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The “Budget Fallacy”: Sources of Accuracy and Bias in Personal Spending Predictions

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THE "BUDGET FALLACY": SOURCES OF ACCURACY AND BIAS IN PERSONAL SPENDING PREDICTIONS

by

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Abstract

In everyday life, people frequently estimate their spending for projects and time periods. In the present research, I extend previous work on self prediction into the realm of personal financial behavior. Seven studies examine people's ability to predict their future personal spending and processes underlying spending predictions. I found that people tended to underestimate their future personal spending when predicting next week's spending (Studies 1 – 3), predicting that they would spend substantially less money during an upcoming week than they actually did. On average, participants underestimated their weekly expenditures by about 27%. However, spending predictions for concrete events appeared to be exempt from the optimistic bias: participants were remarkably accurate in predicting their spending across a wide variety of concrete future purchases such as Birthday shopping and other self-nominated events (Studies 5-7). One source of bias in weekly spending predictions is people's savings goals – defined as the general desire to save money or minimize future spending – at the time of prediction. Participants who reported stronger savings goals (Studies 2, 3, 6, and 7) or were induced experimentally to experience stronger savings goals (Study 4) predicted they would spend less money in a future week. Because savings goals were not related significantly to participants' actual spending they 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. Notably, savings goals were not correlated with predicted spending for a concrete future *event*. This disconnect between goals and prediction might contribute to the accuracy of event spending predictions. The final study revealed that weekly spending predictions could be de-biased by instructing forecasters to consider the individual spending events associated with the future week prior to making a

spending prediction. This cognitive strategy reduced reliance on savings goals during prediction and eliminated the prediction bias for weekly spending predictions. In conclusion, the accuracy of personal spending predictions depends on the prediction target and on existing goals associated with the prediction.

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People's predictions about themselves guide many important decisions and behaviors. Psychological researchers have explored the determinants of people's successes and failures in predicting their future actions and experiences (for reviews see Dunning, 2007; Johnson & Sherman, 1990; Ross & Buehler, 2001). In the present investigation, I extend the existing research on the psychology of self prediction by studying people's forecasts of their own behavior in the realm of personal finance. How and how well do people predict their future personal spending? Surprisingly, despite their practical importance, these questions have not yet been systematically addressed by psychological research. Although many determinants and consequences of spending and money management *behavior* have been examined (Furnham, 1984, 1999; Faber & Vohs, 2004, Vohs & Faber, 2007; Kidwell, Brinberg, & Turrisi, 2003; Lee & Ariely, 2006; Soman, 2001), little is known about people's ability to *predict* their own personal spending (even though people spend lots of time doing so).

Examining personal spending predictions is important because these predictions might have widespread practical and theoretical 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 in 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. Furthermore, from a methodological standpoint, the domain of personal spending provides a rich context for examining self-prediction processes. People have estimated future spending, implicitly or explicitly, on countless occasions, and this accumulation of personal experience enables researchers to search for recurrent patterns across time. Also, unlike many other self-relevant prediction domains, the criteria for evaluating accuracy and bias are relatively clear and unambiguous. Therefore, I believe there is practical and theoretical value in extending the study of self-prediction into this particular domain.

There may be several sources of accuracy and bias in personal spending predictions. In this examination I will focus primarily on motivational sources of bias: how much people wish to spend might bias their forecast of how much they will realistically spend in the desired direction. I will also examine different targets of prediction, in particular future spending during a time period (e.g., a week, a day) and future spending during a concrete event (e.g., a birthday).

Bias in Predictions

Given the paucity of research on spending predictions, my 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; Buehler, Griffin, & Ross, 2002). For example, students predict that they will perform better in their course examinations than they actually do (Gilovich, Kerr, & Medvec, 1993), and predict that they will receive more and better job offers after graduation than they really do (Hoch, 1985). In general, people tend to view themselves as being more likely than the next person to experience positive outcomes and less likely to experience negative

outcomes (Weinstein, 1980) and think of their future selves in very positive terms (Markus & Nurius, 1986).

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, & Peetz, 2010). For example, students, who reported 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, Griffin, & Ross, 1994; Buehler & Griffin, 2003; Byram, 1997; Kruger & Evans, 2004; Taylor, Pham, Rivkin, & Armor, 1998). The planning fallacy is robust and persists even if the planner is instructed to think pessimistically about a project (Buehler et al., 1994), and generalizes across culture and personality traits (e.g., Buehler & Griffin, 2003; Pychyl, Morin, & Salmon, 2000). I propose that a similar bias – a budget fallacy – 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 one 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., Hoorens, Remmers, & van de Riet, 1999; Soman, 2001; Zauberman & Lynch, 2005). Money has several characteristics that might make it easier to account for (e.g., it is a stable unperishable resource, it can be accumulated and stored) and people may also be more practiced in making judgments about money than time (Okada & Hoch, 2004; Soman, 2001).

There are also differences in the extent to which people expect to have spare time or spare money in the future (Zauberman & Lynch, 2005). In particular, people believe that they will be less busy and have more available spare time in the future than they have now, but do not commit the same forecasting error for their expected spare money in the future compared to now. This finding might suggest that forecasting spending is easier and less biased than forecasting time, and that people might not exhibit a budget fallacy similar to the planning fallacy.

Nevertheless, intuition and indirect evidence lead me to believe that people tend to underestimate future spending just like they underestimate completion times. For most individuals, it seems to be a common experience to see their funds depleted sooner than anticipated. Archival data suggests that families routinely overspend their earnings (e.g., nearly 50% of Canadian households spend more than their pre-tax 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. 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 series of studies explored spending predictions directly and systematically.

Research on Spending

Although research involving money and finances is a rich field shared by psychologists, economists and marketing researchers alike, research on personal spending predictions is surprisingly sparse. For example, research examining general attitudes toward money and spending includes mental accounting (Heath & Soll, 1996; Soman, 2001; Thaler, 1999),

shopping goals (Lee & Ariely, 2006), materialism (Watson, 2003), and mutual fund investment decisions (Moore, Kurtzberg, Fox, & Bazerman, 1999). This research is relevant to personal spending predictions only in a very broad way, in that it examines how people think about money. For example, people tend to think about their money within mental categories (e.g., money earmarked for entertainment, food, or clothing) and their spending decisions often do not reference previous spending in *other* categories (Heath & Soll, 1996). This particular tendency might make cross-category predictions, such as weekly or monthly spending predictions, quite difficult.

Some research has directly examined spending behavior. This research is more relevant to the study of personal spending predictions because past spending behavior may inform predictions and spending behavior is the reality against which prediction accuracy is measured. Spending behavior has been examined in research on impulse buying (Faber & Vohs, 2004, Vohs & Faber, 2003), donation behavior (Desmet & Feinberg, 2003; Lee, Piliavin, & Call, 1999; Sargeant, Ford, & West, 2006), and individual differences and contextual factors in spending habits (Furnham, 1984, 1999; Kidwell et al., 2003). For example, depleted self-regulatory resources led to higher incidence of impulse buying and also a greater willingness to pay significantly more for an item (Vohs & Faber, 2003). One common thread in research on spending behavior is that people's spending behavior is very resistant to change. Indeed, theorists have characterized people's attempts to manage their actual spending behavior as a particularly challenging problem of self-control (Faber & Vohs, 2004; Rabinovich & Webley, 2007).

More directly related to the idea of bias in spending predictions are existing accounts of faulty budgets. For example, the Sydney Opera house was estimated to cost $7 million but a

scaled down version opened at a total cost of $102 million (Hall, 1980). Forecasters of the '60s and '70s routinely underestimated the cost of most inventions that came their way, ranging from quatrosonic sound systems to space travel (Schnaars, 1989). The Canadian and the American federal government are known to suffer vast forecasting errors in their annual budgets (Auld, 1984; Kwan & Cotsomitis, 2006; Penner, 2001). In a review of 258 public transportation projects Flyvbjerg, Holm, and Buhl (2002) noted that 86% of these building projects ran over budget, many of them by considerable amounts. It is important to note, though, that these anecdotes primarily concern large project expenses predicted by a team of specialists from and for large organizations or governments. In such predictions, the predicting party might have different interests than accuracy. Low expense estimations, rather than accuracy may be desirable when preparing a pitch for a construction contract or when advocating a public program. Indeed, Flyvbjerg et al. (2002) suggest that building companies often deliberately underestimated costs to secure building contracts.

Taken together, empirical and archival research has investigated how people spend their money and how they think about their expenditures, and has even examined the budgeting of large organizations, but the psychology of *personal* spending predictions is still little known. I am aware of only one published study that examined personal spending predictions. Ülkümen, Thomas, and Morvitz (2008) examined the effect of ease of estimation and confidence on people's monthly and yearly spending predictions. They found that participants in a high confidence condition - who were told that people are generally accurate in their estimations – did not adjust their initial estimate and thus made lower spending predictions. In contrast, low confidence, plenty of cognitive resources, or the sense that the estimation was difficult was associated with upward adjustment of the initial spending prediction. In only one of four studies

Ülkümen et al. (2008) also assess actual spending to support their assumption that lower spending predictions tend to be less accurate. However, they did not compare actual monthly spending with the monthly prediction but instead tracked students' expenses for the duration of one week and extrapolated actual monthly spending by multiplying this expense report by four. Comparing different sums in this way is problematic. For example, there may be expenses that only occur once a month (e.g., rent, major expenses) which could inflate (if they happen during the tracked week) or suppress (if they don't happen during the tracked week) the extrapolated monthly expense. When making a prediction about monthly spending, people presumably think about their expenditures for an entire month, perhaps intending to spend early on and save their money at the end of the month. The behavior in just one week can not reflect such longer term plans. Despite this methodological problem, Ülkümen et al. (2008) report that people's monthly predictions were significantly smaller than the extrapolated actual monthly spending, supporting their initial assumption that low spending predictions tend to be less accurate. The present investigation offers a more comprehensive and thorough examination of personal spending predictions and their accuracy. It also examines in depth a motivational factor that may often contribute to prediction bias.

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, I chose to explore the role of people's goals as they generate spending predictions. In the realm of personal finance there is one overarching goal that I believe is so pervasive that it warrants research attention. Arguably, most people prefer to minimize their expenses, save money, and keep their expenditures under control. I 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, I am 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 (for review see Kunda, 1990) and, more recently, the desirability bias hypothesis (for review see 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 a specific case of motivated reasoning and 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, I propose that a strong directional goal (i.e., savings goals) 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 have been 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 (pp. 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 the present research will help determine whether motivated biases in judgment extend to self-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, personal 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 (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.

I expect 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. Recall that 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, to provide opportunities for one's children, to 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 this 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 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. 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. If this were the case, then savings goals could hurt spending prediction accuracy and lead to optimistic bias.

Different Forms of Bias in Predictions

There are several different ways to measure prediction accuracy, such as absolute error, systematic bias, and discrimination or correlational accuracy (Buehler et al., 1994; Epley & Dunning, 2006). Absolute error is characterized as both over- and underestimation of the actual value and can be measured by the absolute difference between predicted and actual spending. Bias is present when predictions tend to err in the same direction, and can be assessed by the signed difference score between predicted and actual values. Discrimination or correlational accuracy is indicated by the correlation between predicted and actual behavior. Correlational accuracy and systematic bias can be quite discrepant within any particular set of predictions (Buehler et al., 1994; Savitsky, Epley, & Gilovich, 2001; Gagné & Lydon, 2004) and are statistically independent. For example, a participant might predict spending little money compared with others in the sample and actually spend more than predicted (systematic bias) while still spending less than the rest of the sample (correlational accuracy).

The present studies focused primarily on the degree of systematic bias in prediction, as this outcome is arguably most critical for real world spending predictions. Even if people are good at predicting how much they spend in relation to other people (i.e., correlational accuracy) a tendency to underestimate actual expenses (i.e., systematic bias) could have serious practical

consequences. Thus, although I examine both forms of accuracy, the main thrust of the present research is to document and understand the hypothesized underestimation bias.

Spending Prediction Targets

In everyday life, people make a multitude of spending predictions about many different targets. For example, people might make personal spending predictions when withdrawing money from an ATM, when exchanging currency for a trip, or when deciding whether they can afford a tempting purchase or commit to an interesting event. Some of these predictions might be more accurate than others. In this examination I distinguish between spending predictions about concrete events (such as an upcoming birthday party or a planned shopping trip) and spending predictions about entire time periods (such as next week, next month or the upcoming vacation). In the present research I examine both types of spending predictions. In the first four studies I investigate weekly spending predictions, while the last three studies examine both event and weekly spending predictions concurrently.

Time prediction research has primarily examined completion predictions for events (see Buehler et al., 2010 for a review), such as the completion of tax returns, anagram tasks, and school assignments. Thus, the direct parallel to completion time forecasts would be spending forecasts for concrete events. A commonly used procedure in time prediction research is to assign participants an experimental task and ask them to generate predictions about it, in order to keep the task characteristics constant for all participants. I could not adopt this procedure because ethical concerns and financial resources did not allow me to assign participants a common spending task. Instead I asked participants to self-nominate a future event they expect to spend money on (a procedure adopted in Study 6 and 7) - however, these nominated spending events are potentially very different across participants. For these reasons, I chose time periods

as starting point for an investigation of spending predictions and examine concrete spending events and weeks concurrently in the latter part of this project. Time periods (such as weeks) are a convenient spending prediction target because they are similar in scope and temporal distance across all participants. In addition, spontaneous personal spending predictions might often target time periods, rather than events, because salaries, rent and other external markers of financial planning usually occur within the time period units.

I suggest that spending predictions will be generated differently depending on the target of the prediction, and that consequently, predictions might be more or less accurate. As will be discussed in the introduction to Study 5, events and time periods differ in several relevant aspects that might affect spending prediction accuracy.

Overview: The Present Research

A series of seven studies systematically investigated people's ability to predict their future personal spending. I examined spending predictions both for a future time period (the next week; Studies 1-4) and for concrete spending events (Studies 5-7). The degree of accuracy versus bias in prediction was assessed by comparing predicted spending with subsequent reports of actual spending.

I also assessed participants' recollections of previous spending in Studies 1 - 3. These measures not only provide an additional reference point for interpreting predictions, they also allowed me 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, the present

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 weekly spending. 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.

In Studies 5, 6, and 7, I examined spending for concrete events and weeks concurrently, either for self nominated spending events in the near future or for a specified spending event (a birthday). There are a number of reasons to expect that predictions might be generated differently for specific events spending than for time periods, and the introduction to Study 5 reviews potential differences in how people think about event and time period spending. Finally, Study 7 examines how considering individual spending events prior to prediction (event-type thinking) affects both weekly and event spending predictions.

In sum, the present investigation tests three 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, at least in part, by people's motivation to save money. Third, people's event predictions might differ in meaningful ways from their weekly time period 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)?" See Appendix A and B for a summary of prediction instructions across all studies. In the second questionnaire, one 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), $t(30) = 2.29$, $p < .05$, $d = .84$, or than they recalled spending during the previous week

(M = 126.03, SD = 117.70), $t(30) = 2.14$, $p < .05$, $d = .78$ (Table 1). Reports of actual spending did not differ significantly across the two weeks, $t(30) = .62$, *ns*, $d = .23$. 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, $t(30) = 2.59$, $p < .05$, $d = .95$, or the week before that, $t(30) = 2.24$, $p < .05$, $d = .82$, 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; 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. My 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 next 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 I 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*). See Appendix C for a copy of the money attitudes survey. 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. This overall prediction was used as a primary measure of predicted spending.

Participants were then asked to complete a daily diary procedure beginning the day after the questionnaire session. They were given a package containing fourteen daily recording sheets: seven 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 seven 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, to place it in the envelope provided, and to avoid consulting or revising sheets they had already completed. (See Appendix D for a copy of the diary surveys.) After the target week, participants returned the envelope to a central location on campus and received their compensation.

Results and Discussion

Predicted and actual weekly 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 ($M = 166.21$, $SD = 97.31$) (Table 2). These two measures were highly correlated, $r(32) = .79$, $p < .001$, did not differ significantly, $t(33) = .55$, $p = .29$, $d = .19$, and yielded an identical pattern of results. For brevity I report only the analyses using the summed daily reports of actual spending (See Table 2 and 4 for additional analyses using the follow up reports). I then compared

participants' overall prediction of their weekly spending with the summed daily report of actual spending. 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), $t(34) = 3.18, p < .01, d = 1.09$. Thus they underestimated their weekly spending by about 37%. Interestingly, unlike Study 1, predicted spending was not correlated significantly with actual spending, $r(33) = -.01, p = .48, d = -.003$.

Predicted and actual daily spending. To compare predicted and actual daily spending, I first created an index of each participant's predicted and actual daily spending by averaging across daily reports. I then compared participants' summed daily prediction with the summed daily report of actual spending. A paired t-test indicated that predicted daily spending (M = 168.56, SD = 79.17) did not differ significantly from actual daily spending (M =150.75, SD = 78.54), $t(33) = -.70, p = .24, d = -.24$. It is notable that the overall spending prediction for the week that was generated at the beginning of the week was biased, but the sum of the daily predicted spending was accurate, compared to actual spending for the week. 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, $t(31) = 1.30, p = .10, d = .47$, or on weekdays, $t(31) = .53, p = .30, d = .18$ (Table 3).

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, I performed a series of regression analyses to test our hypothesis that the magnitude of the prediction bias would be related to savings goals. I first regressed participants' predicted and

actual weekly spending (in separate analyses) on their savings goals. Consistent with the hypotheses, participants' saving goals were a significant predictor of their predicted spending, β = -.37, $t(33) = -2.30$, $p < .05$, $d = .80$, but not of their actual spending, $\beta = -.15$, $t(34) = -.87$, $p = .20$, $d = .30$. 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.[3] Consequently, participants with a stronger savings goal tended to underestimate their future spending to a greater degree.[4] This relation is depicted in Figure 1.

I 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 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, $\beta = -.38$, $t(32) = -2.31$, $p < .05$, $d = .80$.

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 saving goals, $r(32) = -.08$, $p = .33$). Although speculative, this finding may be interpreted as an instance of people's tendency to generate less optimistic predictions for outcomes as they become closer in time (e.g., Gilovich et al., 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. I offer these interpretations cautiously, however, as this was the only study that assessed the accuracy of daily spending predictions. It might even be that brief time periods are more concrete and more similar to spending events. This analysis might therefore foreshadow differences for concrete event spending predictions compared with weekly spending predictions.

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. I 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, I 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 I did not track participants' actual spending (because I was 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 pre-test 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 and Discussion

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), $t(87) = 2.11$, $p = .04$, $d = .45$ (Table 5). Thus, there was again no evidence that participants' predictions were directly aligned with their memories of previous spending (cf. Roy et al., 2005) - they expected to reduce their spending on average by 13%. There were no significant differences across conditions in predicted spending, $F(1, 86) = .87$, $p = .35$, or past spending, $F(1, 86) = 1.59$, $p = .21$, 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. Using the entire sample, I found that savings goals reported in the initial session were significantly correlated with spending predictions generated much later, $r(86) = -.38$, $p < .001$. This link was equally strong in both conditions, $z = .42$, $p = 67$. 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, $\beta = -.28$, $t(86) = -3.06$, $p < .01$, $d = .66$, over and above that explained by past spending, $\beta = .43$, $t(86) = 4.72$, $p < .001$, $d = 1.01$. Savings goals did not significantly predict the size of participants' *past week*'s spending in the immediate condition, $r(42) = -.20$, $p = .20$, or in the delayed condition, $r(42) = -.15$, $p = .33$.

Then, I examined the strength of the correlation between goals and predictions by condition, finding that this link 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, $r(42) = -.37, p < .05$, $z = .26, p = .37$ (Table 6). 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, $r(42) = -.37, p < .05$), $z = .16, p = .87$. Third, when spending predictions were regressed on the most recent rating of savings goals (T1 goals in the delayed prediction condition and T2 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 ($\beta = -.43$, $t(85) = -2.59, p < .05$, $d = .56$) and no interaction effect ($\beta = .11$, $t(85) = .28, p = .39$, $d = .06$). 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 the hypotheses, do not establish a casual impact of goals on prediction. In the next study I 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 I 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 I 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. This attrition did not differ by condition, $\chi^2(df = 1, N = 43) = .12, p = .73$. 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 Appendix E for a copy of the 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 seven 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, I did not analyze daily spending in this study, and I 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), $t(30) = 3.36$, $p < .001$, $d = 1.22$ (Table 7). Predicted and actual spending were, however, significantly correlated, $r(29) = .59$, $p < .001$.

The role of savings goals. I averaged across the four manipulation check items to create an index of participants' current savings goals ($\alpha = .63$). Participants reported a stronger endorsement of saving goals in the strong (M = 8.11, SD = 1.20) than in the weak savings goal condition (M = 7.33, SD = .76), $t(29) = 2.14$, $p < .05$, $d = .78$, 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 (spending measure: predicted vs. actual) by 2 (savings goal condition: strong vs. weak) ANOVA. 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 (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), $t(29) = 2.38$, $p < .05$, $d = .87$. 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), $t(29) = .55$, $p = .29$, $d = .20$. Thus, as anticipated, savings goals had a greater impact on predicted than on actual spending. Participants' tendency to underestimate their future spending was significant in the strong savings goal condition, $t(15) = 3.91$, $p < .001$, $d = 2.02$, but not in the weak savings goal condition, $t(14) = 1.29$, $p = .11$, $d = .69$.

To further examine the role of savings goals in prediction bias, I 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, $\beta = .59$, $t(29) = 3.92$, $p < .001$, $d = 1.46$; however, after controlling for actual spending the savings goals still significantly influenced predicted spending, $\beta = -.47$, $t(28) = 3.75$, $p < .001$, $d = 1.39$. This result provides further evidence that savings goals contributed to prediction bias.

I 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 ($M = 125.20$, $SD = 83.14$), $t(29) = .37$, $p = .36$, $d = .13$, 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, $t(15) = 2.58$, $p = .02$, $d = 1.33$, and the weak savings goal condition, $t(14) = 2.46$, $p = .03$, $d = 1.31$.

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 stronger savings goals. 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, I was struck by the convergence of results across several studies including, notably,

one which 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 confidence in the interpretation of the series of studies as a whole.

One important limitation of all the previous studies is that they examined spending predictions for time periods rather than specific events. I now turned to examine whether the bias observed in the first four studies would generalize to predictions about specific events.

Study 5

In everyday life, spending predictions may be made about time periods (when we estimate how much money we'll need in the next week) or about concrete purchases (when we estimate spending for one specific event, such as a birthday celebration or a shopping trip). The type of target might influence how spending predictions are generated and how accurate they are. Indeed, predictions for concrete events might be a naturalistic example of a situation in which spending predictions are relatively unbiased. The next three studies extend the investigation of spending predictions to concrete spending events, while comparing them to spending predictions for weekly time periods.

Thoughts about time periods and concrete events might differ on a number of relevant dimensions including the level construal (Liberman & Trope, 1998), and the level of complexity of the prediction task (Wood, Mento, & Locke, 1987). According to temporal construal theory (TCT; Liberman & Trope, 1998; Trope & Liberman, 2003), thoughts about the future can be construed at different levels of abstraction. High-level construals contain abstract features like the desirability of a future action whereas low-level or concrete construals contain more concrete, contextualized representations of the specific case at hand, like the feasibility of performing an action (Liberman & Trope, 1998). Arguably, people will adopt a relatively high-

level, abstract construal for weekly prediction targets, because a mental representation as general and abstract as an entire week is necessarily impoverished in details and can be thought of only abstractly. In contrast, people might be more likely to adopt a low-level, concrete construal for individual spending events because incidental, specific features of this event (e.g., how to get to the event, what the weather will be like) come to mind easily. Mental representations of entire weeks and individual events might also differ in complexity or the number of subcomponents that come to mind. Complex tasks involve more distinct acts, informational cues, and co-ordination across time than simple tasks (Wood, Mento, & Locke, 1987). An entire week is necessarily more complex than any given event during the week, because it includes several spending events. Thus, weekly spending predictions include more subcomponents than event spending predictions.

The different features of time periods and events might affect spending predictions in a number of ways. First, because it is cognitively easier to assess prediction targets with fewer subcomponents than complex targets (Kruger & Evans, 2004), spending predictions for individual events may be easier to generate than weekly spending predictions. This reasoning suggests that event spending predictions will be more accurate than weekly spending predictions, simply due to ease of processing. My findings in Study 2 might indirectly support this argument, because daily predictions – which should be simpler and contain fewer subcomponents – were more accurate than weekly predictions. Second, when considering concrete events, people's representations of these events might contain specific and peripheral information which remind participants of other goals that would require considerable spending in addition to, or in place of, their general goal to control their spending. For example, when predicting how much one will spend on gifts for a loved one, one might focus not only on one's general goal of saving money

but also on how to make the recipient of the gift happy. Being aware of goals that require spending money might increase prediction accuracy because it reduces the tendency to focus on a single, biasing goal (for similar processes see Shah, Friedman, & Kruglanski, 2002; for a review see Fishbach & Ferguson, 2007). Third, the influence of savings goals might be reduced when predicting concrete events rather than abstract time periods because feasibility concerns might be more on people's minds than desirability concerns (Liberman & Trope, 1998). Concrete low-construal events might elicit a focus on a variety of feasibility concerns, such as the need to spend money on groceries, or to take the bus to the mall because it is too cold to walk. In contrast, because time periods are relatively abstract, they might elicit a higher level construal that is focused on the desirability of controlling spending and saving money.

In sum, there is reason to expect that the cognitions underlying predictions about events and time periods should differ meaningfully. Concrete events might be more accurately forecasted than abstract and complex weekly spending. Additionally, the goal to minimize spending and save money might be more influential when people predict abstract spending targets rather than concrete, low level spending targets. Because savings goals have been shown to bias spending predictions (Studies 2-4), a reduction in this biasing influence should lead to greater prediction accuracy for concrete events than for time periods.

The next study provided an initial test of the hypothesis that people make relatively unbiased estimates of the amount of money they will spend for a future event. Participants predicted the amount they would spend for a specific upcoming event (a birthday celebration) or an upcoming week and subsequently reported their actual spending. Participants also reported how much they focused on financial goals when generating their prediction. I have proposed that people are more inclined to use financial goals as a basis for predicting their spending for a

future time period than for a discrete event. Thus I expected participants would report focusing more on financial goals to predict spending for the target week than for the target birthday, and that their goal focus would be linked to lower spending estimates for the week but not for the birthday.

Method

Participants. One-hundred and thirty-eight undergraduate students completed the initial questionnaire and all except four also completed the follow-up questionnaire, resulting in a final sample of 134 students (83 females) between 18 and 22 years old (*M* age = 18.60, *SD* = .81).

Procedure. Students were recruited from introductory psychology classes to complete two online questionnaires concerning their personal finances, and participated in one of two prediction target groups: They were asked to predict either their spending for the upcoming week or their spending for an upcoming birthday celebration. Participants in the week target group were asked to predict as accurately as possible their spending for the coming 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)?" Participants in the birthday target group were first asked to nominate a person they knew with a birthday in the next two months, to indicate their relationship with the person, and to list the person's initials and birth date (Appendix F). Participants nominated friends (n = 43), family members (n = 14), romantic partners (n = 5), and casual acquaintances (n = 3). Participants were then asked to predict as accurately as possible how much money they would spend for the birthday celebration: "Please estimate, to the best of your ability, how much money you will spend on the birthday of (initial). Please include all costs of the celebration (e.g. transportation cost, gifts, drinks)." Next, to assess their focus on financial goals, participants were asked to rate the extent to which they had

thought about their goals and intentions concerning future expenses (1 = *Not at All*, 7 = *Very Much*) when making their predictions. Participants in the birthday target group completed an additional item that asked them to rate the extent to which they had thought about their feelings toward the birthday celebrant (1 = *Not at All*, 7 = *Very Much*).

A second online questionnaire was emailed to participants the day following the target week (i.e., 8 days after the first questionnaire) or the day following the nominated birthday (M = 25.36 days after the first questionnaire, SD = 17.72). Participants were asked to report how much money they actually spent for the target week or target birthday using the same instructions as in the initial questionnaire.

Results

Predicted and actual spending. The measures of predicted and actual spending were submitted to a 2 (spending measure: predicted vs. actual) by 2 (prediction target: week vs. birthday) ANOVA. A main effect of spending measure revealed that predicted spending was significantly lower than actual spending, $F(1, 132) = 7.84, p < .01$. A main effect of the prediction target indicated, not surprisingly, that spending was higher for an entire week than for a birthday celebration, $F(1, 132) = 56.64, p < .001$ (Table 8). More importantly, these effects were qualified by a significant spending measure by target interaction, $F(1, 132) = 13.53, p < .001$. Participants predicted to spend less in an upcoming week (M = 130.22, SD = 105.27) than they actually spent during that week (M = 173.50, SD = 105.81), $t(68) = 3.59, p = .001, d = .41$, whereas their predicted spending for the birthday celebration (M = 59.69, SD = 50.15) did not differ from their actual birthday spending (M = 53.82, SD = 45.00), $t(64) = -.16, p = .25, d = -.12$. Predicted and actual spending were significantly correlated for the target week, $r(63) = .64, p < .001$, and the birthday celebration, $r(63) = .64, p < .001$.

Focus on goals. I next examined participants' reports of the extent to which they focused on their financial goals to generate their predictions. Participants reported that they focused more on goals to predict spending for the week ($M = 4.08$, $SD = 2.11$) than for the birthday celebration ($M = 2.54$, $SD = 1.69$), $t(136) = 4.69$, $p < .001$, $d = .80$. In addition, correlational analyses indicated that participants who focused more on goals predicted to spend less money for the target week, $r(71) = -.34$, $p < .01$, but not for the birthday celebration, $r(63) = .03$, $p = .82$. These correlations differed significantly, $z = 2.17$, $p = .03$. The focus on goals at the time of prediction was not correlated with actual spending for either the target week, $r(71) = -.02$, $p = .85$, or the birthday celebration, $r(63) = -.06$, $p = .66$.

I next performed a multiple regression analysis (separately for each spending target) wherein predicted spending was regressed first on actual spending (step 1) and then also on the focus on goals (step 2), to test whether the focus on goals was linked to prediction *bias*. The regression for the target week indicated that, after controlling for actual spending, the focus on goals was still related to spending predictions, $\beta = -.33$, $t(66) = -3.47$, $p < .01$, $d = -.85$. For the birthday target, in contrast, the focus on goals remained unrelated to spending predictions after controlling for actual spending, $\beta = .01$, $t(62) = .05$, $p = .96$, $d = .01$. Notably, an additional analysis that regressed predicted spending (controlling for actual spending) on the spending target (0 = birthday, 1 = week), the focus on goals, and their interaction revealed a significant interaction effect, $\beta = .46$, $t(129) = 2.66$, $p = .01$, $d = .47$. This finding provides further evidence that the link between focusing on goals and prediction bias differed depending on the target of prediction.

Recall that participants in the birthday target group also reported the extent to which they focused on their feelings for the birthday celebrant. These participants reported focusing more

strongly on their feelings for the birthday celebrant ($M = 5.32$, $SD = 1.58$) than on their savings goals ($M = 2.54$, $SD = 1.69$), $t(64) = 9.08$, $p < .001$, $d = 1.67$. Moreover, the reported focus on feelings was correlated positively with predicted spending: People who focused more on their feelings predicted to spend more on the birthday celebration, $r(63) = .44$, $p < 00$. The focus on feelings was also correlated positively with actual spending, $r(63) = .46$, $p < .001$. Consequently, an analysis that regressed predicted spending on the focus on feelings (controlling for actual spending) did not reveal a significant link between focus on feelings and prediction bias, $\beta = .18$, $t(62) = 1.66$, $p = .10$. In other words, focus on feelings for the birthday celebrant influenced predicted and actual spending equally and thus did not produce bias.

Discussion

Consistent with the hypotheses, participants exhibited an underestimation bias for weekly spending predictions (as in Studies 1-4) but did not give biased estimates of how much they would spend for a specific upcoming event. In addition, participants reported focusing more on their financial goals to predict their spending for a week than to predict their spending for a discrete event. The tendency to focus on goals was also linked to lower (and thus more biased) spending estimates for the upcoming week but not for an upcoming event. The findings are generally consistent with the previous evidence that people underestimate their spending for future time periods because their goals and intentions to minimize future spending (i.e., savings goals) have a greater impact on prediction than on actual behavior. However the findings suggest that the biasing effect of savings goals may not be applicable to predictions for discrete future events.

It is important to note, however, that the target event in the present study (i.e., a birthday celebration) might be one for which people are particularly unlikely to consider savings goals,

because birthday gifts might be perceived as expression of regard and liking for another person. Indeed for birthday celebrations people might be motivated to believe they will spend money freely and generously. Thus it is important to test the generalizability of the findings to a wider range of discrete target events, including events where there could be more motivation to minimize spending. It is also worth noting that, unlike the previous studies, the present study did not measure people's savings goals directly (indeed, participants financial goals could have included spending money rather than saving money) and examine how these goals related to prediction bias. Instead participants provided self reports of how much they had focused, broadly, on financial goals, and this focus did not necessarily involve a goal to reduce or minimize their expenditures.

Study 6

This study provided another test of the hypothesis that people tend to make relatively unbiased estimates of the amount of money they will spend for a future event compared to estimates of spending for a future time period. Participants were again asked to predict spending for either a specific event or for the next week. To ensure that the study included a wide range of target events, the participants themselves nominated events that would be occurring within the next week and then predicted spending for those events. Also, importantly, I recruited a community sample for this study rather than a student sample, to test whether the effects generalize to a more sample including different occupations. Study 6 also examined the role of savings goals in predictions more directly by measuring participants' pre-existing savings goals at the beginning of the study, and then examining the link between these savings goals and prediction (As in Studies 2-4). This procedure allowed me to test whether there is a differential relation between savings goals and prediction as a function of the prediction target.

Method

Participants. The sample consisted of 61 participants (48 female) between 18 and 58 years (*M* age = 34.23 years, *SD* = 10.63). Participants were recruited through online research sites and snowball recruiting techniques, and were compensated with an entry in a lottery for $100. The majority of participants reported working in an office setting (n = 22), and other occupations included nurses, police officers, programmers, students, social workers, and stay-at-home parents.

Procedure. Participants completed two online questionnaires. They first completed a questionnaire concerning their general attitudes and beliefs toward spending and saving money. Embedded in this questionnaire was a single item used to assess savings goals as in Studies 2-4: Participants rated their agreement with the statement that, in general, saving money was important for them (1 = *Disagree Completely*, 7 = *Agree Completely*). Participants also rated the extent to which they agreed that: in general money was important, they often thought about how to spend their money, and they knew exactly what they spend their money on. As in the previous studies, these supplementary items were included primarily to reduce the salience of the savings goal item. Next participants were randomly assigned to the event or the week prediction target. For the week target, participants were asked to predict their spending for the next 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)?" For the event target, participants were first asked to nominate and briefly describe an event that would occur in the next 7 days and would involve spending money (see Appendix G). Participants nominated target events such as shopping trips, (n = 17), movies or shows (n = 9), birthday celebrations (n = 7), and expenses related to driving (n = 4). Participants were then asked predict their spending for

the event ("Include all expenses associated with this event, those that you need to buy before the event starts, and those you need to buy during the event").

Immediately after making their prediction, participants were asked to describe their thoughts leading up to the prediction. Two research assistants coded the open ended responses for whether participants had spontaneously referred to a savings goal (i.e., a desire to reduce or minimize their spending). Examples included: "I need to watch where I spend every penny"; "I try to set a weekly expense limit". The responses were also coded for whether participants mentioned concrete purchase items (e.g., "I need to buy shoes for a wedding") rather than discussing their expenses at a more abstract level. Initial inter-rater agreement was 80% for savings goals and 87% for concrete items, and disagreements were resolved by discussion.

In the second questionnaire, one week later, participants were asked to report how much money they actually spent for the target week or the target event, using the same instructions as in the first questionnaire.

Results

Predicted and actual spending. The measures of predicted and actual spending were submitted to a 2(spending measure: predicted vs. actual) by 2(spending target: week vs. event) ANOVA.[5] A main effect of the spending target indicated that spending was higher for the week than for the single event, $F(1, 59) = 6.23$, $p = .02$ (Table 9). A main effect of spending measure indicated that predicted spending was significantly lower than actual spending, $F(1, 59) = 3.89$, $p = .05$. More importantly, the analysis again revealed a spending target by measure interaction, $F(1, 59) = 5.56$, $p = .02$. This interaction indicates that, consistent with the hypotheses, participants underestimated their actual spending for the week but not for a single event. Participants predicted to spend \$202.94 ($SD = 188.89$) in the next week, but actually spent \$285.58 ($SD = 233.00$), $t(31) = -2.46$, $p = .02$, $d = -.30$. In contrast, participants predicted to spend

$118.91 ($SD$ = 180.54) for an individual event, and actually spent $113.31 ($SD$ = 157.41), $t(28)$ = .49, p = .63, d = .03.

The role of saving goals. A preliminary examination of the savings goals rating item indicated that, in general, participants thought it was important to be saving money (M = 5.46, SD = 1.72, on a 7-point scale), and their rated agreement with the savings goals item did not differ across spending target conditions, $t(59)$ = .25, p = .80, d = .07. Correlational analyses were then performed (separately for each target group) to examine the relation between participants' rated savings goals and spending predictions (Table 10). For the target week, as hypothesized, saving goals were correlated negatively with predicted spending, $r(30)$ = -.44, p = .01. That is, participants who endorsed a savings goal more strongly predicted to spend less money. For the target event, saving goals were not significantly correlated with predicted spending, $r(27)$ = -.15, p = .42. Rated savings goals were not correlated significantly with actual spending for the target event, $r(27)$ = -.08, p = .67. However, savings goals were (marginally) related to actual weekly spending, $r(30)$ = -.33, p = .07.

To examine the role of savings goals in prediction bias, I next performed a multiple regression analysis as in Study 2, wherein predicted spending was regressed first on actual spending (step 1) and then also on savings goals (step 2). In this study I also controlled for the date of the session because data collection extended over a long period of time. For the target week, spending predictions were related to actual spending, β = .71, $t(28)$ = 6.10, p < .001, d = 2.31; however, even after controlling for actual spending the predictions were still linked to savings goals, β = -.23, $t(28)$ = -1.95, p = .06, d = -.74. Therefore, although this study was the only instance across all studies in which savings goals were related to actual spending as well as predicted spending, the underestimation bias was still larger among those with high savings goals

than among those with low savings goals. For a target event, in contrast, spending predictions were related only to actual spending, $\beta = .93$, $t(25) = 13.94$, $p < .001$, $d = 5.58$, and not to savings goals, $\beta = -.07$, $t(25) = -1.12$, $p = .28$, $d = -.45$. This pattern suggests that individuals with stronger savings goals were more inclined to underestimate their spending for an upcoming week but not for a single, concrete event (see Figure 3).

Notably, an additional analysis that regressed predicted spending on the spending target (0 = birthday, 1 = week), savings goals, and their interaction term, controlling for actual spending, did not reveal a significant interaction effect. The study might be underpowered to detect such an effect, yet caution is warranted in concluding that the link between savings goals and prediction bias differed for weeks vs. events. Nevertheless, the overall pattern of results is similar to that of Study 5, and consistent with the proposal that savings goals contribute to an underestimation bias for predictions concerning an upcoming week but not for predictions concerning a single, concrete event.

Coding of open-ended responses. The open-ended thought coding revealed little focus on savings goals overall: Only 10 people mentioned savings goals. Of these, one participant (3%) was in the event condition and 9 participants (28%) were in the week condition, χ^2 ($df = 1$, $N = 61$) = 6.76, $p = .009$. Furthermore, those participants who predicted spending for an event were more likely to mention concrete items ($n = 19$, 66%) than participants predicting spending for the entire week ($n = 10$, 35%), χ^2 ($df = 1$, $N = 61$) = 5.90, $p = .02$. Exploratory analyses also revealed that among the subset of participants who mentioned concrete purchases in the open ended thought listing for their weekly prediction, savings goals did not correlate significantly with predicted spending, $r(9) = -.01$, $p = .97$, and did not determine prediction bias, $\beta = .01$, $t(7) = .03$, $p = .98$, respectively. In contrast, for those who did not mention concrete items, savings goals

correlated strongly with predicted spending, $r(19) = .59$, $p = .01$, and determined prediction bias, $\beta = -.23$, $t(17) = -1.76$, $p = .09$.

Discussion

Consistent with the hypothesis, this study again found that spending predictions for an upcoming week were biased whereas predictions for concrete future events were not. The bias in weekly spending predictions replicates previous findings, and is particularly notable because this was the first study to examine spending predictions in a community based sample compared to the student samples examined previously. It appears that even individuals with more life-experience and a wider scope of monetary resources and responsibilities tend to underestimate their future weekly spending, just like undergraduate students (Studies 1- 5; Ülkümen et al., 2008). In addition, the absence of bias for event spending predictions extends the findings of Study 5 to a much broader range of target events.

The study also provided additional support for the hypotheses concerning the role of savings goals in prediction bias. Participants' tendency to underestimate their expenses for a future week was related to their pre-existing savings goals, as in Studies 2-4, but savings goals were not a significant determinant of predictions for discrete events. This pattern replicates the findings of Study 5 and enhances the convergent validity of the findings by using an alternative methodological approach. Whereas participants in Study 5 reported how much they focused on financial goals during prediction, participants in this study reported their general savings goals prior to prediction. The present study showed that savings goals assessed prior to prediction are linked to predictions for time periods but not for events. This pattern is consistent with the proposal that people place more weight on their savings goals – and thus become more prone to a desirability bias – when predicting spending for time periods than when predicting spending for

future events. Notably, this study also showed a marginal association between savings goals and actual spending for those predicting their weekly spending. This association might be due to the wider range in income in this community sample than in the previous student samples. For example, low SES participants might be more motivated to save than high SES participants and they might also be more restricted in how much they can spend compared to high SES participants. It may seem surprising that participants did not mention savings goals more often in the open ended responses. One reason for this is that participants did not write much overall, in fact many claimed they did not know how they arrived at their prediction. There were no other consistent themes apart from savings goals that were mentioned. It is also important to note that a substantial proportion of participants in the weekly condition did mentioned savings goals (about 1 in 3). This proportion was much higher than the proportion of people mentioning savings goals in the event condition, which is consistent with my theorizing.

Study 7

In the next and final study I sought to address a number of potential procedural concerns with the previous studies. First, to enhance the convergent validity of our findings relating goals and predictions, I obtained both participants' self-reports of their focus on financial goals (as in Study 5), and I also assessed their pre-existing savings goals (as in Study 2, 3, and 6). Second, participants' savings goals were measured well in advance of their spending predictions (as in Study 3), to rule out the possibility of demand characteristics due to measuring goals and predictions in close temporal proximity. Third, I obtained reports of actual spending using more proximal self-report measures that should be less susceptible to memory bias: Weekly spending was assessed through daily diaries and event spending was assessed the day after the event (rather than at the end of 7 days as in Study 6).

The main and central objective of this study was to introduce an intervention that has potential to attenuate the underestimation bias for weekly spending predictions. Recall that I have proposed, and found, that spending predictions for discrete events should be less prone to the desirability bias that characterizes predictions for future time periods. Thus, it seems plausible that asking forecasters to break down a future time period into a series of discrete, individual events might help to eliminate or attenuate prediction bias. To test this hypothesis, I instructed some participants to generate a list of the concrete expenses they will incur in the coming week before predicting their overall spending for the week.

I expected that this procedure would focus people's attention on the concrete events in their lives that would require them to spend money, and thereby detract from a tendency to base predictions on financial goals and desires that may otherwise be salient at the time of prediction. Thus I hypothesized that, for weekly predictions, the manipulation would attenuate the underestimation bias because it would reduce people's reliance on savings goals. For event predictions, in contrast, I did not expect this effect. The discrete spending events that I examine are already concrete and specific – that is they are already relatively "unpacked". Also, our previous studies imply that, even when left to their own devices, people place little weight on their savings goals to predict event spending. Thus I did not expect any further reduction in predicted spending or reliance on savings goals when target events were broken down into more specific components.

Unpacking Procedures in the Literature

Relevant to my proposed accuracy intervention, there is a larger literature discussing the benefits of considering task components prior to judgments about the task. Support theory (Tversky & Koehler, 1994) suggests that considering subcategories (rather than only a

superordinate category) can influence the perceived probability of an event: for example, if "death due to natural causes" is unpacked into subcomponents ("death due to heart disease", "death due to cancer", etc), the subjective probability of the event "death due to natural causes" increases. The implications of support theory are not limited to judgments of probability; considering an event's subcomponents might change people's perception of the event in various ways. In decision analysis research, a similar technique called decomposition has been shown to improve fact estimation accuracy (Armstrong et al., 1975; Connolly & Dean, 1997; MacGregor & Lichtenstein, 1991; Kleinmuntz, 1990). Decomposition techniques prompt the forecaster to make many small, simple judgments which are then mathematically integrated to arrive at a larger complex judgment. A related approach, segmentation of individual task components, has been applied to project completion time forecasts, with mixed results (Byram, 1997; Forsyth & Burt, 2008). Considering three individual components of a computer assembly task did not reduce the optimistic time prediction bias (Byram, 1997) whereas segmenting a multi-component office-work task (proofread, order documents, deliver letters) into its six components prior to prediction did eliminate optimistic bias in completion time prediction (Forsyth & Burt, 2008). Notably, these techniques require components to be broken down in advance rather than allowing participants to self-generate subcomponents -- a procedure that would be unpractical for spending forecasts because purchases differ widely between people and there is no one correct solution. Therefore, a similar technique labeled *unpacking* (Kruger & Evans, 2004) might most resemble the procedure of considering individual, personalized events prior to a week spending prediction.

The unpacking procedure has been introduced in the domain of time predictions and involves listing subcomponents of a project without making separate predictions for each

component (Kruger & Evans, 2004), and has been demonstrated to increase prediction accuracy. For example, a subset of participants who considered the details of their Christmas shopping (listing each person and each present) before predicting when they would complete their shopping predicted to finish later than those who did not consider the details of their Christmas shopping. Similarly, participants who listed the individual steps involved in a document formatting task predicted to finish this task later than participants who did not list individual steps. Actual completion time did not differ and thus participants who had unpacked the task were less optimistically biased than those in the control group. The proposed event-thinking intervention resembles Kruger and Evan's (2004) unpacking procedure most closely: participants will list individual spending events prior to making an overall weekly spending prediction. The hypothesized effect of the unpacking procedure is in line with previously documented effects of unpacking for time predictions: I expect that spending predictions will become more accurate when unpacked prior to generating the prediction. In addition, my novel prediction in the context of spending forecasts is that this unpacking effect should be mediated by a reduced focus on goals when generating the spending prediction.

Method

Participants. Of an initial sample of 149 undergraduate students, 26 participants missed more than two diary entries and 8 participants failed to complete the event followup survey and were therefore excluded.[6] The final sample consisted of 115 participants (73 female) between 17 and 33 years (*M* age = 18.47, *SD* = 1.67).

Procedure. Participants in this study completed measures at several time points. First, at the beginning of the academic term, participants completed an item assessing their savings goals

as part of a larger prescreen questionnaire (as in Study 3). On average, participants completed the savings goal item 20.46 days (SD = 14.22) before the first session of the study.

In the first session of the study, participants were asked to predict their spending for either the next week or a self-nominated event, as in previous studies. Participants in the event target condition nominated events such as going out for dinner with friends (n = 20), movies or shows (n = 16), festivals or parties (n = 7), grocery shopping or mall shopping (n = 6), trips (n = 6), birthday celebrations (n = 2), and expenses related to driving (n = 1). In addition, participants were randomly assigned to an unpacking or control condition.[7] In the unpacking condition, participants were asked to generate an itemized list of all the individual expenses they would incur during the next week (or for the target event) before making their overall spending prediction (See Appendix H for the Unpacking manipulation). Participants in the control condition were not asked to generate the itemized list before making their prediction. However, to control for potential effects of unpacking on actual spending, control participants generated this list at the end of the session (i.e., *after* their prediction had been made).

Participants were also asked to report the extent to which they based their spending prediction on financial goals. They rated the extent to which they agreed (1 = *Disagree Completely*, 7 = *Agree Completely*) that they had based their prediction on "how much money I ideally want to spend" and on "how much money I want to save in the long term". These two ratings correlated positively, $r(113) = .38, p < .001$, and were averaged to create an index of participants' self-reported focus on financial goals (see Appendix I and J, respectively, for the complete thought focus scales, and Table 13 and 14 for additional analyses for all thought focus items).

In the second part of the study, actual spending was assessed. Participants in the event condition were contacted by email the day after their nominated event, reminded of the event, and asked to complete an online follow-up questionnaire. In this questionnaire, participants listed their purchases for and during the target event and reported how much they had spent overall for the event. Participants in the weekly condition completed a spending diary during the target week: At the end of each day they accessed an online survey to report their spending for that day. Participants did not receive daily reminders and consequently they sometimes missed entries. Those who missed only one entry ($n = 15$) or two entries ($n = 6$) were included in the sample and the missing values were replaced by the mean of the remaining entries. Those who missed more than two entries were excluded (see participants section). I summed the daily reports to arrive at the measure of actual spending for the target week.

Results

Predicted and actual spending. First, to determine whether the difference in prediction bias across prediction targets (week vs. event) observed in Study 5 and 6 was replicated, I conducted a 2(spending measure: predicted vs. actual) by 2(prediction target: week vs. event) ANOVA using only the participants in the control condition. Once again, the spending measure by prediction target interaction was significant, $F(1, 54) = 4.22$, $p = .05$, indicating that, left to their own devices, participants underestimated future spending for an upcoming week, *paired* $t(26) = -2.27$, $p < .03$, $d = -.48$, but not for a discrete event, $t(28) = -1.30$, $p = .21$ $d = -.09$.

Next, to examine the effects of the unpacking manipulation on prediction bias, I conducted a 2(condition: unpacking vs. control) by 2(spending measure: predicted vs. actual) ANOVA separately for the participants assigned to a week and event target (see Table 11 for means). For the week target, the ANOVA revealed only the hypothesized spending measure by

condition interaction effect, $F(1, 53) = 3.93$, $p = .05$. Control participants predicted to spend \$112.41 ($SD = 72.63$) in the next week and actually spent \$150.45 ($SD = 86.29$). Participants who unpacked the week into events prior to prediction predicted to spend \$165.54 ($SD = 95.83$) and actually spent \$159.42 ($SD = 93.67$). As expected, participants underestimated their spending in the control condition, $t(26) = -2.27$, $p < .03$, $d = -.48$, but not in the unpacking condition, $t(27) = .42$, $p = .68$, $d = .06$. Furthermore, predicted spending was higher in the unpacking condition than in the control condition, $t(53) = -2.31$, $p = .03$, $d = -.63$, whereas actual spending was not affected by the manipulation, $t(58) = -.37$, $p = .71$, $d = -.10$. This pattern of results suggests that the tendency to underestimate spending for an upcoming week was eliminated by instructing participants to unpack their spending for the time period into discrete spending events prior to prediction.

For the target event, in contrast, the ANOVA did not yield any significant main effects or interaction effect. Control participants predicted to spend \$45.32 ($SD = 40.38$) for the nominated event and actually spent \$49.44 ($SD = 45.54$). Participants who unpacked the event further prior to prediction predicted to spend \$60.71 ($SD = 71.46$) and actually spent \$54.91 ($SD = 58.74$). Participants did not underestimate their spending significantly in either the control condition, $t(28) = -1.30$, $p = .21$, $d = -.09$, or the unpacking condition, $t(30) = .90$, $p = .38$, $d = .09$. Thus, as hypothesized, when participants were already making a prediction about a discrete spending event (and generating unbiased predictions), asking them to break the event into smaller components did not alter prediction significantly.

The role of goals. Next I sought to examine the role of goals in producing the effects described above. I have hypothesized that people rely more heavily on savings goals to predict their spending for a future time period than for a discrete event, and that this difference would be

attenuated by the unpacking manipulation. I tested these hypotheses in two ways: by comparing the relation between pre-measured savings goals and predictions across condition, and by examining participants' self-reports of how much they had focused on financial goals to generate their prediction.

Pre-measured savings goals. A preliminary ANOVA confirmed that savings goals, assessed prior to the experiment, did not differ significantly across the experimental conditions. In general, participants believed it was important to be saving money ($M = 5.50$, $SD = 1.49$ on a 7-point scale).

To test the hypotheses, I first examined the correlation between savings goals and predicted spending within each condition (Table 12). Consistent with the hypotheses, there was a significant correlation between savings goals and predicted spending in only the week-control condition: Participants who endorsed savings goals more strongly predicted to spend less money in the upcoming week, $r(24) = -.44$, $p = .03$. Savings goals were not related to predicted spending in the event-control condition, $r(27) = .15$, $p = .44$, the week-unpacking condition, $r(26) = .12$, $p = .55$, or the event-unpacking condition, $r(29) = .20$, $p = .29$.

To further examine the role of savings goals in prediction bias, I performed regression analyses, wherein predicted spending was regressed first on actual spending (step 1) and then also on savings goals (step 2). Within each condition, participants' spending predictions were related strongly to their actual spending: βs ranged from .50 to .94. More importantly, even after controlling for actual spending, savings goals were significantly related to predicted spending in the week-control condition, $\beta = -.36$, $t(23) = -2.28$, $p = .03$. That is, the participants who endorsed savings goals more strongly were more inclined to underestimate their actual spending for the week. In contrast, participants' savings goals were not a significant determinant of bias in

the week-unpacked condition, β = -.12, $t(25)$ = -.78, p = .44, the event-control condition, β = .12, $t(26)$ = 1.77, p = .09, or the event-unpacked condition, β = -.03, $t(28)$ = -.27, p = .78. Figure 4 depicts the relation between savings goals and prediction bias in each condition.

Notably, an additional analysis that regressed predicted spending (controlling for actual spending) on the prediction target (0 = week, 1 = event), savings goals, unpacking condition (0 = control, 1 = unpacking), and the interactions among these variables revealed a marginally significant three way interaction, β = -.18, $t(106)$ = -1.78, $p < .08$. Overall, the pattern of findings was generally consistent with results from Study 6: in the control conditions, savings goals contributed to bias in predictions for an upcoming week but not for an event. Additionally, the findings were consistent with the idea that the biasing effect of savings goals on weekly predictions can be attenuated by an unpacking manipulation.

Self-reported focus on financial goals. To test whether the experimental manipulations influenced participants' self-reported focus on their financial goals, I submitted the index of goal focus to a 2(prediction target: event vs. week) by 2(condition: unpacking vs. control) ANOVA. The analysis revealed only a target by condition interaction, $F(1, 111) = 7.72$, $p < .01$, and an examination of the relevant means and subsequent contrasts yielded considerable support for the hypotheses. In the control conditions, as in Study 5, participants reported focusing more on their financial goals to generate predictions for an upcoming week (M = 4.96, SD = 1.27) than for an event (M = 3.78, SD = 1.47), $t(111) = 4.39$, $p < .01$; however, in the unpacking condition the focus on goals did not differ for predictions concerning a week (M = 3.84, SD = 1.43) and an event (M = 4.15, SD = 1.55), $t(111) = 1.15$, $p = .13$. Furthermore, participants reported focusing more on their financial goals in the weekly control condition (M = 4.96, SD = 1.27) than in the weekly unpacking condition (M = 3.84, SD = 1.43), $t(111) = 4.17$, $p < .01$. In contrast, the focus

on goals did not differ significantly across the event control ($M = 3.78$, $SD = 1.47$) and event unpacking condition ($M = 4.15$, $SD = 1.55$), $t(111) = -1.38$, $p = .09$.

Next, I conducted a multiple regression analysis (separately for each spending target) using only the participants in the control conditions, in order to examine, as in Study 5, the link between the reported focus on goals and the bias in spending predictions. Predicted spending was regressed first on actual spending (step 1) and then also on the focus on goals (step 2), to test whether the focus on goals was linked to prediction *bias*. The regression for the target week indicated that, after controlling for actual spending, the focus on goals was still related to spending predictions, $\beta = -.34$, $t(52) = -3.17$, $p < .01$, $d = .88$. For the event target, in contrast, the focus on goals remained unrelated to spending predictions after controlling for actual spending, $\beta = .04$, $t(57) = .56$, $p = .58$, $d = .15$. An additional analysis that regressed predicted spending (controlling for actual spending) on the spending target (0 = week, 1 = event), the focus on goals, and their interaction revealed a significant interaction effect, $\beta = .52$, $t(110) = 2.85$, $p = .01$, $d = .54$. These effects replicate the findings of Study 5. A similar multiple regression analysis using only the participants in the unpacking conditions revealed no significant interaction effect, $\beta = .06$, $p = .50$, and no main effects of savings goals or prediction target (βs = -.03 and -.11, respectively).

Mediation model of thought focus. I next wanted to examine whether the effect of the unpacking manipulation on prediction was explained by a reduced focus on savings goals. Because participants' general savings goals were measured far in advance of the experimental session they cannot be influenced by the experimental manipulation. However, the unpacking procedure might have affected how much people *focused* on their goals during prediction. I performed mediation analyses separately for each prediction target. In each case I regressed

participants' goal focus on the unpacking condition (0 = control, 1 = unpacking), and I also regressed predicted spending first on goal focus and then also on the unpacking condition (see Figure 5 for the mediation model and standardized coefficients).

For the one week target, participants reported focusing less on financial goals in the unpacking condition than in the control condition, $t(53) = -3.08$, $p = .003$, $d = -.85$, and a reduced focus on goals was, in turn, linked to higher spending predictions (controlling for condition), $t(52) = -2.69$, $p = .01$, $d = .75$. This pattern indicates that the degree of focus on goals was a mediator of the effect of unpacking on weekly spending predictions, *Sobel* $z = 2.03$, $p = .04$ (Baron & Kenny, 1986). This pattern of mediation was unaffected if I also controlled for actual spending in the regressions (i.e., the effect of condition on predicted spending, controlling actual spending, dropped from $\beta = .28$ to $\beta = .17$ when goal focus was entered in the model, *Sobel* $z = 1.88$, $p = .05$).

For the event spending predictions, in contrast, the unpacking manipulation did not affect focus on goals, $t(58) = .94$, $p = .35$, $d = .23$, and the focus on goals was not related to spending predictions (controlling for condition), $t(57) = -.40$, $p = .69$, $d = -.11$, *Sobel* $z = 0.36$, $p = .71$. This pattern of effects remained unaffected if I also controlled for actual spending (i.e., the effect of condition on predicted spending, controlling actual spending, was not significant, $\beta = .09$, and did not change when goal focus was entered in the model, $\beta = .08$, *Sobel* $z = 0.36$, $p = .71$).

Discussion

The findings offered support for each of the guiding hypotheses. First, there was further evidence that people are more inclined to underestimate their future spending for time periods than for specific events. As in the previous studies, participants underestimated how much they would spend in the next week, but were unbiased in predicting their spending for concrete

spending events. Second, the difference in prediction bias across targets (week vs. event) was again linked to a differential focus on financial goals. Participants appeared to rely more heavily on savings goals to predict their spending for a future week than for a future event, and a greater focus on savings goals was associated with spending predictions that were lower and more prone to bias. Note that this finding was foreshadowed in Study 6, where the interaction between prediction target and spending measure did not quite reach significance. In Study 6, the association between savings goals and prediction bias was somewhat, but not significantly, stronger for the weekly predictions than for the event predictions. In the present study, these links were significantly different - possibly due to more sensitive measures and a larger sample size. The results of the goal focus measure also suggest that participants were aware of the extent to which their savings goals contributed to their predictions. Participants reported basing their predictions on their financial goals to a greater extent when predicting weekly spending rather than event spending.

Third, this study showed that when weekly spending predictions were unpacked into concrete spending events, participants' thoughts and predictions resembled those in the event prediction conditions, eliminating the bias in weekly spending predictions. Furthermore, as hypothesized, the de-biasing effect of the unpacking manipulation was mediated by a reduced focus on savings goals. Notably, the unpacking procedure did not change thoughts or predictions for the event prediction condition, arguably because participants predicting their spending for a specific event are already in an unpacked mindset.

General Discussion

In everyday life, people estimate their spending for projects and time periods. A person might try to estimate how much she will spend during the next week or she might try to estimate

her spending specifically for an upcoming event, such as a birthday party. The present research examines personal spending predictions in a series of seven studies, and results supported the three initial hypotheses. A summary of predicted and actual spending across all studies is presented in Table 15.

First, I found that people tended to underestimate their future personal spending when forecasting time periods, predicting that they would spend substantially less money during an upcoming week than they actually did. On average, participants underestimated their weekly expenditures by 27%. However, concrete spending events appeared to be exempted from the optimistic bias in spending predictions; participants were remarkably accurate in predicting their spending across a wide variety of concrete future purchases (birthday shopping, self-nominated events).

Second, I demonstrated that one source of bias in weekly spending predictions is people's savings goals – defined as the general desire to save money or minimize future spending – at the time of prediction. Participants who reported stronger savings goals (Studies 2, 3, 6, and 7) or were induced experimentally to experience stronger savings goals (Study 4) predicted they would spend less money in a future week. Because savings goals were not related significantly to participants' actual spending they 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. Notably, savings goals were not correlated with predicted spending when people were predicting their spending for a future *event*. This disconnect between goals and prediction might contribute to prediction accuracy for event spending predictions.

Third, I demonstrated that people can be induced to make more accurate spending predictions for a future week, by considering the individual spending events and expense details that they will encounter during a week (Study 7). This unpacking procedure appears to be successful because it reduces reliance on savings goals during prediction, and thus attenuates the biasing influence of goals.

Bias in Spending Predictions

Anecdotally, it appears that overspending is pervasive. However, to my knowledge, this is the first program of psychological research to systematically compare predicted and actual spending, and the documented bias has widespread implications. From a practical standpoint, the prediction bias is important because, as noted previously, 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. The effect size of the prediction bias for weekly spending ranged from .41 to 1.09 (control conditions), which can be characterized as medium to large effects (Cohen, 1992). From a theoretical standpoint, the finding extends literature on self prediction to an understudied domain. The spending prediction bias is an instance of overly optimistic prediction, and contributes 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. Strikingly, even though participants were aware that they had spent more in the past week, they persisted in optimistically predicting to spend less in the next week, and continued to do so even after their expectations had been disconfirmed (e.g., Study 1 and 4). 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.

It is also important to note that the present studies did not show optimistic bias across all personal spending predictions. Predictions for concrete events (Studies 5-7) and predictions for daily spending (Study 2) were remarkably accurate. One of the distinctions between event and daily spending on the one hand and weekly spending on the other hand is the level of complexity or number of components of spending. Thus, accuracy may be determined by the number of subcomponents of the prediction target. Simple, few-component targets may be predicted accurately and complex, many-component targets may be underestimated. Given that weekly predictions include many components and are relatively complex, this account is consistent with the underestimation evident for weekly spending predictions. Some types of spending events might be as abstract and complex as weekly predictions and might therefore be underestimated. This reasoning might help to explain the cost overruns that occur for major construction projects (Hall, 1980; Flyvbjerg et al., 2002), which are highly complex and multifaceted. However, the present studies suggest that the reason for prediction accuracy is not only due to cognitive mechanisms (such as ease of processing for simple targets) but that savings goals play a large role. Reliance on savings goals was an important source of bias for weekly spending predictions

and the attenuation of the goal-prediction link was a source of accuracy for event spending predictions.

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 than discretionary spending. In a preliminary investigation of this issue, I have found that prediction bias was less pronounced for monthly predictions (18% underestimation) than for weekly predictions.[8] 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.

An additional cognitive difference between predictions for events and time periods might be the relative confidence in prediction. Ülkümen et al. (2008) argued that people who are less confident about their spending predictions adjust these predictions upward. If people were less confident about event spending predictions than weekly spending predictions, they might have adjusted their predictions upward, predicting to spend more money. Thus, different levels of confidence might be responsible for the difference in prediction bias for events and weeks. To explore this possibility, I asked participants to rate how certain they were that their prediction was accurate in most studies. There were no systematic differences in confidence about spending predictions (or actual spending reports) across prediction targets. Table 16 shows the means of these supplementary measures for all those studies that assessed confidence ratings.

The Role of Savings Goals

The 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, the present 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), the present studies focused specifically on behavioral predictions which, 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 (or at least partial control) of the forecaster.

Although I characterized savings goals as a factor that is motivational in nature, I 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 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 future events will unfold (Dunning, 2007; Kahneman & Tversky, 1979; Ross & Buehler, 2001), and this approach leaves them prone to optimism for several reasons: they focus on central features of an event without considering all the concrete subcomponents or details (e.g., Kruger & Evans,

2002; Jørgenson, 2004), 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), 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. 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 of prediction bias, which was indeed borne out in the data: People underestimated future spending only when they endorsed savings goals strongly and when they relied on their savings goals. When

predicting a concrete spending event, the influence of savings goals seemed to be attenuated, resulting in more realistic forecasts. At the present stage of the research, I can only speculate as to why savings goals are less influential in prediction for future events than for time periods.

One possibility is that thinking about concrete events calls to mind other goals (such as the goal to enjoy oneself, to revive old friendships, make a partner happy). Having specific goals on one's mind might suppress the activation of other (i.e., savings) goals (Shah & Kruglanski, 2002; Shah et al., 2002). If savings goals are not activated, they would not influence spending predictions. In contrast, time periods may be construed more abstractly. When thinking about future spending at a more abstract level, people might be influenced more by the desirability of spending little money (Liberman & Trope, 1998) and thus base their prediction on savings goals. A second possibility is that thinking of events activates goals that directly *conflict* with savings goals (such as being fashionable, being generous, providing opportunities for one's children) and that participants are aware of potential interference of these goals with their savings goals (or they regard the conflicting goals as more important). Thus, even though savings goals are activated, participants may base their prediction less on these goals because they are overshadowed by other goals that require spending.

The Unpacking Intervention

The third main finding, that participants' weekly spending prediction became more accurate if they unpacked their spending into individual spending details, offers a first step toward a debiasing intervention. Note that the unpacking procedure required participants simply to think about and list what they would buy – participants did not have to engage in more extensive planning such as estimating and mathematically integrating each individual purchase (as a decomposition approach would demand of them). This unpacking procedure may be a

particularly easy approach to de-biasing spending predictions, and may even be employed spontaneously in some circumstances: approximately one-third of participants predicting weekly spending in Study 6 employed a similar technique spontaneously by mentioning at least the concrete purchase events in their thought listings.

Although Study 7 identified the extent to which participants focused on their financial goals as one mediator of the unpacking effect, there may be a number of reasons why unpacking increased prediction accuracy. It might be that unpacking made it cognitively easier to process complex prediction targets, as implied by Kruger and Evans (2004). Note that Kruger and Evans did not test the mechanisms by which unpacking increased completion time predictions in the domain of time predictions. Thus, it may be that the mediator uncovered in Study 7 applies not only to the financial domain: unpacking may reduce the biasing influence of performance goals across several domains. It might also be, however, that the present unpacking procedure exhibited a unique pattern of effects due to the domain under investigation. Unpacking weekly spending into individual spending components may have induced a mindset in weekly spending forecasters that was more similar to that of event spending forecasters.

It is interesting to note that the unpacking procedure reduced the underestimation bias more than did the procedure designed to weaken savings goals in Study 4 (bias effect sizes were .06 and .20 respectively, compared to an average .62 bias effect size in the control conditions across studies).

Money and Time

This program of research can contribute to an emerging literature exploring similarities and differences in judgments across the domains of money and time (e.g., Okada & Hoch, 2004; Soman, 2001; Zauberman & Lynch, 2005). The present studies identify a systematic bias in

weekly spending predictions – a "budget fallacy" – similar to the prevalent "planning fallacy" bias in time prediction (Buehler et al., 1994; Kahneman & Tversky, 1979). The results for weekly spending predictions 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, current 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. In addition, one of the underlying mechanisms for the planning fallacy is the motivation to finish a project early (Buehler et al., 1997), a concept that may be linked to the goal to minimize spending in the context of a budget fallacy.

However, Studies 5-7 identified a very important limitation to the similarities between a budget fallacy and the planning fallacy: when the prediction target was a concrete event, there was no difference between remembered, predicted, and actual spending. Interestingly, then, if the present investigation had not examined both types of prediction targets, evidence might have implied very different conclusions depending on which target had been examined. Research limited to spending events (arguably the more direct parallel to planning fallacy research) would have concluded that predictions for time and money are very different, whereas research limited to time period spending predictions would highlight similarities. Neither examination would have provided a complete picture. Future research should explore the degree to which a "budget fallacy" and "planning fallacy" share common boundary conditions, underlying mechanisms, and psychological consequences, and should be careful to examine both event and time period spending predictions.

Limitations

One limitation of the present studies is the population studied. Most of the studies sampled from university students who could differ in many relevant ways (e.g., SES background, disposable income, parental support, leisure time, fixed expenses, personal characteristics) from other demographic groups. 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.

Some of the sampling issues were addressed in Study 6. Using a more diverse and older sample, the direction and the magnitude of the prediction bias was replicated. Non-students predicted to spend more than students, and actually did spend more, so that the extent of bias was comparable. However, even the sample in Study 6 may differ from the general population in important ways (e.g., interest in psychology research, education level). Future studies should examine spending predictions in a variety of social groups that differ in pertinent characteristics such as SES, disposable income, size of family, level of education, and age. These factors might influence the prediction bias as well as the effectiveness of different planning interventions.

Another concern relevant to the present studies is the typicality of the prediction targets. Replicating the main findings over several studies suggests that the weeks and events under observation were not particularly unusual. I also avoided collecting data in weeks that preceded or followed unusual times of the year (Christmas holidays, reading week, first week of classes). In some studies I assessed ratings of how typical or usual the prediction targets were. Typicality

was not explicitly defined in terms of typical expenses. Therefore, rating a target as unusual did not necessarily imply unusually high or low expenses but could refer to other unusual features of the target. See Table 17 for the dates when each study was conducted and for a summary of typicality ratings where available.

Another limitation of the present studies is that they did not explore the role of individual differences between participants. In each sample, there were participants who accurately (and sometimes pessimistically) predict their spending, even though the majority exhibited an optimistic bias. There may be reliable differences that distinguish accurate forecasters from others, such as personality variables (self-esteem, trait optimism, conscientiousness). For exploratory purposes I included a limited number of personality scales in some of the present studies. Table 18 summarizes the results of personality scales for those studies where dispositional measures were administered. Future studies might examine more systematically the role of personality variables on spending predictions.

Future Directions

There may be other ways to reduce people's reliance on savings goals besides the unpacking procedure. It might be that simply instructing participants to ignore savings goals would result in less optimistically biased predictions. On the other hand, such instructions might have ironic effects similar to thought suppression (Wegner, Schneider, Carter, & White, 1987). Recall that I speculated that unpacking weekly spending reduced people's focus on savings goals because it increased their awareness of other goals (e.g., making a friend happy, eating well, buying fashionable clothes). Future studies could examine the role of savings goals in event predictions and unpacked weekly predictions in more detail. For example, future studies may examine the cognitive accessibility (e.g., Shah et al., 2002) of savings goals during prediction to

determine whether savings goals are suppressed or simply ignored during event and unpacked predictions.

Another interesting avenue for future research is to explore the incongruity between goals and spending behavior. I had hypothesized that people's goals would have relatively little impact on actual spending, 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 across all studies. 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 pre-commitment 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 I emphasize that research should continue to explore the relative impact of factors on prediction and behavior. Also, interventions that reduce actual spending (as opposed to bringing predictions in line with behavior) might not always be better or desirable. Indeed, in some contexts spending money increases happiness – for example when money is spent on others (Dunn, Aknin, & Norton, 2008) or when it is spent on experiences rather than material goods (Van Boven, 2005). When actual spending should not or cannot be changed, accurate knowledge about how much one will spend in the future may be particularly important and valuable.

Given that accurate spending predictions should lead to less debt and financial worries, strategies that improve accuracy may have a positive impact on people's life quality. However, it is important to note that budgeting, on the whole, does not only depend on spending predictions, but also on other predictions, such as earning or saving predictions. Knowledge about availability of money includes both incoming (saving, earning) and outgoing money (spending). There is some evidence that these forms of budgeting are afflicted with similar biases as spending predictions. For example, students inaccurately predict to save a large percentage of their summer earnings (Koehler, White, & John, 2007) and students as well as financial analysts inaccurately overestimate earning probabilities of large firms (Whitecotton, 1996). To improve financial planning significantly, future interventions might need to tackle more than one faulty prediction process simultaneously.

Concluding Remarks

Personal spending predictions have widespread practical implications. Major life decisions as well as everyday choices almost always involve a consideration of future expenses. The present research fills an existing gap in the social psychological prediction literature, by examining effects of goals on predictions within the realm of personal finance, and gives some initial accounts of sources for accuracy and bias in personal spending predictions. By identifying factors that can improve day-to-day budgeting and restrain personal spending, the research has direct applications in programs aimed at improving the quality of personal financial planning and decision making. Knowing accurately what the future will bring and how much money will be available might lead to informed (and better) spending decisions, resulting in less debt and financial worries, and could eventually have a positive impact on people's life quality.

Endnotes

[1] In this study and subsequent studies, I omitted outliers (defined as participants with predicted or actual spending more than 3 Standard Deviations above or below the mean) from the reported samples, as follows: one participant from Study 1, two participants from Study 2, two participants from Study 4, two participants from Study 6, and four participants from Study 7. 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] Note that I refer to participants as having relatively stronger or weaker savings goals throughout the manuscript (rather than as thinking of saving as relatively important or unimportant). The savings goal item was phrased "Saving money is important to me". Therefore, participants' responses to this item might alternatively be understood as representing the *importance* of saving rather than the *strength* of saving goals.

[4] I did not have a priori hypotheses concerning the supplementary items included in the money attitudes survey in Studies 2, 3, 6 and 7. 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 Study 2 (β = -.57, $t(30)$ = -2.47, p < .05), Study 3 (β = -.40, $t(81)$ = -3.52, p < .01), Study 6 (week condition: β = -.57, $t(25)$ = -3.00, p < .05), and in Study 7 (week control condition: β = -.47, $t(14)$ = -.95, p = .07). See Table 19 for correlations of all money attitude items with predicted and actual spending across studies.

[5] Because there was much variation in spending in this study (possibly because this was a heterogeneous sample of community members with vastly different income levels), I also conducted the same analysis with log transformed values for predicted and actual spending. The target by spending interaction remained significant, $F(1, 59) = 10.42, p = .002$.

[6] Participants with incomplete diary data did not differ from other participants in their spending predictions. I conducted additional analyses including participants with incomplete diary data (substituting the missing days with the mean daily spending for that participant) and there was no change in the patterns of analyses. However, because extrapolating weekly spending from very incomplete diaries might increase error variance, I selected the conservative procedure of excluding participants with less than 5 diary entries.

[7] I also included a no prediction control group in the weekly spending conditions. Twenty randomly assigned participants completed the first session without making an overall spending prediction and without listing the items they might buy in the next week. At the end of the week, they reported having spent \$151.21 ($SD = 99.59$), which was not significantly different from participants' spending in the control condition, $t(45) = .03, p = .89, d = .01$, or the unpacking condition, $t(46) = -.29, p = .77, d = .09$.

[8] In a preliminary investigation of monthly spending, I asked 365 participants to predict their spending for the next month (i.e., the next 30 days) and to report their spending for the past month. These questions were embedded in a larger questionnaire administered to undergraduate students during mass-testing. Participants reported having spent an average \$527.14 ($SD = 440.37$) in the past month and expected to spend \$431.61 ($SD = 403.98$) in the next month, thus predicting to reduce their spending significantly, $t(364) = 13.39, p < .001, d = 1.40$. However, this study did not assess actual spending for the target time periods and thus it is conceivable (if

unlikely) that participants actually did have lower expenditures in the future month than they had previously.

Appendix A

Weekly Spending Prediction Instructions

Study 1 and Study 2: How much money do you think will you spend next week (i.e., the next 7 days, all expenses included except things that only occur once a month such as rent)? $_____

Study 3, Study 4, Study 5, and Study 7: Now, we would like you to think more specifically about your spending for the next week (i.e., the next 7 days, starting tomorrow morning). Think about all your expenses, including everything except fixed expenses that occur only once a month, such as rent. Also include expenses that you will buy with cards (your Laurier one-card, debit, or credit card) or cash. How much money will you spend next week? I will spend $_____ next week.

Study 6: Now, we would like you to think more specifically about your spending for the next week (i.e., the next 7 days, starting tomorrow morning). Think about all your expenses, including everything except fixed expenses that occur only once a month, such as rent. Also include expenses that you will buy with cards (e.g., debit, or credit card) or cash. How much money will you spend next week? I will spend $_____ next week.

Appendix B

Event Spending Prediction Instructions

Study 5: Now, please estimate, to the best of your ability, how much money you will spend on the birthday of _____ (initial). Please include all costs of the celebration (e.g., transportation cost, gifts, drinks). $_____

Study 6 and Study 7: Now, think about all your expenses for this event. Include all expenses associated with this event, those that you need to buy before the event started (e.g., tickets for the movies), and those you need to buy during the event (e.g., drinks at the movies). Include expenses that you buy with cards (i.e., debit card, credit card) or cash. How much money will you spend for the event that you just described above? I will spend $_____

Appendix C

Money Attitudes Survey (Studies 2, 3, 6, 7)

Now, we would like to know about your general attitudes towards money and spending in general. Please respond to the following statements by selecting the field that best represents your response.

How much do you agree with the following statements?

1.	Money is very important for me.	Disagree Entirely	○	○	○	○	○	○	○	Agree Entirely
2.	I often think about how I will spend my money.	Disagree Entirely	○	○	○	○	○	○	○	Agree Entirely
3.	I save some of my available money each month.	Disagree Entirely	○	○	○	○	○	○	○	Agree Entirely
4.	*(Study 2,3,7)*Saving money is very important for me.	Disagree Entirely	○	○	○	○	○	○	○	Agree Entirely
5.	I feel that I know exactly what I spend my money on	Disagree Entirely	○	○	○	○	○	○	○	Agree Entirely
6.	*(Study 2)* I feel the amount of money that I have is insufficient. *(Study 3,6,7)* I often try to estimate how much I will spend in the future	Disagree Entirely	○	○	○	○	○	○	○	Agree Entirely
7.	*(Study 2)* I have very little money available each month, compared to my friends. *(Study 3)* I often try to estimate what I will spend my money on in the future. *(Study 6)* I usually spend a lot more money than I thought I would.	Disagree Entirely	○	○	○	○	○	○	○	Agree Entirely

Note. Study 2 used a 10-point response scale, and Studies 3, 6, and 7 used a 7-point response scale (as depicted). Items 6 and 7 varied as indicated.

Appendix D

Diary Surveys (Study 2)

MORNING QUESTIONNAIRE (please complete as early in the day as possible)
Date: _____ Time: _____a.m./ p.m.

Please estimate, to the best of your ability:
How much money will you spend today (all expenses included except things that only occur once a month, e.g. rent): $ _____

I am sure that this prediction is an accurate estimation of today's expenses.

1	2	3	4	5	6	7	8	9	10
Disagree entirely									Agree entirely

I feel that I know exactly what I will spend that money on.

1	2	3	4	5	6	7	8	9	10
Disagree entirely									Agree entirely

Please put this paper in the envelope and do not look at it again.

EVENING QUESTIONNAIRE (please complete as late in the day as possible)
Date: _____ Time: _____a.m./ p.m.

Please think for a moment about today's expenses. What did you spend money on? Please sum all your purchases up and estimate, to the best of your ability:

How much money did you spend today (all expenses included except things that only occur once a month, e.g. rent): $ _____

I am sure that this is an accurate estimation of today's expenses.

1	2	3	4	5	6	7	8	9	10
Disagree entirely									Agree entirely

I feel that I know exactly what I spent that money on.

1	2	3	4	5	6	7	8	9	10
Disagree entirely									Agree entirely

Please put this paper in the envelope and do not look at it again.

FINAL QUESTIONNAIRE --- after completion, please return the sealed envelope with your diary questionnaires to the Psychology Main Office.

We are interested in your experience and opinion with this diary study. Please keep in mind that your responses are entirely anonymous and answer as honestly as possible.

Please circle the response that represents your experience best:

a) I completed all diary sheets on time.
b) I forgot to complete some of the diary sheets and completed them up to 24 hours later.
c) I forgot to complete some of the diary sheets and completed them at the end of the entire survey, after 7 days.
d) I forgot to complete some of the diary sheets and did not complete them at a later point.

Please think for a moment about last week's expenses. What did you spend money on? Please sum up all your purchases and estimate to the best of your ability. (Do not look back to your previously completed daily estimates)

How much money did you spend last week (all expenses included except things that only occur once a month, e.g. rent): $ _____

Appendix E

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.

Appendix F

Birthday Nomination Instructions (Study 5)

In this study, we are interested people's preparations for their friends' birthdays. Please take a moment now to think about a friend or family member whose birthday is within the next two months and whose birthday you would celebrate (e.g. go to a birthday party or buy a present). Please type the initial of this friend in this box [ ] Please record the birthday of this friend (click here for a calendar. Type a range if you are not sure which day it is) (mm/dd)[ ]

Appendix G

Event Nomination Instructions (Study 6 and 7)

Now, we would like you to think more specifically about an event in the future that you will spend money on. Think about an event that you know will be happening in the next 10 days that fulfills the following criteria:

1. An event that will require you to spend at least some money (e.g., going to the movies rather than watching TV with your friends).
2. An event that takes at least half an hour (e.g., a full movie rather than a brief video clip).

Describe the event below:

[expanding textbox]

When will the event take place? DD/MM/YY

Appendix H

Unpacking Manipulation (Study 7)

Weekly Group: What items will you buy next week? Now, please list as many details of next week's spending as you can think of. Include all your expenses, except fixed expenses that occur only once a month, such as rent. Include expenses that you will buy with cards (your Laurier one-card, debit, or credit card) or cash. Use as many or as few lines as you need.

Day 1 -Tomorrow *[expanding textbox 1]*

Items:

...

Day 7 *[expanding textbox 7]*

Items:

Event Group: What items will you buy before or during the event? Now, please list as many details of your expenses for this event as you can think of. Include all expenses associated with this event, those that you need to buy before the event started (e.g., tickets for the movies), and those you need to buy during the event (e.g., drinks at the movies). Include expenses that you will buy with cards (your Laurier one-card, debit, or credit card) or cash. Use as many or as few lines as you need.

[expanding textbox 1]

...

[expanding textbox 10]

Appendix I

Thought Focus Rating Scales (Study 7, Week Group)

How much does each of the following statements describe your thoughts when you were making your prediction of how much you'll spend next week?

1.	I thought about the items that I plan to purchase next week.	Not at all	○	○	○	○	○	○	○	Very much
2.	I thought about the prices of items that I plan to purchase next week.	Not at all	○	○	○	○	○	○	○	Very much
3.	I thought about which items I might buy on impulse (i.e., without planning to buy them).	Not at all	○	○	○	○	○	○	○	Very much
4.	I thought about each individual day of next week.	Not at all	○	○	○	○	○	○	○	Very much
5.	I tried to imagine what activities I might do next week that require me to spend money.	Not at all	○	○	○	○	○	○	○	Very much
6.	I thought about the week as a whole.	Not at all	○	○	○	○	○	○	○	Very much
7.	I thought of the next week as one week in many this year.	Not at all	○	○	○	○	○	○	○	Very much
8.	I thought about how much I usually spend in a regular week.	Not at all	○	○	○	○	○	○	○	Very much
9.	I thought about how much I spent last week (i.e., the last 7 days).	Not at all	○	○	○	○	○	○	○	Very much
10.	I thought about how much I ideally want to spend.	Not at all	○	○	○	○	○	○	○	Very much
11.	I thought about how much I ought to spend.	Not at all	○	○	○	○	○	○	○	Very much
12.	I thought about how much money I want to save next week (e.g. to buy something big later on).	Not at all	○	○	○	○	○	○	○	Very much
13.	I thought about how much money I want to save for other big items in the long term.	Not at all	○	○	○	○	○	○	○	Very much
14.	I thought about how much money I have available next week.	Not at all	○	○	○	○	○	○	○	Very much
15.	I thought about unforeseeable expenses that might happen next week.	Not at all	○	○	○	○	○	○	○	Very much
16.	I was just guessing; I don't know how I arrived at my prediction.	Not at all	○	○	○	○	○	○	○	Very much

Appendix J

Thought Focus Rating Scales (Study 7, Event Group)

How much does each of the following statements describe your thoughts when you were making your prediction of how much you'll spend next week?

1.	I thought about the items that I plan to purchase before and during the event.	Not at all	○	○	○	○	○	○	○	Very much
2.	I thought about the prices of items that I plan to purchase for the event.	Not at all	○	○	○	○	○	○	○	Very much
3.	I thought about which items I might buy on impulse (i.e., without planning to buy them).	Not at all	○	○	○	○	○	○	○	Very much
4.										
5.	I tried to imagine what activities I might do before and during the event that require me to spend money.	Not at all	○	○	○	○	○	○	○	Very much
6.	I thought about the event as a whole.	Not at all	○	○	○	○	○	○	○	Very much
7.	I thought of the event as one event in many this year.	Not at all	○	○	○	○	○	○	○	Very much
8.	I thought about how much I usually spend for similar events.	Not at all	○	○	○	○	○	○	○	Very much
9.	I thought about how much I spent for the last event that was similar.	Not at all	○	○	○	○	○	○	○	Very much
10.	I thought about how much I ideally want to spend.	Not at all	○	○	○	○	○	○	○	Very much
11.	I thought about how much I ought to spend.	Not at all	○	○	○	○	○	○	○	Very much
12.	I thought about how much money I want to save next week (e.g. to buy something big later on).	Not at all	○	○	○	○	○	○	○	Very much
13.	I thought about how much money I want to save for other big items in the long term.	Not at all	○	○	○	○	○	○	○	Very much
14.	I thought about how much money I have available.	Not at all	○	○	○	○	○	○	○	Very much
15.	I thought about unforeseeable expenses that might happen before and during the event.	Not at all	○	○	○	○	○	○	○	Very much
16.	I was just guessing; I don't know how I arrived at my prediction.	Not at all	○	○	○	○	○	○	○	Very much

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Table 1. Means, Standard Deviations, and Inter-correlations of Weekly Spending (Study 1)

	past week spending (1)	predicted spending (2)	actual spending (3)	next week spending (4)
M	126.03	94.33	121.67	85.17
SD	117.70	77.27	195.11	75.77
(1)				
(2)	.75**			
(3)	.39*	.61**		
(4)	.57**	.79**	.54**	

Note. ** $p < .01$

Table 2. Means, Standard Deviations, and Intercorrelations of Weekly Spending (Study 2)

	predicted spending (1)	actual spending - diary (2)	actual spending – followup (3)
M	95.00	150.75	166.21
SD	67.31	78.54	97.31
(1)			
(2)	-.01		
(3)	.19	.79**	

Note. ** $p < .01$

Table 3. Means and Standard Deviations of Daily Spending (Study 2)

	Mean predicted weekly spending (1)	Mean actual weekly spending (2)	Mean predicted weekend spending (3)	Mean actual weekend spending (4)
M	24.08	24.80	26.98	32.82
SD	11.31	11.26	11.61	13.03
(1)				
(2)	.86**			
(3)	.60**	.60**		
(4)	.37*	.49**	.83**	

Note. ** $p < .01$

Table 4. Correlation of Savings Goals with Weekly and Daily Spending (Study 2)

	predicted spending	actual spending - diary	actual spending – followup	Mean predicted daily spending
Savings goals	-.37*	-.15	-.04	-.08

Note. ** $p < .01$

Table 5. Means, Standard Deviations and Inter-correlations of Weekly Spending (Study 3)

	Goals measured separately (delayed condition)		Goals measured in session (immediate condition)	
	past week spending (1)	predicted spending (2)	past week spending (1)	predicted spending (2)
M	125.25	106.70	106.09	94.40
SD	78.58	62.18	63.06	60.37
(1)				
(2)	.44*		.56**	

Note. * $p < .05$, ** $p < .01$

Table 6. Correlations of Savings Goals with Spending (Study 3)

	Goals measured separately (delayed condition)		Goals measured in session (immediate condition)	
	past week spending	predicted spending	past week spending	predicted spending
Savings goals (delayed)	-.15	-.40**	-.26	-.32*
Savings goals (immediate)			-.20	-.37*

Note. * $p < .05$, ** $p < .01$

Table 7. Means, Standard Deviations, and Inter-correlations of Weekly Spending (Study 4)

	Weak savings goal condition		Strong savings goal condition	
	predicted spending (1)	actual spending (2)	predicted spending (1)	actual spending (2)
M	126.67	154.67	83.13	178.19
SD	50.34	91.84	51.28	138.98
(1)				
(2)	.74**		.54*	

Note. * $p < .05$, ** $p < .01$

Table 8. Means, Standard Deviations, and Inter-correlations for Weekly and Birthday spending (Study 5)

	Weekly Spending		Birthday Spending	
	predicted spending (1)	actual spending (2)	predicted spending (1)	actual spending (2)
M	130.22	173.50	59.69	53.82
SD	105.27	105.81	50.15	45.00
(1)				
(2)	.64**		.64*	

Table 9. Means, Standard Deviations, and Inter-correlations of Weekly and Event Spending (Study 6)

	Weekly Spending		Event Spending	
	predicted spending (1)	actual spending (2)	predicted spending (1)	actual spending (2)
M	202.94	285.58	118.91	113.31
SD	188.89	233.00	180.54	157.41
(1)				
(2)	.79**		.94**	

Note. ** $p < .01$

Table 10. Correlation of Savings Goals with Weekly and Event Spending (Study 6)

	Weekly Spending		Event Spending	
	predicted spending	actual spending	predicted spending	actual spending
Savings goals (immediate)	-.44*	-.33	-.15	-.08

Note. * $p < .05$

Table 11. Means, Standard Deviations, and Inter-correlations of Weekly and Event Spending (Study 7)

	Weekly Spending				Event Spending			
	Control		Unpacking		Control		Unpacking	
	predicted spending	actual spending	predicted spending	actual spending	predicted spending	actual spending	predicted spending	actual spending
M	112.41	150.45	165.54	159.42	45.32	49.44	60.71	54.91
SD	72.63	86.29	95.83	93.67	40.38	45.54	71.46	58.74
(1)								
(2)	.41*		.66**		.93**		.87**	

Note. * $p < .05$, ** $p < .01$

Table 12. Correlation of Savings Goals with Weekly and Event Spending by Condition (Study 7)

	Weekly Spending				Event Spending			
	Control		Unpacking		Control		Unpacking	
	predicted spending	actual spending	predicted spending	actual spending	predicted spending	actual spending	predicted spending	actual spending
Savings goals (delayed)	-.44*	-.16	.12	.34	.15	.03	.20	.26

Note. * $p < .05$

Table 13. Means and Standard Deviations of the Complete Thought Focus Scales (Study 7)

	Weekly Spending				Event Spending			
	Control		Unpacking		Control		Unpacking	
Item	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
1	5.56	1.40	5.75	1.60	5.79	1.32	5.84	1.16
2	5.15	1.68	5.46	1.69	3.45	1.94	3.48	1.48
3	4.07	1.96	3.64	2.08	3.66	1.91	3.65	1.99
4	3.85	2.35	2.96	1.97				
5	5.67	1.18	5.57	1.79	4.76	1.57	4.55	1.80
6	5.26	1.58	4.29	2.09	5.75	1.38	5.48	1.50
7	3.93	1.94	3.85	2.13	4.79	2.19	5.00	2.00
8	5.04	1.79	5.04	1.80	6.28	1.13	5.23	1.75
9	4.81	1.84	4.32	2.09	6.48	.74	5.03	1.84
10	5.67	1.14	4.86	1.65	4.79	1.72	3.06	1.90
11	5.22	1.58	4.75	1.86	4.00	1.71	3.39	1.87
12	4.15	2.01	2.82	1.93	2.76	1.75	3.87	2.30
13	4.00	2.04	2.70	1.94	3.10	2.02	3.06	1.69
14	4.56	2.03	4.00	2.11	3.66	1.90	5.94	1.37
15	3.70	2.05	3.64	2.04	2.66	1.76	6.06	1.29
16	2.19	1.33	2.18	1.42	1.48	.79	1.97	1.40

Note. For item wording see Appendix I and Appendix J, respectively. Item 10 and Item 12 were aggregated to form a measure of thought focus on financial goals.

Table 14. Correlation of Thought Focus Scales with Predicted and Actual Spending (Study 7)

	Weekly Spending				Event Spending			
	Control		Unpacking		Control		Unpacking	
Item	predicted	actual	predicted	actual	predicted	actual	predicted	actual
1	-.21	-.17	-.40*	-.29	.08	.12	.09	.10
2	-.26	-.07	-.36†	-.19	.06	.05	-.04	-.02
3	.09	.29	.04	.04	.19	.10	.05	.04
4	-.19	-.01	-.22	-.04				
5	.05	-.02	-.12	-.18	.40*	.38*	.05	.11
6	.07	.05	-.04	.06	.22	.22	-.11	-.04
7	.48*	.28	.12	.13	.40*	.39*	-.07	-.12
8	.17	.04	-.11	-.25	.23	.28	-.29	-.25
9	.10	-.05	-.01	.09	.22	.28	-.28	-.19
10	-.26	-.10	-.45*	-.22	.17	.06	-.09	-.16
11	.09	.05	-.29	-.05	.12	.15	-.09	-.11
12	.03	.14	-.35†	-.26	-.03	-.06	-.12	-.10
13	-.02	-.10	-.32	-.18	-.06	-.05	-.06	-.04
14	-.20	.01	-.03	-.01	.38*	.32†	.01	.02
15	.15	.31	.02	-.02	.40*	.40*	.04	.04
16	.02	.24	-.01	.03	.21	.23	-.14	-.08

Note. † $p < .10$, * $p < .05$. For item wording see Appendix I and Appendix J, respectively. Item 10 and Item 12 were aggregated to form a measure of thought focus on financial goals.

Table 15. Summary of Predicted and Actual Spending Across All Studies

	Target	Condition	*N*	Predicted Spending	Actual Spending	paired t-test (*t*)	correlation (*r*)
Study 1	next week		31	$94	$122	2.29*	.61**
Study 2	next week		36	$95	$151	3.18**	-.01
Study 3	next week		88	$101			
Study 4	next week	strong savings goal	16	$83	$178	3.91**	.54*
	next week	weak savings goal	14	$127	$155	1.29	.74**
Study 5	next week		69	$130	$174	3.59**	.64**
	birthday		65	$60	$54	-0.16	.64**
Study 6	next week		31	$203	$286	3.02**	.79**
	event		29	$119	$113	-0.27	.94**
Study 7	next week	control	27	$112	$150	2.39*	.41*
	next week	unpacking	28	$166	$159	0.39	.66**
	event	control	29	$45	$49	0.78	.93**
	event	unpacking	31	$61	$55	- 1.14	.87**

Note. * $p < .05$, ** $p < .01$.

Table 16. Confidence about Predictions and Spending Reports

Study	Item assessing certainty of...	*M*	*SD*
Study 1 (1-10 scale)	target week prediction	6.39	2.19
	second week prediction	6.74	1.91
Study 2 (1-10 scale)	mean daily prediction	7.27	1.42
	mean daily actual report	8.69	1.08
	mean daily predicted purchase awareness	7.28	1.63
	mean daily actual purchase awareness	8.91	1.18
Study 3 (1-7 scale)	target week prediction	4.80	1.42
Study 4 Weak goals (1-7 scale)	target week prediction	4.70	1.15
	actual week report	4.82	.98
Strong goals (1-7 scale)	target week prediction	4.10	1.45
	actual week report	4.77	1.30
Study 6 (1-7 scale)	event prediction	5.14	1.66
	actual event report	6.34	1.05
	target week prediction	5.32	1.49
	actual week report	5.61	1.41
Study 7 Control (1-7 scale)	event prediction	5.76	1.00
	actual event report	6.45	.91
	target week prediction	4.81	1.47
	actual week report	4.70	1.59
Study 7 Unpacking (1-7 scale)	target event prediction	5.74	1.09
	actual event report	6.30	.92
	target week prediction	4.79	1.45
	actual week report	4.15	1.87

Note. Higher numbers indicate more certainty.

Table 17. Typicality of Prediction Targets

	Time of study	Time 1		Time 2 (Followup)			
		"How unusual is next week?" (7=Very Unusual)		"How typical is the amount of money you spent last week for your usual weekly spending?" (7=Very typical)		"Was there anything unusual about last week/this event? (e.g., you might have had midterms)" (7=Very Unusual)	
		M	*SD*	*M*	*SD*	*M*	*SD*
Study 1	Jul 9-Jul 20			5.26	2.83		
Study 2	Jan 15-Feb 30						
Study 3	Nov 4-Nov 29					3.29	2.05
Study 4	Mar 20-Apr 30			4.54	1.44		
Study 5 Birthday	Jan 2-Apr 30						
Study 6 Week	Jan 16-Mar 25 & Nov 16-Dec 14	2.58	2.11				
Study 6 Event		2.36	1.66				
Study 7 Week	Sept 25-Nov 12					4.37	2.21
Study 7 Event						2.50	1.93

Note. Participants responded on 7-point scales.

Table 18. Personality Variables and Spending

		M	*SD*	correlation with predicted spending	correlation with actual spending
Study 3 (Week)	RSES	6.16	.46	-.05	
	LOT-R	4.50	1.09	.11	
Study 7 (Week)	RSES	5.07	1.11	-.08	-.02
	LOT-R	4.32	1.00	-.06	.01
Study 7 (Event)	RSES	5.13	1.01	.05	-.06
	LOT-R	4.47	1.19	.03	.01

Note. ** $p < .01$. Participants responded on 7-point scales. RSES = Rosenberg Self-Esteem Scale (Rosenberg, 1965); LOT-R = Life Orientation Test - Revised (Scheier, Carver, & Bridges, 1994).

Table 19. Money Attitude Correlations with Predicted and Actual Spending Across Studies.

			Money is very important for me.	I often think about how I will spend my money.	I save at least some money each month.	Saving money is very important for me.	I know exactly what I spend my money on.	I feel my money is insuf-ficient.	I have very little money compared to my friends.	I often try to estimate how much I will spend.	I often try to estimat e what I will buy.	I usually spend a lot more money than I thought.
Study 2		predicted	-.22	-.42*	-.10	-.49**		-.17	-.05			
		actual-diary	-.24	-.31	.02	.01		-.28	-.17			
		actual-followup	-.30	-.41*	.06	-.08		-.26	-.15			
Study 3	Delayed	predicted	-.25	-.21	-.34*	-.37*	-.12			-.17	-.22	
	Immediate	predicted	.02	-.07	-.07	.19	-.34**			-.38**	-.12	
Study 6	Week	predicted	.04	.02		-.44*	-.03					-.14
		actual	.08	-.05		-.33	-.08					-.05
	Event	predicted	-.21	-.03		-.15	.02					.03
		actual	-.08	.03		-.08	.11					-.08
Study 7 Week	Control	predicted	.01	.27	.13	-.41*	.36			.45*		
		actual	-.09	.24	.05	.15	-.01			.29		
	Unpacking	predicted	.18	-.09	-.37*	.20	-.41			-.20		
		actual	.07	-.18	-.36*	.26	-.38*			-.04		
Study 7 Event	Control	predicted	-.09	.24	.05	.15	-.01			.29		
		actual	.02	.10	.06	.03	.01			.46*		
	Unpacking	predicted	-.03	-.50**	-.18	.12	-.17			-.25		
		actual	-.05	-.59**	-.51**	.34	-.28			-.32		

Note. Item wording is abbreviated. For the complete item wording see Appendix D.

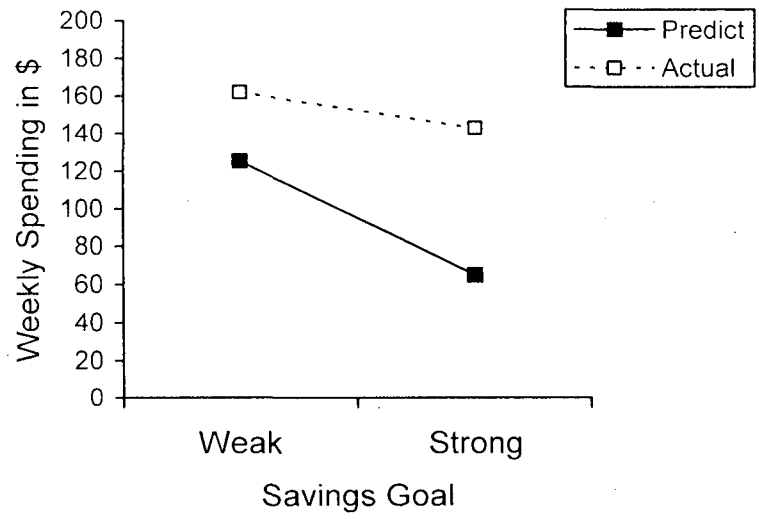

Figure 1. Predicted and actual weekly spending for people who endorsed saving goals strongly (one SD above the mean) and weakly (one SD below the mean) (Study 2)

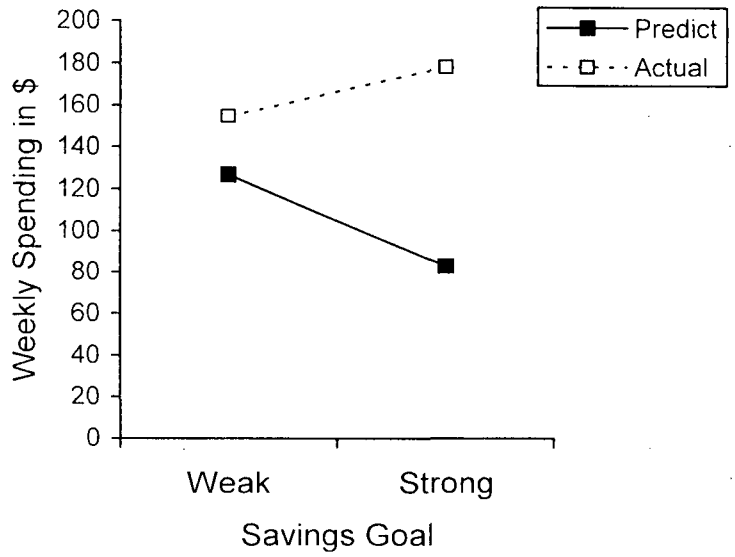

Figure 2. Predicted and actual weekly spending for people in the weak savings goal condition and people in the strong savings goal condition (Study 4)

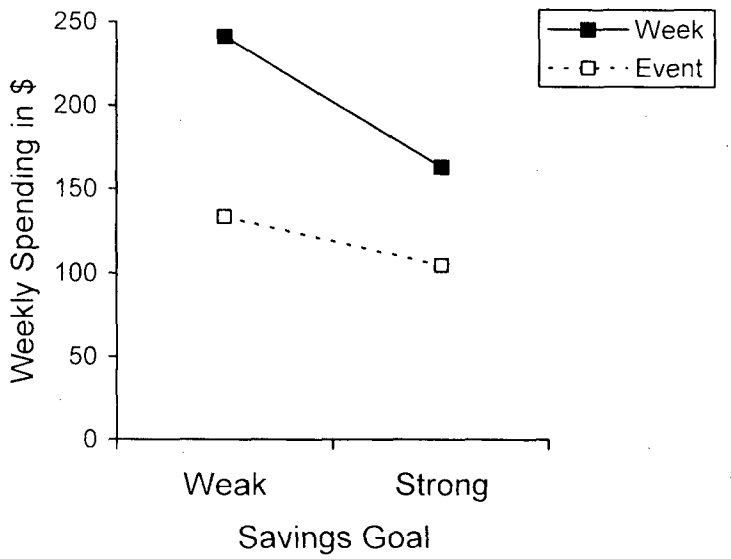

Figure 3. Predicted spending (controlling actual spending) for people who endorsed saving goals strongly (one SD above the mean) and weakly (one SD below the mean) (Study 6)

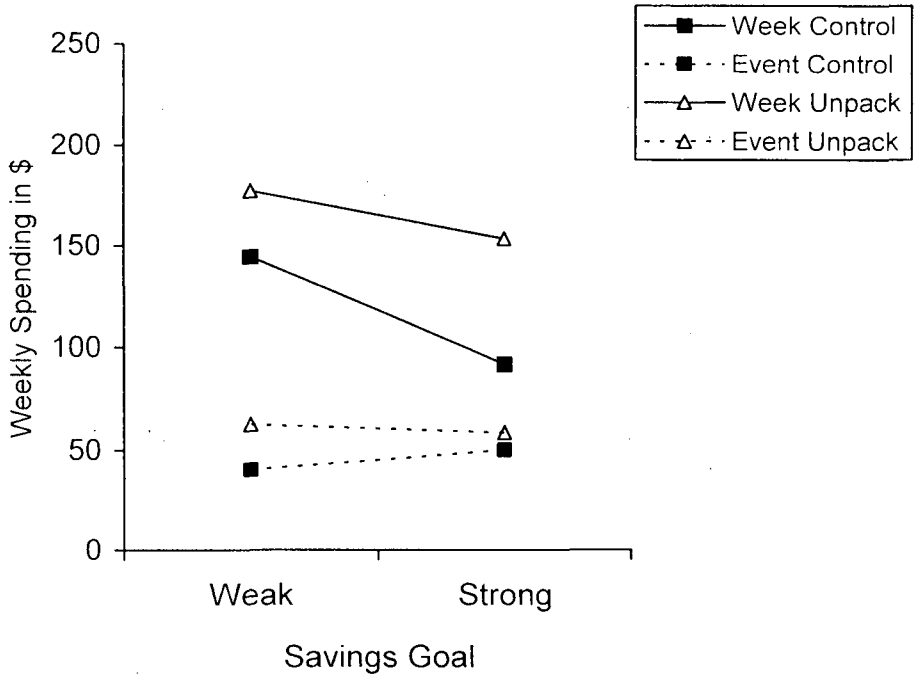

Figure 4. Predicted spending (controlling actual spending) for people who endorsed saving goals strongly (one SD above the mean) and weakly (one SD below the mean) (Study 7).

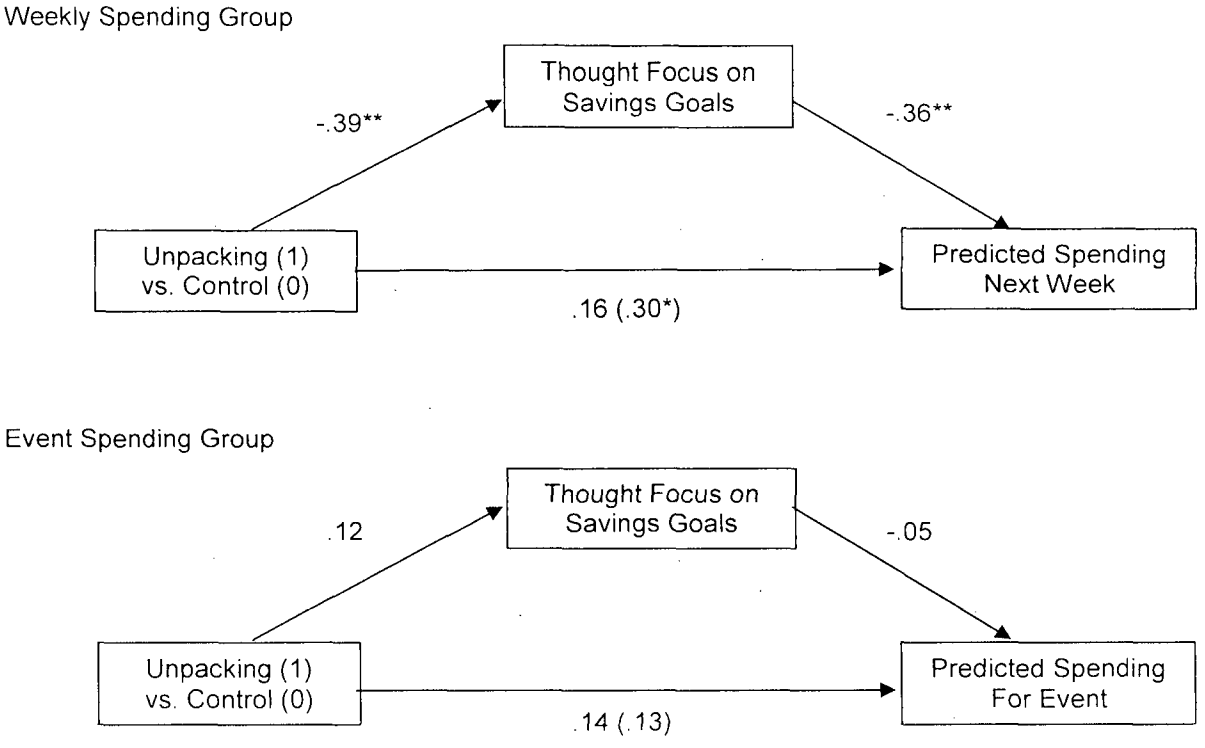

Figure 5. Thought focus on savings goals mediates effect of unpacking for weekly spending predictions (Study 7)