaviors with weak personal norms (i.e., reading books and watching the news) but weakens repetition for exercising, a behavior for which our participants held strong personal norms. We also show 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. After demonstrating that personal norms are more available in memory for exercising than for watching the news or reading books, experiment 2 directly tests the proposed explanation for this effect by priming either personal norms, past behavior, or unrelated concepts (in a control condition). Experiment 2 finds that behavior prediction increases behavior repetition for both exercising and news watching when past behavior is primed prior to a prediction request but that it decreases behavior repetition for the same behaviors when personal norms are primed. Finally, the two field experiments show that such effects hold even when using longer-term, unobtrusive measures of behavior in noisier settings. Taken together, the findings support the proposed framework and have implications for research as well as for public policy.

Implications for Future Research

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 results shed new light on the debate over the relative importance of past behavior and intentions in guiding future behavior (Ajzen 2002; Webb and Sheeran 2006; Wood and Neal 2007). If we agree that most behaviors are non-normative, studies investigating the relative importance of intentions and habits may be overestimating the true level of repeat behavior in the population because they are measuring habits among people whose intentions are also measured, and our results show that measuring intentions artificially increases habits in this case.

Our framework and findings allow us to reexamine prior empirical results and make predictions regarding the direction of bias that prediction may create in these studies. For example, Ji and Wood (2007) measured 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, then our results suggest that the actual strength of habits may be stronger than reported by these authors for fast food and may be weaker than reported for watching news and taking the bus.

Our findings also have implications for future research regarding the question-behavior effect. For example, it would be interesting to examine whether behavioral prediction would strengthen behavior repetition more among people who are less susceptible to interpersonal (i.e., normative) influence (Bearden, Netemeyer, and Teel 1989). It

would also be interesting to examine whether social norms, such as personal norms, can moderate the effects of prediction on behavior repetition. In fact, it would be particularly interesting to examine the effects of prediction on behavior repetition when personal and social norms conflict.

Although experiment 2 provides empirical evidence supporting the role of personal norm accessibility, it would be useful to examine whether differences in perceived diagnosticity of personal norms (or in their judged applicability) might also contribute to our results (Feldman and Lynch 1988; Higgins 1996). Even if strong personal norms are no more accessible than weaker ones, strong personal norms are likely to be perceived as being more appropriate than weaker ones for guiding future behavior. Hence the higher judged applicability of strongly held personal norms could be another reason why behavior prediction reduces behavior repetition when personal norms are strong.

Implications for Public Policy

Identifying interventions that reinforce socially beneficial behaviors and weaken socially harmful behaviors is important to societal welfare and public policy, particularly for habitual behaviors (such as the lack of exercise) which are difficult to change even when people have intentions to do so (Verplanken and Wood 2006; Webb and Sheeran 2006). It is therefore encouraging that a seemingly innocuous (and easily implemented) technique—asking questions regarding a future behavior—can lead to significant changes in exercising behavior. Prediction requests can be included in routine, auto-administered questionnaires and have been shown to work even in mass communication settings, where the targets do not actually report their prediction to another but instead are prompted by an advertisement to "predict to themselves" (Spangenberg et al. 2003).

Our finding that the effect's direction depends on one's personal norms and prior behavior indicates that care is warranted in applying our work here to policy-oriented measures aimed at improving society. When personal norms are weak, the effects of behavior prediction may be more uniformly beneficial from a social welfare point of view. This is because in this case, behavior prediction increases the chances that people repeat what they normally do—and hence presumably works for them—rather than follow what others are doing or the recommendation of the latest fad (Wansink, Payne, and Chandon 2007). 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 benefit those who engage in the behavior at higher or lower frequency levels. For example, it is probably good at a broader societal level that low exercisers exercise more and that people who exercise excessively exercise less. In other contexts, such as donating to charities, any positive effect of behavior prediction among low contributors may be more than offset by negative effects among high contributors, thereby reducing the overall level of contribution to the charity. In these contexts, asking questions will increase overall behavior if the behavior of most people in the population is below their personal norm, but it will reduce overall behavior if most people are above their personal norm.

Clearly, policy makers and others interested in influencing human behavior associated with strong personal norms should consider segmenting the market using measures of past behavior or closely related variables. Alternatively, our results suggest that policy makers concerned about the potentially detrimental effects of behavior prediction could prime either past behavior or personal norms to reach the desired effect regardless of the type of behavior.

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