Is There a Budget Fallacy? The Role of Savings Goals in the Prediction of Personal Spending

Johanna Peetz
Roger Buehler
Wilfrid Laurier University

The authors extend research and theory on self prediction into the realm of personal financial behavior. Four studies examined people's ability to predict their future personal spending and the findings supported the two main hypotheses. First, participants tended to underestimate their future spending. They predicted spending substantially less money in the coming week than they actually spent or than they remembered spending in the previous week. Second, the prediction bias stemmed from people's savings goals—defined as the general desire to save money or minimize future spending—at the time of prediction. Participants who reported (Studies 2 and 3) or were induced to experience (Study 4) a stronger savings goal predicted they would spend less money. However, savings goals were not related to actual spending and thus contributed to the bias in prediction.

Keywords: *prediction; optimism; spending; motivated reasoning; bias*

People's predictions about themselves guide many consequential decisions and behaviors, and thus considerable psychological research has explored people's successes and failures in predicting their future actions (for reviews, see Dunning, 2007; Ross & Buehler, 2001). We extend the existing research by studying self prediction within the realm of personal finance. In particular, we examine people's ability to predict their future spending accurately. The two main objectives are to assess the degree of accuracy or bias in personal spending predictions and to explore a motivational factor—the desire to minimize future spending—that may contribute to bias.

Bias in Spending Predictions

Although researchers have examined many determinants and consequences of spending behavior (e.g., contextual factors that influence spending habits, Furnham, 1999; attitudes toward money management, Kidwell, Brinberg, & Turrisi, 2003; materialism, Watson, 2003), surprisingly, they have not yet explored people's ability to predict their future personal spending. Personal spending predictions have widespread practical implications. Major life decisions (e.g., whether to have a child, when to retire) as well as everyday choices (e.g., where to buy lunch, how to spend the weekend) almost always involve a consideration of future expenses. In this domain prediction errors can be costly, resulting in choices that are later regretted or unwise financial decisions, and ultimately could contribute to increased stress and reduced well-being. For example, if people underestimate the amount they will spend in a future time period (e.g., next week or next month), this could lead them to commit to events or purchases they will be unable to afford or to acquire excessive debt. In sum, the ability to estimate one's future expenses accurately plays an important role in financial planning and adaptive decision making, and thus it is important to understand how and how well people predict future spending.

Given the paucity of research on spending predictions, our hypotheses were guided by research on prediction in other domains. The research indicates that self predictions are often inaccurate and, in many cases, tend to be overly optimistic (for reviews, see Armor & Taylor, 1998; Dunning, 2007; Ross & Buehler, 2001).

Authors' Note: The research was supported by a doctoral fellowship and research grant from the Social Sciences and Humanities Research Council of Canada. Please address correspondence to Johanna Peetz at the Psychology Department of Wilfrid Laurier University, 75 University Avenue West, Waterloo, ON, Canada N2L 3C5; e-mail: johanna.peetz@gmail.com.

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Of particular relevance, researchers have documented a phenomenon known as the "planning fallacy" (Kahneman & Tversky, 1979), wherein people underestimate the time they will spend on a future task, even though they are fully aware that similar tasks have taken longer in the past (for a review, see Buehler, Griffin, & Ross, 2002). For example, students who report that they typically completed their writing assignments about a day before the due date predicted they would complete an upcoming essay a week before it was due; but they finished the essay, as usual, about a day before the deadline. The tendency to underestimate completion times has been observed for a wide range of personal, academic, and work-related tasks (e.g., Buehler et al., 1994; Buehler & Griffin, 2003; Byram, 1997; Kruger & Evans, 2004; Taylor, Pham, Rivkin, & Armor, 1998). We now propose that a similar bias—a budget fallacy if you will—may exist for personal spending predictions. People may tend to predict that they will spend less money in the future than they actually spend or than they have spent in relevant previous circumstances.

Of course we cannot simply assume that people exhibit similar biases for predictions concerning time and money; judgments sometimes diverge quite markedly across the two domains (e.g., Soman, 2001; Zauberman & Lynch, 2005). Nevertheless, intuition and experience lead us to believe that people tend to underestimate future spending. For most individuals, it seems to be a common experience to see their funds depleted sooner than anticipated. Archival data suggest that families routinely overspend their earnings (e.g., nearly 50% of Canadian households spend more than their pretax income each year, *Statcan*, 2005). Also, research on credit card adoption and use suggests that individuals' monthly expenses typically exceed their expectations (Ausubel, 1991; Yang, Markoczy, & Qi, 2007). Yang et al. (2007) found that consumers are insensitive to credit card interest rates because they intend to pay off their outstanding balance each month, even though they carry such balances on a regular basis. Although these studies did not assess spending predictions, they imply indirectly that people routinely underestimate future expenses. The present research assessed spending predictions directly and explored a potential source of prediction bias—the goal to save money or minimize future spending.

The Role of Savings Goals

Research on the psychology of prediction has typically focused on cognitive processes underlying prediction bias (Dunning, 2007; Griffin, Dunning, & Ross, 1990; Kahneman & Tversky, 1979; Ross & Buehler, 2001). However in a recent review, Dunning (2007) proposed that variations in goals, although understudied in the literature to date, might be the key factor that leads people to be overly optimistic or pessimistic in their self predictions. Goals and predictions are of course distinct constructs: Whereas goals represent desired future states, predictions represent beliefs about what will actually transpire (Austin & Vancouver, 1996; Fishbach & Ferguson, 2007; Karniol & Ross, 1996). However, people's goals could often be an important determinant of their predictions. Consistent with this proposal, we chose to explore the role of people's goals as they generate spending predictions. We believe that in the realm of personal finance there is one overarching goal that is so pervasive that it warrants research attention. Arguably, most people prefer to minimize their expenses, save money, and keep their expenditures under control. We refer to this seemingly ubiquitous goal as a "savings goal" and suggest that it may fuel people's tendency to generate unrealistic predictions. In essence, then, we are proposing that people tend to underestimate how much they will spend because their preference or desire is to keep their future spending in check.

The idea that people's predictions may be biased by preferences and desires is grounded in theory. Variants of this idea have appeared in the literature on motivated reasoning (Kunda, 1990) and, more recently, the desirability bias hypothesis (Krizan & Windschitl, 2007). According to the motivated reasoning framework, many kinds of judgments are guided not only by accuracy goals (the desire to reach a correct conclusion) but also by directional goals (the desire to reach a particular conclusion). This is not to say that people simply choose to believe whatever they wish; their judgments are subject to reality constraints and so they will only draw a desired conclusion if it seems reasonable based on the available evidence. However, a salient directional goal often prompts individuals to process the relevant evidence selectively, in a manner that makes the desired conclusion seem reasonable. The desirability bias, wherein people generate predictions corresponding with their preferences, is thought to operate similarly, though it refers more specifically to people's predictions about future outcomes (Krizan & Windschitl, 2007). Consistent with this previous theorizing then, we propose that a strong directional goal (i.e., a savings goal) will result in biased predictions corresponding to that goal.

Such a finding would complement existing theory and address a number of limitations in the empirical evidence that were identified by Krizan and Windschitl (2007). First, although the idea of a desirability bias has been prevalent, very few studies have varied people's preferences experimentally in order to demonstrate a causal impact on prediction. Second, although motivated reasoning has been documented for many kinds of

judgments (e.g., ratings of one's traits and abilities, Kunda & Sanitioso, 1989; the persuasiveness of arguments, Kunda, 1987), the findings may not be applicable to predictions concerning specific behaviors. As Krizan and Windschitl (p. 96) noted, predictions are likely to elicit a higher level of accuracy motivation than other kinds of judgments that have been shown to be susceptible to motivated reasoning, because the predictor often knows that the accuracy of the prediction can soon be evaluated. Accuracy motivation tends to constrain judgmental bias (for reviews, see Kunda, 1990; Pittman, 1998). Thus, research is needed to determine whether motivated biases in judgment extend to predictions in particular. Third, the desirability bias in prediction has typically been studied for outcomes that are not under the predictor's control (e.g., sporting events, elections, and games of chance), and thus it is important to test whether the bias will generalize to more controllable, naturalistic outcomes.

An important feature of controllable outcomes is that people's goals can influence their actual attainments, both directly through an increased commitment to undertake the necessary actions (Fishbach & Ferguson, 2007; Locke & Latham, 2002) and indirectly through the process of generating corresponding plans and predictions (Armor & Taylor, 2003; Gollwitzer, 1999; Taylor et al., 1998). Thus, unlike uncontrollable outcomes (where there is a clear normative dictate that preferences should not influence expectations), it could be perfectly reasonable to generate predictions corresponding to one's goals. Whether the goals create a bias in prediction will depend upon their relative impact on prediction versus behavior. To the extent that a goal has a differential impact on predicted than actual outcomes, it will produce biased predictions.

We reasoned that savings goals are likely to have a substantially greater impact on predicted than on actual spending. It is relatively easy and straightforward to generate a prediction that corresponds with one's current savings goal—the prediction may be seen as a natural extension of one's goal—but it will often be much more difficult to translate the goal into behavior. Indeed, theorists have characterized people's attempts to manage their personal spending as a particularly challenging problem of self-control (Faber & Vohs, 2004; Rabinovich & Webley, 2007). Individuals in Western societies encounter a steady barrage of temptations and pressures to spend that are often difficult to resist. Also, because people have multiple goals at any point in time, the goals salient at prediction (e.g., to reduce spending) may later collide with other goals that demand increased spending (e.g., to take a vacation, provide opportunities for one's children, support a worthy cause). In light of the myriad challenges involved in controlling expenditures, it seems plausible that savings goals would tend to exert a greater impact on predicted than on actual spending.

A few previous studies buttress our theorizing by showing that people's motives and intentions can bias their predictions by exerting a stronger impact on predicted than on actual behavior (Buehler, Griffin, & MacDonald, 1997; Byram, 1997; Koehler & Poon, 2006). For example, Koehler and Poon (2006) demonstrated that strong intentions to perform desirable behaviors (e.g., donating blood, volunteering for research) can lead people to overestimate the likelihood that they will perform these acts. Participants tended to overweight the strength of their current intentions and underweight other situational or contextual factors that determined whether they would actually act on their intentions. Thus, it seems plausible that a similar pattern could emerge in the realm of personal spending, wherein people's savings goals exert a greater impact on predicted than on actual spending behavior.

The Present Research

A series of four studies examined people's ability to predict their future personal spending for an upcoming time period (e.g., the next week). The degree of accuracy versus bias in prediction was assessed by comparing predicted spending with subsequent reports of actual spending. Although there are various forms of prediction accuracy (e.g., correlational accuracy, prediction bias; Buehler et al., 1994; Epley & Dunning, 2006), we focused primarily on prediction bias, which is arguably most critical for real-world spending predictions. Even if people's predictions are correlated with their actual spending (i.e., correlational accuracy), a tendency to underestimate actual expenditures (i.e., prediction bias) would have serious ramifications. Thus, although we assessed both forms of accuracy, our main objective was to document and understand prediction bias.

We also assessed participants' recollections of previous spending in Studies 1 and 3. These measures not only provide an additional reference point for interpreting predictions, they also allow us to test a memory bias account that has been proposed for biased predictions of task duration (Roy, Christenfeld, & McKenzie, 2005) and might be applicable to biased predictions of spending. According to a memory bias account, people generate biased predictions because they base the predictions on biased memories of past experience. This account implies that predicted spending should be very similar to memories of previous spending. In contrast, our theoretical account implies that savings goals will motivate people to believe they can reduce their expenditures, and

thus they will predict spending less than they remember spending previously.

Study 1 tested whether participants underestimate future spending, and the next three studies explored the hypothesized role of savings goals. The studies introduced measures (Studies 2 and 3) and manipulations (Study 4) of people's savings goals and examined their relation to predicted and actual spending. There were two main hypotheses: First, people tend to underestimate the amount of money they will spend in a future time period. Second, this prediction bias is produced, in part, by people's savings goals at the time of prediction. Specifically, savings goals have a greater impact on predicted than on actual spending behavior, and thus contribute to biased spending predictions.

STUDY 1

This study provided an initial test of the hypothesis that people tend to underestimate, systematically and repeatedly, the amount of money they will spend in a future time period. Participants predicted the amount they would spend in the coming week and subsequently reported their actual spending.

Method

Participants. Participants were 31 students (24 female and 7 male) aged 18 to 24 (M = 21.22, SD = 1.48) recruited from undergraduate classes by means of e-mail announcements and offered $8 to complete two online questionnaires.[1]

Procedure. In the initial questionnaire, participants were first asked to predict their spending for the target week: "How much money do you think you will spend next week (i.e., the next seven days; all expenses included except things that occur only once a month such as rent)?" Then they were asked to recall their spending in the past week: "How much money did you spend last week (i.e., the past seven days; all expenses included except things that occur only once a month such as rent)?" In the second questionnaire, 1 week later, participants were asked to report how much money they actually spent during the target week and then to predict how much money they would spend in the upcoming week, using the same questions as in the initial session.

Results and Discussion

Participants predicted they would spend less money during the target week (M = 94.33, SD = 77.27) than they subsequently reported spending during that week (M = 121.67, SD = 195.11), $t(30) = 2.29$, $p < .05$, or than they recalled spending during the previous week (M = 126.03, SD = 117.70), $t(30) = 2.14$, $p < .05$. Reports of actual spending did not differ significantly across the two weeks, $t(30) = .62$, *ns*. Thus, participants underestimated their actual spending by about 23% and also predicted to spend 25% less than they had previously. At the end of the second session, participants again predicted they would spend less money in the upcoming week (M = 85.17, SD = 75.77) than they reported spending during either the target week, $t(30) = 2.59$, $p < .05$, or the week before that, $t(30) = 2.24$, $p < .05$, suggesting that they failed to learn from their experience in the study.

Despite the prediction bias observed at the mean level, participants' predicted spending for the target week was strongly correlated with the amount they reported spending that week, $r(29) = .61$, $p < .001$, and the amount they recalled spending the previous week, $r(29) = .75$, $p < .001$. Thus, participants who predicted spending more money, relative to other participants, also reported spending relatively large amounts of money. This pattern is consistent with previous evidence that there can be strong correlations between predicted and actual behavior (i.e., correlational accuracy) even when predictions are systematically biased (e.g., Buehler et al., 1994; Epley & Dunning, 2006; Gilovich, Medvec, & Savitsky, 2000).

The findings support the hypothesis that people are inclined to underestimate their future personal spending. Also, in contrast to a memory bias account, the bias in prediction did not appear to result from participants basing their predictions on biased recollections of previous spending. Participants' actual spending during the target week was, on average, nearly identical to the amount they recalled spending in a previous week. However, predicted spending was substantially lower than recalled spending, suggesting that participants were not inclined to base their predictions on memories of past experience. Our interpretation is that many participants hoped to reduce spending and thus generated predictions corresponding with their goals for the future rather than their previous experience. The next study examined the role of goals in spending predictions.

STUDY 2

Study 1 relied on retrospective reports of spending during the target week, which could have been prone to errors and bias in memory. Thus, one purpose of the present study was to replicate the evidence of a prediction bias using diary measures of actual spending that should be less susceptible to memory bias. The second purpose was to explore the relation between people's

goals to reduce future spending (i.e., savings goals) and their tendency to underestimate future spending. Thus, we assessed participants' savings goals, asked them to predict their spending for the upcoming week, and then tracked their actual spending with daily diary measures.

Method

Participants. The participants were 36 university students recruited for a study that examined people's attitudes and beliefs about money.[2] Participants were compensated with course credit and a chance to win a $50 gift card.

Procedure. Participants first completed a questionnaire concerning their general attitudes and beliefs toward spending and saving money. One item embedded in this questionnaire assessed savings goals: Participants rated their agreement with the statement that in general, saving money is very important for them (1 = *disagree entirely*, 10 = *agree entirely*). Participants also rated the extent to which they agreed that in general money is important, they save a big percentage of their available money, and they know exactly what they spend their money on (1 = *disagree entirely*, 10 = *agree entirely*). These supplementary items were included primarily to reduce the salience of the savings goal item. Following these ratings, participants were asked, as in Study 1, to predict how much money they would spend in the coming week.

Participants were then asked to complete a daily diary procedure beginning the day after the questionnaire session. They were given a package containing 14 daily recording sheets: 7 morning questionnaires that asked participants to predict as early in the day as possible how much they would spend that day (i.e., predicted daily spending) and 7 evening questionnaires that asked participants to report as late in the day as possible how much money they had actually spent that day (i.e., reported daily spending). In addition, a final questionnaire asked participants to recall how much they had spent over the entire week (i.e., reported weekly spending). Participants were instructed to complete each sheet and record the date and time it was completed, place it in the envelope provided, and avoid consulting or revising sheets they had already completed. After the target week, participants returned the envelope to a central location on campus and received their compensation.

Results and Discussion

Predicted and actual spending. Participants reported on average that they completed the morning questionnaires at 9:30 a.m. and the evening questionnaires at 11:30 p.m. Actual spending for the target week was assessed in two ways: by summing the reports of daily spending ($M = 150.75$, $SD = 78.54$) and by the report of overall spending at the end of the week ($M = 166.21$, $SD = 97.31$). These two measures were highly correlated, $r(32) = .79$, $p < .001$; did not differ significantly, $t(33) = 1.55$, *ns*; and yielded an identical pattern of results. For brevity we report only the analyses using the summed daily reports. Consistent with the primary hypothesis, participants predicted they would spend less money in the coming week ($M = 95.00$, $SD = 67.31$) than they actually spent ($M = 150.75$, $SD = 78.54$), $t(34) = 3.18$, $p < .01$. Thus, they underestimated their weekly spending by about 37%. Interestingly, unlike Study 1, predicted spending was not correlated significantly with actual spending, $r(33) = –.01$, *ns*.

To compare predicted and actual daily spending, we first created an index of each participant's predicted and actual daily spending by averaging across daily reports. A paired *t* test indicated that predicted daily spending ($M = 24.08$, $SD = 11.31$) did not differ significantly from actual daily spending ($M = 24.80$, $SD = 11.26$), $t(33) = .70$, *ns*. Further analyses that distinguished between weekends (i.e., Friday through Sunday) and weekdays (i.e., Monday through Thursday) indicated that participants did not underestimate their daily spending significantly either on weekends, $t(31) = 1.30$, *ns*, or on weekdays, $t(31) = .53$, *ns*.

The role of savings goals. A preliminary examination of the savings goal item indicated that in general, participants thought it was important to be saving money ($M = 7.19$, $SD = 2.04$, on a 10-point scale). Given that participants tended to underestimate their weekly spending, we performed a series of regression analyses to test our hypothesis that the magnitude of the prediction bias would be related to savings goals. We first regressed participants' predicted and actual weekly spending (in separate analyses) on their savings goals (see Figure 1). Consistent with the hypotheses, participants' saving goals were a significant predictor of their predicted spending, $\beta = –.37$, $t(33) = –2.30$, $p < .05$, but not of their actual spending, $\beta = –.15$, $t(34) = –.87$, *ns*. That is, participants who endorsed a savings goal more strongly predicted that they would spend less money in the coming week, but did not actually spend less money. Consequently, participants with a stronger savings goal tended to underestimate their future spending to a greater degree.[3]

We next performed a multiple regression analysis wherein predicted weekly spending was regressed first on actual spending (Step 1) and then also on savings goals (Step 2). Essentially, this is a multiple regression test of prediction bias, in which bias is defined as that part of the variance in spending predictions that is not related to

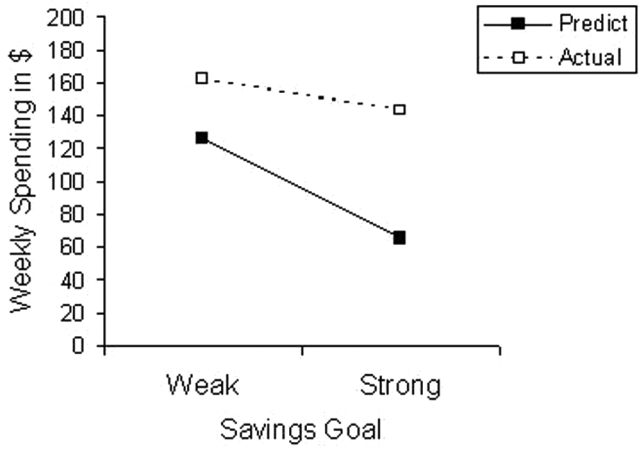

Figure 1 Study 2: Predicted and actual weekly spending for people who endorsed savings goal strongly (one *SD* above the mean) and weakly (one *SD* below the mean).

actual spending. Thus, the analysis provides a sensitive test of the hypothesis that savings goals are a significant determinant of prediction bias. Consistent with this hypothesis, after controlling for actual spending, participants' saving goals were still significantly related to their predictions, $\beta = -.38$, $t(32) = -2.31$, $p < .05$.

In sum, the results for weekly spending offer further support for the primary hypothesis that people tend to underestimate future personal spending. Participants predicted they would spend significantly less in the coming week than they subsequently reported spending. This finding replicates the prediction bias observed in Study 1 using a daily diary methodology that should be less susceptible to memory bias than previous measures. Notably, daily spending predictions did not exhibit the same bias found for weekly predictions (and were not correlated significantly with savings goal), $r(32) = -.08$, *ns*. Although speculative, this finding may be interpreted as an instance of people's tendency to generate less optimistic predictions for events and outcomes as they become closer in time (e.g., Gilovich, Kerr, & Medvec, 1993; Shepperd, Ouellette, & Fernandez, 1996). People may shift from optimism as events draw near because they are responding to new information that becomes available or to brace themselves for the possibility of an undesired outcome (for a review of possible mechanisms, see Carroll, Sweeny, & Shepperd, 2006). Alternatively, the absence of bias may be attributable to the recurrence of prediction and outcome feedback for the daily predictions. We offer these interpretations cautiously, however, as this was the only one of our studies that assessed the accuracy of daily spending predictions. Future research could explore more systematically whether, and why, daily predictions may be relatively free of bias.

The study also provided evidence for the hypothesized role of savings goals. Individuals who reported a stronger desire to save money were more inclined to underestimate their weekly spending, because savings goals were a stronger determinant of predicted than actual spending. Although the findings are correlational, they are consistent with the idea that savings goals exert a stronger impact on predicted than actual spending and thus contribute to prediction bias. However, a potential alternative explanation is that the results reflect experimental demands for consistent responding. We attempted to minimize experimental demand by embedding the measure of savings goals in a series of other measures and by assessing the goals at a very global level, without reference to the target time period. Nevertheless, participants who had just endorsed a goal to save money may have felt pressure, for the sake of consistency, to also predict they would actually spend less in the future. This consistency account also provides another explanation for why the daily spending predictions—which did not follow immediately after the measure of savings goals—were neither biased nor related to savings goals. Thus, the next study was designed to test the viability of this alternative account.

STUDY 3

To test the consistency account, we experimentally varied whether participants' spending predictions were separated in time from their endorsement of savings goals and examined the relation between goals and predictions. In an initial questionnaire, all participants rated their savings goals. In a second questionnaire, some participants rated their savings goals again and then predicted their spending for the upcoming week (immediate prediction condition) whereas others only predicted their spending (delayed prediction condition). Although we did not track participants' actual spending (because we were concerned primarily with the relation between goals and prediction), all participants did report their previous week's spending. According to the consistency account, the relation between savings goals and spending predictions should disappear, or be attenuated, for goals assessed separately from predictions.

Method

Participants. Participants were 88 psychology students (71 female, 17 male) ranging in age from 17 to 33 years ($M = 18.70$, $SD = 1.74$) who were compensated with course credit.

Procedure. In an online pretest questionnaire at the start of term, participants rated their savings goals as in

Study 2, by indicating their agreement with the statement that in general, saving money is very important to them (1 = *completely disagree*, 7 = *completely agree*). The measure was again embedded in a series of supplementary items concerning their general beliefs about money. After an interval of several days or weeks (M = 48.1 days, SD = 61.3) participants completed a second online questionnaire and were randomly assigned to one of two versions. In the immediate prediction condition, participants rated their savings goals again, predicted their spending for the upcoming week, and indicated how much they had spent in the past week; thus, they made spending predictions immediately after endorsing their savings goals. In the delayed prediction condition, participants predicted their spending for the upcoming week and indicated how much they spent in the past week; thus, their spending predictions were temporally removed from their endorsement of savings goals.

Results

Predicted and past spending. Participants predicted to spend less money during the upcoming week (M = 100.55, SD = 61.24) than they spent the past week (M = 115.67, SD = 71.49), $t(87) = 2.11$, $p = .04$. Thus, there was again no evidence that participants simply based their predictions on their memories of previous spending—they expected to reduce their spending by 13%. There were no significant differences across the prediction conditions in predicted spending, $F(1, 86) = .87$, *ns*, or past spending, $F(1, 86) = 1.59$, *ns*, suggesting that measuring goals immediately before spending predictions did not affect the predictions.

The role of savings goals. According to the consistency account, the relation between savings goals and spending predictions should disappear or be attenuated when the goals are assessed separately from the predictions. However, contrary to this hypothesis, we found that savings goals reported in the initial session were significantly correlated with spending predictions generated much later, $r(86) = -.38$, $p < .001$. Similarly, an analysis that regressed predicted spending on both past spending and savings goals reported at the initial session revealed that the savings goals explained variance in predicted spending, $\beta = -.28$, $t(86) = -3.06$, $p < .01$, over and above that explained by past spending, $\beta = .43$, $t(86) = 4.72$, $p < .001$.

Additional comparisons indicated that the strength of the correlation between goals and predictions did not depend on the timing of predictions. First, within the immediate prediction condition, the goal-prediction correlation was as strong for goals reported at the initial session, $r(42) = -.32$, $p < .05$, as for goals reported immediately prior to prediction, $r(42) = -.37$, $p < .05$, $z = .26$, *ns*. Second, between-subject comparisons also revealed that the goal-prediction correlation was as strong for goals reported at the initial session (delayed prediction condition: $r(42) = -.40$, $p < .01$) and goals reported right before prediction—immediate prediction condition: $r(42) = -.37$, $p < .05$, $z = .16$, *ns*. Third, when spending predictions were regressed on the most recent rating of savings goals (Time 1 goals in the delayed prediction condition and Time 2 goals in the immediate prediction condition), the prediction condition (0 = *delayed*, 1 = *immediate*), and the goals by condition interaction term, there was a significant effect of savings goals, $\beta = -.43$, $t(85) = -2.59$, $p < .05$, and no interaction effect, $\beta = .11$, $t(85) = .28$, *ns*. These results indicate that the relation between savings goals and predictions did not depend on predictions being measured immediately after the endorsement of goals.

The findings provide further evidence for the relation between people's savings goals and their optimistic spending predictions and, importantly, address the possible role of experimental demands for consistency. Contrary to a consistency account, participants' predictions did not differ whether their savings goals were assessed immediately before prediction or well in advance. Also, goals assessed well in advance of spending predictions were as strongly related to predictions as were goals assessed immediately before the predictions. Thus, it does not appear that either the prediction bias itself, or the role of savings goals in this bias, is simply an artifact of asking participants to make predictions shortly after stating their savings goals.

STUDY 4

The results so far are correlational and thus, although consistent with our hypotheses, do not establish a casual impact of goals on prediction. In the final study we attempted to establish a more direct causal link between participants' goals at the time of prediction and the bias in their predictions. The procedure was similar to that of Study 2 with the exception that we manipulated, rather than simply measured, the strength of participants' desire to save money and then examined the impact of this manipulation on both predicted and actual spending. Again we expected that participants with a stronger savings goal would be more inclined to underestimate their future spending, because this goal would exert a stronger impact on predicted than on actual spending.

Method

Participants. Participants were recruited from undergraduate psychology classes for a study that included an

initial questionnaire at the lab followed by a series of online questionnaires during the next week. A total of 43 undergraduate students completed the initial questionnaire, and 31 of these participants also completed follow-up questionnaires. The sample for all analyses consisted of the 31 participants (13 male and 18 female) who completed both the initial questionnaire and the final online questionnaire.

Procedure. In the initial questionnaire, participants first completed an exercise designed to vary the strength of their desire to save money. They were told that research indicates people are more successful in life if they either save money (strong savings goal condition) or spend without restraint (weak savings goal condition) and were presented with several reasons for this finding (see the appendix for the complete manipulation). As a manipulation check, participants then completed four items assessing their current endorsement of savings goals. They rated the extent to which they agreed that people who save money are more successful in life, that it is important to think twice before spending money, that they will try to save at least some money in the future, and that they will try hard not to waste money in the future (1 = *disagree completely*, 10 = *agree completely*). Following the manipulation check, participants predicted their spending for the upcoming week.

The follow-up measures were similar to those in Study 2 but presented in an online format. Following the initial questionnaire session, participants received an e-mail message containing a link to the online daily diary. They were instructed to sign on to a computer each morning to predict their daily spending and each evening to report their actual daily spending. At the end of the week, participants completed a final online questionnaire in which they reported how much they had spent during the target week. Finally, they predicted how much they would spend during the upcoming week (i.e., the 7 days after the final questionnaire).

Results and Discussion

Predicted and actual spending. Unlike Study 2, where each participant provided a complete diary, fully 12 participants failed to complete at least one daily report and several participants missed multiple entries (the mean number of entries was 9.3 out of 14). The increase in missing entries may reflect the switch to an online format wherein participants needed to access a computer to complete the measures. In any case, due to the incompleteness of the diaries, we did not analyze daily spending in this study, and we used the report of overall spending on the final questionnaire as the measure of actual spending for the target week. A preliminary comparison of predicted and actual spending for the target week revealed once again that participants predicted to spend less ($M = 104.19$, $SD = 54.65$) than they reported actually spending ($M = 166.81$, $SD = 117.20$), $t(30) = 3.36$, $p < .001$. Predicted and actual spending were, however, significantly correlated, $r(29) = .59$, $p < .001$.

The role of savings goals. We averaged across the four manipulation check items to create an index of participants' current savings goals ($\alpha = .63$). Participants reported a stronger endorsement of savings goals in the strong ($M = 8.11$, $SD = 1.20$) than in the weak savings goal condition ($M = 7.33$, $SD = .76$), $t(29) = 2.14$, $p < .05$, suggesting that the manipulation was successful in varying the strength of participants' current savings goals.

To test our hypotheses concerning the role of savings goals in prediction bias, the measures of predicted and actual spending were submitted to a 2 × 2 ANOVA with measure (predicted vs. actual) as the within-subject factor and savings goal (strong vs. weak) as the between-subject factor. A main effect of measure confirmed again that predicted spending was significantly lower than actual spending, $F(1, 29) = 14.13$, $p < .001$. More importantly, there was a significant interaction effect, $F(1, 29) = 4.20$, $p < .05$, and an examination of the relevant means and contrasts supported our hypothesis (see Figure 2). Participants predicted to spend less money in the strong ($M = 83.13$, $SD = 51.28$) than in the weak savings goal condition ($M = 126.67$, $SD = 50.34$), $t(29) = 2.38$, $p < .05$. However, actual spending did not differ significantly across the strong ($M = 178.19$, $SD = 138.98$) and weak savings goal conditions ($M = 154.67$, $SD = 91.84$), $t(29) = .55$, *ns*. Thus, as anticipated, savings goals had a greater impact on predicted than actual spending. Participants' tendency to underestimate their future spending was significant in the strong savings goal condition, $t(15) = 3.91$, $p < .001$, but not in the weak savings goal condition, $t(14) = 1.29$, *ns*.

To further examine the role of savings goals in prediction bias, we performed a multiple regression analysis as in Study 2, wherein predicted weekly spending was regressed first on actual spending (Step 1) and then also on the dummy coded (0 = *weak*, 1 = *strong*) savings goal condition (Step 2). Participants' spending predictions were determined partially by actual spending, $\beta = .59$, $t(29) = 3.92$, $p < .001$; however, after controlling for actual spending, the savings goals still significantly influenced predicted spending, $\beta = -.47$, $t(28) = 3.75$, $p < .001$. This result provides further evidence that savings goals contributed to prediction bias.

We also examined spending predictions for the week following the study. Predicted spending for the future week did not differ significantly across the strong ($M = 112.81$, $SD = 103.92$) and weak savings goal conditions

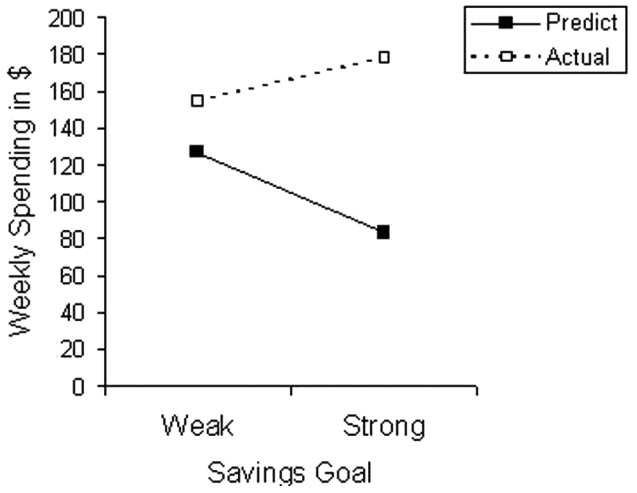

Figure 2 Study 4: Predicted and actual weekly spending by strong or weak savings goal condition.

(M = 125.20, SD = 83.14), $t(29) = .37$, *ns*, suggesting that the impact of the savings goal manipulation had diminished over the week of the study. Interestingly, participants predicted they would spend less money in the future week than they reported spending during the target week in both the strong, $t(15) = 3.01$, $p < .01$, and the weak savings goal condition, $t(14) = 2.10$, $p < .05$.

In sum, the study again demonstrated people's tendency to underestimate their future spending and provided experimental evidence that a goal to save money, rather than spend without restraint, is linked causally to the prediction bias. Participants predicted they would spend less money in the coming week when they were induced to experience a stronger savings goal. Because savings goals did not affect actual spending behavior, they produced a bias in prediction.

It is worth considering, once again, the possible role of demand characteristics. Given that the manipulation of savings goals occurred immediately prior to the manipulation checks and prediction measures, it is conceivable that the results reflected experimental demand. However, we are struck by the convergence of results across several studies, including one that separated the measurement of goals and predictions. This convergence of findings helps to allay potential concerns about experimental demand in a particular study and increases our confidence in the interpretation of the series of studies as a whole.

GENERAL DISCUSSION

The studies support our two main hypotheses concerning people's ability to predict their personal spending. First, people tended to underestimate their future personal spending, predicting that they would spend substantially less money in the upcoming week than they actually did. On average, participants underestimated their weekly expenditures by about 33%. Second, this tendency to underestimate future spending stemmed from savings goals—defined as the general desire to save money or minimize future spending—at the time of prediction. Participants who reported a stronger savings goal (Studies 2 and 3) or were induced experimentally to experience a stronger savings goal (Study 4) predicted they would spend less money. However, the savings goals were not related significantly to participants' actual spending, and thus contributed to prediction bias. Somewhat ironically, then, the very individuals who were more motivated to regulate their future personal spending were also most inclined to generate unrealistic spending predictions.

Bias in Spending Predictions

The primary finding, that people tend to underestimate their future spending, is perhaps unsurprising. Anecdotally, it seems that overspending is pervasive. However, to our knowledge, this is the first program of psychological research to systematically compare predicted and actual spending, and the bias that we documented has widespread implications. From a practical standpoint, the prediction bias is important because people base many life decisions on a consideration of future expenditures. Unrealistic expectations could be costly, resulting in unwise decisions or serious financial problems such as overspending, excessive debt, and the experience of financial stress.

From a theoretical standpoint, the finding extends literature on self prediction to an understudied domain. Notably, to the extent that people hope to minimize their spending, the bias could be seen as an instance of overly optimistic prediction and contribute to theoretical discussions about the prevalence and nature of optimistically biased prediction (Armor & Taylor, 1998; Carroll et al., 2006; Dunning, 2007). Previous findings indicate that the optimistic bias that characterizes many predictions is often reduced or eliminated in settings in which optimistic forecasts could be openly disconfirmed, such as when outcomes can be evaluated in the near future (e.g., Shepperd et al., 1996) and when performance tasks are real as opposed to hypothetical (e.g., Armor & Sackett, 2006). Some aspects of our findings are consistent with this pattern: The bias in spending predictions was smaller for daily than weekly predictions. However, the robust bias found for weekly spending predictions suggests that optimistic biases can emerge even in important, naturalistic domains in which prediction

outcomes can be readily verified. A challenge for future research will be to assess whether factors that moderate optimism in other domains (e.g., temporal proximity, perceived importance, accountability) also moderate the bias in predicted spending.

Another noteworthy feature of the results is that they provide a case where predictions concerning money exhibit similar patterns as predictions concerning time, and thus can contribute to an emerging literature exploring similarities and differences in judgments across these two domains (e.g., Okada & Hoch, 2004; Soman, 2001; Zauberman & Lynch, 2005). The present results were in fact remarkably similar to the findings of previous research on the planning fallacy (Buehler et al., 2002). Recall that a defining feature of the planning fallacy is that people underestimate the time they will spend on a future task even though they are aware that previous tasks have taken considerably longer. Similarly, our participants predicted they would spend less money than they actually did, as well as less money than they remembered spending previously. They appeared to dissociate their predictions from memories of relevant previous experience. Future research should explore the degree to which a "budget fallacy" and "planning fallacy" share common boundary conditions, underlying mechanisms, and psychological consequences.

More generally, future research will be needed to assess the scope and generality of the bias in spending predictions. The present studies were limited to predictions concerning an upcoming time period (e.g., the upcoming day or week), and thus it is still unknown whether predictions concerning discrete future events (e.g., a weekend excursion, a household project) would exhibit similar effects. Another important issue that should be explored further concerns the time frame for predictions. We found that prediction bias was more pronounced for weekly than daily predictions (Study 2) and offered potential interpretations of this pattern (e.g., people shift from optimism when they know that the actual outcomes will soon be verified). However, an interesting question that remains is whether predictions for a longer time frame (e.g., the coming month or year) would be more or less prone to bias. One could easily expect, for the reasons previously noted, that the magnitude of bias would continue to increase with longer time frames. On the other hand, the longer time frames may be less prone to bias because they include more fixed and recurring expenditures (e.g., monthly rent) that may be easy to predict. Also, people may be more inclined to base the predictions on past experiences. Notably in a preliminary investigation of this issue, we have found that prediction bias was less pronounced for monthly predictions than for weekly predictions. Conceivably, then, the weekly time frame is uniquely prone to bias because it is long enough to minimize concerns with verifiability but short enough to exclude easily predicted recurring expenses. This hypothesis awaits further research.

In addition, the university students sampled in our studies could differ in many relevant ways (e.g., socioeconomic status background, disposable income, parental support, leisure time, fixed expenses, personal characteristics) from other demographic groups. It is particularly noteworthy that participants' spending reports imply they spend approximately $6,000 to $8,000 per year. Although these amounts omit fixed monthly expenses such as rent, they seem quite low when we consider that the average annual income of single Canadians is about $28,800 (*Statcan*, 2008). This might suggest that participants were both underpredicting future expenses and underreporting actual expenses. Or perhaps university undergraduates have fewer expenses than others (e.g., if they have a prepaid residence and meal plan). Interestingly, some of the unique characteristics of university students could make them prone to prediction error. For example, undergraduates may have relatively little experience in budgeting, and given that they may have parental support, there may be little incentive to avoid overspending. On the other hand, given that students have relatively few expenses to keep in mind, one could expect them to have less difficulty predicting expenses than would individuals with more complex expenditures. These and other issues related to generalizability should be addressed in future research that includes more diverse samples.

The Role of Savings Goals

Our second main finding, that people's tendency to underestimate future spending stemmed from their savings goals, sheds light on a motivational determinant of prediction bias. The findings are generally consistent with previous theories suggesting that people's expectations are colored by their current preferences and desires (Krizan & Windschitl, 2007; Kunda, 1990). They also help to address several limitations in the relevant empirical evidence identified in a recent literature review (Krizan & Windschitl, 2007). Whereas previous research has typically been correlational, our studies included an experimental manipulation of savings goals at the time of prediction and thus support a causal interpretation. Whereas previous research has documented motivated reasoning processes within a wide variety of judgmental domains (Kunda, 1990; Kunda & Sanitioso, 1989), our studies focused specifically on behavioral predictions that, arguably, could be relatively high in accuracy constraints and thus relatively immune to bias. Finally, whereas research on the desirability bias has typically

examined people's predictions for outcomes that are beyond their control (Krizan & Windschitl, 2007), the present studies explored naturalistic, real-world outcomes that are under the control (at least partial control) of the forecaster.

Although we characterized savings goals as a factor that is motivational in nature, we do not wish to imply that the prediction bias was produced solely by motivational rather than cognitive processes. In addition to the effects of savings goals that we documented, there are likely to be numerous cognitive processes that could themselves produce unrealistic spending estimates. For example, people often generate predictions by constructing a scenario or mental simulation of how a relevant future event will unfold (Dunning, 2007; Kahneman & Tversky, 1979; Ross & Buehler, 2001), and this approach leaves them prone to optimism for several reasons: They generate only a single or very limited number of scenarios without appreciating the vast array of possibilities (e.g., Griffin et al., 1990; Newby-Clark, Ross, Buehler, Koehler, & Griffin, 2000), they focus on central features of an event without considering all the concrete details (e.g., Jørgenson, 2004; Kruger & Evans, 2002), and they focus narrowly on the target event itself and neglect other influential events (e.g., Wilson, Wheatley, Meyers, Gilbert, & Axsom, 2000). Such cognitive processes produce highly optimistic and confident predictions in many domains (Armor & Taylor, 1998; Buehler et al., 2002; Dunning, 2007) and could likewise result in a tendency to underestimate future spending.

Also, the goal construct itself—defined as a cognitive representation of desired end states—involves a blending of cognitive and motivational properties (Fishbach & Ferguson, 2007). Goals are imbued with motivational properties because they refer to desired end states, but they also include cognitive representation of the plans and actions needed to reach that end state. Thus, the effects of savings goals on prediction could be attributable to either motivational or cognitive properties. Furthermore, even when the effects of a goal on prediction are driven by motivation, they are likely mediated by cognitive mechanisms, such as the selective search and evaluation of evidence (Buehler et al., 1997; Krizan & Windschitl, 2007; Kunda, 1990). For example, Buehler et al. (1997) demonstrated that the impact of people's desire to finish tasks early on their predicted completion times was mediated by a selective focus on optimistic plans. In sum, people's savings goals may elicit a host of cognitive mechanisms (e.g., a selective focus on optimistic scenarios) that support a prediction of reduced spending. A challenge for future research will be to identify the specific cognitive mechanisms that mediate the impact of savings goals on prediction.

Evidence for the role of savings goals also suggests boundary conditions for the prediction bias: People might underestimate future spending only when a savings goal is strong at the time of prediction. In some circumstances, people may be relatively unconcerned about controlling their expenses, or might even prefer to believe they will spend freely (e.g., when contemplating a friend's birthday, a charity fundraiser, or a long awaited night on the town). Such goals might lead people to overestimate future spending. In addition, the impact of a strong savings goal could sometimes be diminished by other competing goals. For example, accuracy goals tend to constrain motivated reasoning (Buehler et al., 1997; Kunda, 1990), and thus increased concerns about accuracy might override the biasing effects of savings goals. Also, people sometimes alter their levels of optimism in a strategic manner (Armor, Massey, & Sackett, 2008; Armor & Taylor, 1998): Predictors may consider and weigh the perceived benefits (e.g., feelings of hope, motivation, and commitment) and costs (e.g., unwise decisions, regret, disappointment) of generating predictions congruent with their savings goal. Future research could explore this possibility by varying costs and rewards contingent upon the under- and overestimation of future spending.

Another interesting avenue for future research is to explore the incongruity between goals and spending behavior. We had hypothesized that people's goals would have less impact than they anticipated, in light of the considerable challenges involved in monitoring and controlling spending (Faber & Vohs, 2004; Rabinovich & Webley, 2007). Still it is intriguing that people's goals had no measurable impact on their spending. One possible explanation is that the goals were too abstract and lacked concrete plans for implementation (Armor & Taylor, 2003; Gollwitzer, 1999). Indeed, research on financial behavior has identified several concrete strategies that can help people to bring their spending more in line with their goals, including precommitment strategies (e.g., Shefrin & Thaler, 1992), setting detailed budgets and tracking expenses (e.g., Heath & Soll, 1996), and developing concrete plans for implementing financial goals (e.g., Rabinovich & Webley, 2007). However, note again that strategies designed to control behavior will not necessarily eliminate prediction bias if these strategies also influence prediction, and thus we encourage researchers to continue exploring the relative impact of factors on prediction and behavior. Such research will shed light on the complex interrelations between goals, predictions, and actual attainments and may help us to understand why people with the best motives may sometimes generate the worst financial predictions.

APPENDIX
SAVINGS GOAL MANIPULATION (STUDY 4)

Strong Savings Goal: Research indicates that people who are careful about their expenses and save rather than spend money are generally more successful in life. For example, they have more satisfying relationships and more interesting and fulfilling careers. These are some reasons for this phenomenon: (a) Financial security allows people to develop satisfying relationships, (b) people who save money do not have shallow friendships that are based on consumption, (c) people who save money are able to take opportunities when they arise (e.g., because they have the funds), and (d) saving money is just one indicator of a future-oriented approach to life, which is linked to career success.

Weak Savings Goal: Research indicates that people who are more generous with their expenses and spend rather than save money are generally more successful in life. For example, they have more satisfying relationships and more interesting and fulfilling careers. These are some reasons for this phenomenon: (a) Financial spontaneity allows people to develop satisfying relationships, (b) people who spend money do not have boring friendships based on convenience, (c) people who spend money are able to take opportunities when they arise (e.g., because they are not afraid to take chances), and (d) spending money is just one indicator of a spontaneous approach to life, which is linked to career success.

NOTES

1. In this study and subsequent studies, we omitted outliers (defined as participants with predicted or actual spending more than 3 *SD*s above or below the mean) from the samples that we report, as follows: 1 participant from Study 1, 2 participants from Study 2, and 2 participants from Study 4. After omitting outliers, the distributions of predicted and actual spending were approximately normal. The pattern of results remains unchanged if the outliers are included in analyses.

2. In this study and Study 4, degrees of freedom differ slightly across analyses due to missing data.

3. We did not have a priori hypotheses concerning the supplementary items included in Studies 2 and 3. Exploratory analyses indicated that they were not significantly correlated with spending predictions. Also, when predicted weekly spending was regressed simultaneously on the savings goal as well as the remaining supplementary measures, only the savings goal emerged as a significant predictor in both Study 2, $\beta = -.57$, $t(30) = -2.47$, $p < .05$, and Study 3, $\beta = -.40$, $t(81) = -3.52$, $p < .01$.

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