To Know and To Care:
How Awareness and Valuation of the Future
Jointly Shape Consumer Spending

DANIEL M. BARTELS
OLEG URMINSKY

Daniel M. Bartels (bartels@uchicago.edu) is an Assistant Professor of Marketing at the University of Chicago Booth School of Business, Oleg Urminsky (oleg.urminsky@chicagobooth.edu) is an Associate Professor of Marketing at the University of Chicago Booth School of Business. Both authors contributed equally to the research. The authors also thank Eugene Caruso, Stephanie Chen, Emily Hsee, Yun-ke Chin-Lee, Ran Kivetz, Pete McGraw, James Pooley, Stephen Spiller, and Rob St. Louis for helpful comments on this research and thank Jarrett Fowler for superogatory research assistance. Particular thanks to Shane Frederick for substantial feedback and advice throughout the project. This research was supported by a grant from the John Templeton Foundation.

CONTRIBUTION STATEMENT

Prior research on intertemporal choices has tended to focus on either the relative valuation of present vs. future outcomes (using choices with explicit intertemporal tradeoffs) or on the consideration of future outcomes (using choices with implicit intertemporal tradeoffs). However, the literature has not provided an account of how the valuation and awareness of future consequences jointly shape choices with intertemporal consequences, such as the decision whether or not to make a purchase. We describe three possibilities: that the two factors are inseparable and empirically equivalent (H1), that both factors influence choices independently (H2), or that each factor mutually reinforces the other in inducing fiscal restraint (H3). While theorizing in the prior literature is most consistent with H1 or H2, our novel account (H3) proposes that the two factors operate distinctly and fiscal restraint occurs primarily when people both value and consider the future consequences of their purchase. We test between these accounts by manipulating and measuring both the awareness of future consequences (via salient opportunity costs and making tradeoffs) as well as valuation of future outcomes (via connectedness to the future self and time discounting). Consistent with H3, that the consideration of opportunity costs and valuation of future outcomes are mutually reinforcing—people are likely to restrain their spending when both factors co-occur, but are substantially less likely to do so when either factor is absent.

ABSTRACT

Reducing spending in the present requires the combination of being both motivated to provide for one's future self (valuing the future) and actively considering long-term implications of one's choices (awareness of the future). Feeling more connected to the future self—thinking that the important psychological properties that define your current self are preserved in the person you will be in the future helps motivate consumers to make far-sighted choices by changing their valuation of future outcomes (e.g., discount factors). However, this change only reduces spending when opportunity costs are considered. Correspondingly, cues that highlight opportunity costs reduce spending primarily when people discount the future less or are more connected to their future selves. Implications for the efficacy of behavioral interventions and for research on time discounting are discussed.

> *"If you're wasting $5 a day on little things like a latte at Starbucks or a muffin, you can become very rich if you can cut back on that, and actually took that money and put it in a savings account at work, like a 401(k) plan or an IRA account… [I]n your 20s, you can actually be a multimillionaire by the time you reach retirement by simply finding your latte factor and paying yourself back." (Bach 2002)*

The advice above—offered by financial self-help guru David Bach—describes continuous restraint that is difficult to execute: one must both account for future opportunities that current indulgences displace and value those future outcomes, even though the benefits enjoyed by future selves come at the cost of current forbearance. Individual differences in these two dispositions—being aware of and valuing future outcomes— may help explain why people in similar economic circumstances save at different rates (Venti and Wise 2001). Contemporary research investigates each of these factors individually, but has not integrated the two in a framework that would address how awareness and valuation of future outcomes influence choices.

We argue that awareness of future outcomes and the valuation of those outcomes are not only conceptually distinct, but the nature of the interaction between them is important for understanding everyday intertemporal choices. To illustrate the distinction, consider two people, Jan and Fran, who each spend all their discretionary income every month on current consumption instead of saving for the future. Jan spends all her money because, even though she does care about her future welfare, she fails to consider her future financial needs when making purchases now. In contrast, Fran also spends all her money, but does so because she doesn't sufficiently care about the resources she'll have when she's older, despite being aware of the consequences. Thus, studying either factor in isolation would miss how these considerations interact to shape intertemporal choices and would therefore fail to predict either Fran or Jan's lack of restraint in spending.

The current studies focus on how both factors *jointly* affect decisions. We investigate the effect that being aware of future consequences has on spending by examining how much people consider the opportunity costs of their choices. (In this paper, awareness of future tradeoffs and opportunity cost consideration are used interchangeably.) To examine the influence of valuing future outcomes, we both (i) measure and manipulate one antecedent of caring about future outcomes—psychological connectedness to the future self (which has been found to impact time discounting, Bartels and Urminsky 2011), and (ii) directly measure the valuation of future outcomes (via discount factors). The results reveal that awareness and valuation interact to promote thrift.

Next, to fully develop the rationale for this argument, we first discuss factors that influence valuation of future outcomes, and then how the awareness of opportunity costs affects choice. We then contrast our novel account, in which both factors are *mutually reinforcing*, with prior theories that assume awareness and

valuation of future outcomes are either redundant or operate independently. Seven studies demonstrate that valuing future outcomes reduces spending primarily when opportunity costs are considered.

We see the contribution of this work as having three facets. First, our findings contradict related prior research that presents or assumes two possibilities (reviewed as hypotheses 1 and 2 below) and provide evidence for a new view of how valuation and consideration of future outcomes impact choice (hypothesis 3 below). Second, our results may help resolve the puzzle of why time preference (as measured by elicited discount factors) has been only inconsistently linked to consumers' saving or restraint in spending. And third, our supported account has novel practical implications for the potential limitations of well-intentioned interventions designed to improve consumer decisions.

THEORETICAL BACKGROUND

Valuation of future outcomes.

Time preferences (i.e., the strength of preferences to receive outcomes sooner and thereby forego larger outcomes that occur later) have been interpreted as revealing how much the future is valued, and have been viewed as a primary determinant of savings and spending decisions (see Frederick, Loewenstein, and O'Donoghue 2002; Urminsky and Zauberman 2015 for reviews). While the degree of discounting, the functional form of discount rates, and correlates of discounting have been widely studied, less work examines the motivational reasons why people discount future outcomes so steeply, and why some people are less patient than others. While prior work has primarily focused on economic considerations (e.g, liquidity constraints; Meyer, 1976) and perceptual accounts (e.g., subjective time, Zauberman et al. 2009; comparison of delay relative to outcome, Scholten and Read 2010), intertemporal choices do involve conflict between competing motivations (Urminsky and Kivetz 2011).

One starting point for understanding the underlying motivations is the idea that a person can be construed as a temporal sequence of overlapping, but partly distinct selves (Parfit 1984), rather than a single irreducible entity over time. The motivation to sacrifice consumption on behalf of future selves could then depend on how "connected" the current self feels toward those future selves—how much overlap the person perceives with respect to beliefs, values, goals, and other defining features of personal identity. The more one anticipates change in these aspects, the less motivated the person may be to save for the future self who will benefit. Recent work finds that a high sense of connectedness increases patience in intertemporal choice tasks (Bartels, Kvaran, and Nichols 2013; Bartels and Rips 2010; Bartels and Urminsky 2011). Building on this work, in the current paper we investigate time preferences both directly (using a measure of tradeoff between present and future outcomes) and via an underlying motivation which affects time preferences (measuring and manipulating how connected people feel toward their future selves).

Most research on time discounting has measured preferences using explicit tradeoffs between smaller rewards available sooner and larger rewards available later (e.g., would you rather have $500 in a week or $1000 in a year?). Spending decisions, by contrast, are rarely explicitly framed as an intertemporal tradeoff (Rick and Loewenstein 2008). For example, a person might spend $4 on a latte at Starbucks without thinking about opportunity costs at all (Frederick et al. 2009), and people may make such decisions without considering the future opportunity costs of the expenditure. The existing work on connectedness has used explicit intertemporal tradeoffs and has not studied choices with only implicit future consequences, such as spending decisions. Furthermore, this distinction may help explain why studies using laboratory-derived estimates of discounting to predict "far-sighted" decision making in the field have yielded mixed results (e.g., Chabris et al. 2008; see Urminsky and Zauberman 2015 for a review).

Awareness of future outcomes.

Studies have found that highlighting opportunity costs or tradeoffs restrains spending. Frederick et al. (2009) found that merely reminding people that unspent money could be used for other purposes reduced intended spending. In our studies, we will adopt similar methodology, manipulating the salience of opportunity costs, to affect consumers' awareness of the tradeoffs inherent in their choices—specifically, the other uses of money that current purchases displace. While some of the opportunity costs people consider may be in the present (e.g., other items in the same store), the opportunity cost of a current purchase could often also be construed as reduced consumption in the future.

Manipulations that explicitly direct attention to future consequences can increase preferences for delayed rewards (Hershfield et al. 2011), and a greater focus on long-term consequences predicts higher intent to save more money for retirement (Nenkov, Inman, and Hulland 2008) and higher (self-reported) incidence of healthy behaviors (Strathman et al. 1994). Individual differences in the propensity for financial planning (e.g., explicit consideration of future spending) likewise predict accumulated wealth, coupon use, and credit score (Lynch et al. 2010). Thus, greater awareness of future consequences increases farsighted-behaviors for at least some of the population.

However, to date there has been minimal overlap between research investigating the consideration of future outcomes and research investigating the valuation of future outcomes. Neither the distinction, nor possible interactions are typically discussed. For example, in empirical research using the widely studied tradeoff tasks (choices between outcomes differing in their delay and magnitude), the consideration of those future outcomes is taken for granted (Ainslie 1975; Chabris et al. 2008; Loewenstein and Prelec 1992). Accounts of decision-making based on this discounting literature, then, often assume that people vary in patience, without distinguishing between consideration and valuation of future consequences as determinants of patience.

In the current studies, we investigate the unaddressed question of whether and how these two factors interact in shaping people' spending decisions. We find that awareness of future outcomes and valuation of the future interact to predict people's choices. Our finding that awareness of future outcomes plays a moderating role may offer insights into why financial outcomes have not been consistently predicted by measures of discounting in the prior literature.

Next, we discuss three distinct possibilities—our account and two competing accounts implied by the prior literature—for how the combination of considering future consequences and valuation of future consequences influence decisions. As illustrated in Figure 1, these accounts make different predictions about how purchase likelihood will be affected by manipulations that target the consideration of future outcomes (e.g., emphasizing opportunity costs vs. not) and valuation of future outcomes (e.g., affirming connectedness vs. not).

One possibility is that the two factors are closely linked in people's deliberation. Thinking more about future consequences may induce people to place a higher value on future outcomes than they would otherwise. Correspondingly, people with higher valuations of future outcomes in general might invest more effort in considering the future consequences of a specific choice.

H1—Inseparability: Restrained spending depends on a single construct reflecting the awareness of and valuation of future outcomes—greater awareness of future outcomes co-occurs with higher valuation of those outcomes. So, each factor induces the other.

Some research has taken a position consistent with this view. The degree of consideration of future outcomes has been interpreted as one determinant of discounting (Logue 1988, Radu et al. 2011). Conversely, impatience—steep discounting—has been proposed as underlying inattention to future outcomes (Ainslie 1992). More generally, some researchers have argued that those with more concern for the welfare of future selves (e.g., people who discount the future less) will be motivated to more assiduously investigate the future consequences of a present action (Hershfield, Cohen and Thompson 2012; Strathman et al.1994).

If H1 holds, manipulating one factor would also affect the other: A manipulation that increased valuation of future outcomes would also increase consideration of future outcomes (such as opportunity costs) and a manipulation that increased consideration of future outcomes would also increase valuation of those outcomes. So, prompting either (i) consideration of future consequences, (ii) or valuation of future consequences, or (iii) both would all produce similar outcomes, as each is sufficient to promote far-sighted behavior (see first panel of Figure 1). Purchases would be most likely specifically when people are both not thinking about opportunity costs *and* not valuing future outcomes.

H2—Independence: Awareness of future outcomes and valuing those outcomes contribute independently to restrained spending.

An alternative possibility is that each factor independently influences choices. Many previous approaches investigated the effect of one factor independently of the other, usually uninvestigated, factor. More explicitly in line with this assumption, Adams and Nettle (2009) correlated measures of smoking with a measure of discounting and, separately, with the propensity to consider future consequences, without considering interactions. Similarly, quantitative models of consumer choice often either assume a fixed discount rate consistent with market interest and estimate aspects of the planning horizon (e.g., probability of taking future discounts into account, Hartmann 2006) or fix the planning horizon and estimate the discount rate (Yao et al. 2012).

Empirically, if H2 holds, manipulating either factor does not affect the influence of the other factor—the likelihood of purchase would reveal two simple effects with *no* interaction (see middle panel of Figure 1).

Lastly, we propose a third view, distinct from H1 and H2 and unexplored in the literature thus far. We argue that consideration of and concern for future outcomes may be neither equivalent nor independent, but may instead be mutually reinforcing. The specific interaction we predict is the following: Consideration of future consequences will promote restrained spending more when the person cares about the welfare of her future self, and this concern will motivate thrift more when she sees her current consumption as reducing future welfare.

H3—Mutual reinforcement: Restrained spending requires both being aware of future outcomes and valuing those outcomes.

To illustrate the differences between these hypotheses, let's return to our earlier example: Jan spends all her money because although she cares about her future needs, she doesn't think about them when making purchases. In contrast, Fran understands the consequences of her current spending but doesn't care about what happens to her when she's old. How would Jan and Fran be affected by interventions that target the awareness or valuation of future consequences? First, H1 suggests that (i) interventions that increase valuation of future consequences or (ii) reminders to consider tradeoffs would help both people reduce their spending (because both interventions impact the same construct), which is inconsistent with the distinction drawn between Jan and Fran.

Similarly, H2 would imply that either intervention should be helpful, because it assumes that getting Jan to care even more about her future needs or getting Fran to pay even more attention to future consequences would reduce their spending. However, in this example, the first intervention wouldn't help Jan (who doesn't think about the future), and the second wouldn't help Fran (who doesn't care about her future). H3, on the other hand, implies that making Jan care more about her future self won't reduce spending nor will reminding Fran of the tradeoffs she's making. But doing the reverse—reminding Jan and inducing caring in Fran—would reduce spending, as would combing these interventions.

While H3 is reflected conceptually in some quantitative models of decision making (e.g., Winer 1997), the two factors have not been jointly estimated due to the difficulty in empirically identifying both factors from choices observed in field data. However, we can test H3—and distinguish its predictions from those of H1 and H2—using direct measurement and experimental methods. Under H3, manipulations that prompt consideration of future outcomes will be most effective at reducing purchases when people value (or are prompted to value) those future outcomes (see last panel of Figure 1). As a result, reduced spending will occur primarily when opportunity costs are recognized *and* valuation of future outcomes is high.

In this paper, we test the mutual reinforcement account (H3) against the other accounts suggested by prior literature (H1 and H2). As noted earlier, we operationalize the valuation of future outcomes in two ways: (i) we measure and manipulate one antecedent of caring about future outcomes—psychological connectedness to the future self and (ii) measure the valuation of future outcomes (via discount factors). To operationalize awareness, we both measure people's tendency to consider future outcomes (via their propensity to plan) and manipulate it (by providing opportunity cost reminders and prompting relative comparisons). We discuss the novel implications of our findings for the design of policy interventions.

STUDY 1A: CONNECTEDNESS AND OPPORTUNITY COST SALIENCE JOINTLY DETERMINE WILLINGNESS TO PURCHASE

Studies 1a and 1b examine how recognition of the tradeoffs inherent in choices and how valuation of the future (which increases with greater connectedness to the future self—Study 1a, and is reflected in measures of discounting—Study 1b) jointly determine financial decisions. Any single contemplated expenditure, by itself, rarely jeopardizes any other specific spending or savings goals and so may often be made without considering opportunity costs. However, the notion of opportunity cost can be readily cued, and we predict that doing so will potentiate the relation between connectedness and thrift.

Method

Eighty-eight adults were approached on a college campus and nearby museum to complete a short survey in return for a candy bar. They rated psychological connectedness to their future self—how much they felt that the important psychological properties that define their current selves would be preserved in their future selves, and on a corresponding visual scale using Euler circles, each coded to 0-100 (see Appendix A for materials). These two measures were substantially correlated ($r = .40$, $p < .001$), and we used the average as our measure of connectedness. Then, following Frederick et al. (2009), respondents chose whether to

spend $14.99 on a hypothetical DVD, and we manipulated the salience of the expenditure's opportunity cost by including or excluding the reminder in brackets below:

> *Imagine that you have been saving some extra money on the side to make some purchases, and on your most recent visit to the video store, you come across a special sale on a new DVD. This DVD is one with your favorite actor or actress, and your favorite type of movie (e.g., comedy, drama, thriller, etc.). This particular DVD that you are considering is one that you have been thinking about buying for a long time. It is available at a special sale price of $14.99.*
>
> *What would you do in this situation? (please circle A or B)*
>
> *(A) Buy this entertaining DVD*
> *(B) Not buy this entertaining DVD [keeping the $14.99 for other purposes]*

Results and Discussion

Consistent with prior work, providing an information-neutral opportunity cost cue marginally reduced purchase intentions (from 71% to 51%; $\chi^2(1) = 3.69$; $p = .055$). More importantly, as predicted by H3, the relation between psychological connectedness and purchase intent was much stronger when opportunity costs were highlighted (biserial correlation r (43) = -.41, $p < .01$), than when they were left implicit (biserial correlation r (45) =.04, *n.s.*; difference between correlations $z = 2.14$. $p < .05$). A floodlight analysis (Spiller et al. 2013) based on a fitted logistic regression model (Figure 2; Appendix B, Table 1) found that the opportunity cost cue significantly decreased purchase rates for people with connectedness scores 0.11 standard deviations above the mean and higher. Among consumers with connectedness scores one-standard deviation above the mean, for example, the opportunity cost reminder decreased purchase rates from 73% to 30%. Among those whose connectedness scores were less than 0.11 standard deviations above the mean, the opportunity cost cue did not have any significant effect.

These results are inconsistent with the alternative possibilities (H1 and H2). Under H1 (Inseparability), we would not expect to see an effect of highlighting opportunity cost among people who were high in connectedness to the future self because H1 predicts that people high in connectedness would spontaneously consider opportunity costs. Under H2 (Independence), we would expect to see an equally strong effect of manipulating opportunity costs for those who are high or low in connectedness. So, these results suggest—consistent with H3—that restraint in spending arises from the *combination* of highlighting opportunity cost (which facilitates the recognition that money saved now can be spent later) and connectedness to the future self (which motivates caring about the future selves that benefit from savings).

STUDY 1B: OPPORTUNITY COST SALIENCE AND ESTIMATES OF DISCOUNTING JOINTLY DETERMINE WILLINGNESS TO PURCHASE

As noted earlier, while prior work has theorized that estimates of discounting elicited via explicit tradeoffs would predict a wide range of behaviors, relatively modest correlations between estimates of discounting and behaviors in the field have been found (see Urminsky and Zauberman 2015 for a review). In particular, to our knowledge, there is no research linking level of spending (such as purchase probabilities or amount spent) and separately measured discounting measures. The results of Study 1a suggest that, in contrast with the stylized choices involving explicit tradeoffs that have been studied in discounting tasks, many real world choices lack explicit tradeoff cues. So, we predict that measures of discounting will correlate more strongly with purchase choices when tradeoffs between the choice options are highlighted.

Method

Two hundred thirty three online participants completed a titration task where participants chose between $900 in a year and various smaller amounts available immediately. We used these choices to compute the *discount factor* (the proportion of present value retained when the amount of money is delayed, often represented by δ) for each participant. Note that the discount factor (δ) and discount rate (often represented by r) are simple nonlinear transformations of each other: $\delta = 1/(1+r)$, and $r = (1/\delta)-1$. We use the discount factor because the distribution of elicited discount rates is often highly skewed. A high discount factor represents greater patience, or valuation of the future, while a low discount factor signals impatience, or steep discounting (i.e., a high discount *rate*). Discount factors at the time of measurement can be thought of as reflecting both potentially stable individual traits as well as situational factors (Urminsky and Zauberman 2015). After responding to the discounting task, participants decided whether to purchase the DVD, with opportunity cost salience manipulated as in Study 1a.

Results and Discussion

As predicted by H3, and inconsistent with both H1 and H2, the relation between discount factor and purchase intent was stronger when opportunity costs were highlighted (r (121) = -.20, $p < .05$), than when they were left implicit (r (112) =.09, $p > .10$; difference between correlations $z = 2.21$. $p < .05$). A floodlight analysis based on a fitted logistic regression model (Figure 2; Appendix B, Table 2) found that for the more patient respondents (those with discount factors of .74 or higher; 46% of the sample) the opportunity cost reminder significantly decreased purchase rates. However, for the more impatient respondents with discount factors below .74, the manipulation of opportunity cost did not have any significant effect on purchases.

These results support the contention that how people trade off the present against the future (as represented by their measured discount factor) predicts their purchase decision specifically when tradeoffs in

the purchase context are highlighted. This result is (directionally) weaker than in Study 1a, consistent with the view that elicited discount factors are multiply determined while connectedness represents a motivational determinant of discount factors that may be particularly relevant to reducing spending. We will revisit the role of discounting in Study 4, where we both manipulate connectedness to the future self and measure the resulting differences in discount factors.

More broadly, these findings suggest a solution to the puzzle of why estimates of discounting do *not* consistently predict consumer behavior in previous studies, despite representing a partially stable individual difference (as evidenced by test-retest reliability, per Simpson and Vuchinich 2000; see Urminsky and Zauberman 2015 for a review). When behaviors are not spontaneously construed as a tradeoff between present costs and future benefits at the time of choice (e.g., flossing, making credit card payments on time), we anticipate that measured discount factors will be a relatively weak predictor. However, when behaviors are spontaneously construed as intertemporal tradeoffs (e.g., trading off time and inconvenience now to avoid periodontal disease or interest charges later), discount factors, as elicited via explicit intertemporal tradeoffs, should be an effective predictor. Conversely, many behavioral interventions (or "nudges"), such as providing information about future consequences (Koehler, White, and John 2011) may be ineffective for precisely those people whose behavior appears the most shortsighted—those who heavily discount the future.

STUDY 2: THE ROLE OF SPONTANEOUS AND PROMPTED OPPORTUNITY COST CONSIDERATION IN DISCRETIONARY SPENDING

In Study 1, we manipulated the salience of opportunity costs, but some people may be less likely to require such prompts. Spiller (2011) found that people with greater propensity to plan for the future (a scale introduced by Lynch et al, 2010) are more likely to spontaneously recognize opportunity costs. This suggests that connectedness to the future self may be a stronger predictor of discretionary purchasing among those with greater propensity to plan, much as we predict it to be when opportunity costs are experimentally cued.

Method

One hundred ninety-nine adult consumers completed an online survey involving the DVD scenario from Study 1 and, after making their choice, completed the connectedness measures from Study 1. They then completed the "Consideration of Future Consequences" scale (Strathman et al. 1994), and the "Propensity to Plan for Money" scale (Lynch et al. 2010) adapted to a one-year time frame. We also measured the Elaboration of Potential Outcomes scale (Nenkov et al, 2008), but only weak non-significant relationships were found, which we do not discuss further.

Results and Discussion

The opportunity cost manipulation reduced intended purchase rates from 63% to 49% ($\chi^2(1) = 4.1$; $p < .05$). The manipulation did not affect the subsequent connectedness measure ($r(199) = -.02$, $p = .82$),

confirming that awareness of future implications and concern for them (as measured by connectedness) are empirically distinct, contrary to H1. Since the manipulation of opportunity costs affected choices but not the later connectedness measure, this pattern is also inconsistent with a self-generated validity (Feldman and Lynch 1988) interpretation of connectedness—i.e., that participants inferred their connectedness from their choice.

A floodlight analysis based on a fitted logistic regression model (Figure 2; Appendix B, Table 3) found that the opportunity cost cue significantly reduced purchasing for people higher in connectedness (.06 SD above the mean or higher). For them, the opportunity cost reminder decreased purchase rates from 60% to 34%. Conversely, among those whose connectedness scores were below the mean, the manipulation had no effect (70% vs. 73%).

In this study, we analyzed two measures of spontaneous consideration of opportunity costs. The consideration of future consequences scale and the propensity to plan scale correlated strongly with each other (r = .53). Both measures also correlated significantly— though not especially strongly—with connectedness to the future self (rs = .18 and .22, ps < .01).

Overall, purchase intent was negatively correlated with connectedness, propensity to plan, and consideration of future consequences (biserial correlations of r = -.26, p < .01; r = -.19, p < .01 and r = -.17, p < .05). However, as predicted by H3, higher connectedness related to lower probability of purchase intent when opportunity costs were highlighted (β = -.94, p < .001), but not in the control condition (β = -.21, p = .38). The difference between logistic regression slopes is statistically significant (β_{INT} = -.37, p = .04, Table 3 in Appendix B). Additionally, when opportunity costs were experimentally highlighted, the spontaneous propensity to plan became a directionally weaker predictor of purchase intent (r = -. 31 vs. -.09, p = .10), as did consideration of future consequences (r = -.24 vs. -.12, *n.s.*).

These results suggest three insights: (i) consistent with the findings of Study 1a, psychological connectedness to the future self has a greater effect on purchase decisions when tradeoffs are highlighted, (ii) highlighting tradeoffs reduced spending more for participants low in propensity to plan, similar to Spiller (2011), and (iii) highlighting tradeoffs reduces the significance of individual differences in the spontaneous tendency to do so.

To model the combined effects of these factors, we jointly regressed respondents' purchase decision on opportunity cost cue, connectedness, propensity to plan and the interactions between these variables. All of the predictor variables (except for connectedness) and all pairwise interactions were significant. More importantly, the three-way interaction was significant (all ps < .01), indicating that measured propensity to plan moderated the interaction of connectedness and opportunity cue reminder. The full details of the logistic regression are given in Table 4 of Appendix B, where we have z-scored the continuous variables and coded

the opportunity cost manipulation as -1 (no reminder) or 1 (reminder). A second analysis using consideration of future consequences instead of propensity to plan yields similar results (see Table 5 in Appendix B).

The predicted means in Figure 3 suggest connectedness depressed purchase intent when opportunity costs were chronically salient (for people with a high propensity to plan) or situationally salient (an opportunity cost cue was provided). A floodlight analysis reveals that, in the salient opportunity cost condition, higher connectedness consistently predicted lower likelihood of purchase, a relationship that was significant for Propensity to Plan 1.07 SD above the mean or lower. In the no-reminder condition, connectedness predicted lower purchase probability for people with Propensity to Plan scores of .70 SD above the mean or higher. Unexpectedly, among those with low propensity to plan (.20 SD below the mean or lower) who were not cued to consider tradeoffs, connectedness significantly elevated purchase intent. However, there is no significant overall positive effect of connectedness on purchase probability when the opportunity cost cue is not present. We return to this potential unanticipated result in the General Discussion, where we provide meta-analysis results.

These findings have implications for understanding the efficacy of behavioral interventions that remind people of the future consequences of their actions (e.g., that buying a latte means spending down one's retirement account). Such interventions are likely to be less effective for those who don't identify strongly with their future selves (and may therefore steeply discount the value of future outcomes) and are likely to be redundant for people who already spontaneously construe the opportunity costs of their choices.

STUDY 3: HIGH CONNECTEDNESS AND SALIENT OPPORTUNITY COST DECREASE PREFERENCE FOR AN EXPENSIVE OPTION

The prior results support our contention that financial restraint arises from the combination of connectedness to the future self (which motivates savings) and recognition of tradeoffs (whether spontaneous or experimentally induced). In the following study, we extend these findings by manipulating (rather than merely measuring) connectedness.

Method

We collected 137 complete surveys from adult online participants who indicated that they would consider buying a tablet computer. Using a 2 x 2 between-subjects design, we crossed an opportunity cost manipulation used by Frederick et al. (2009) with a psychological connectedness manipulation used by Bartels and Urminsky (2011) that induces the belief that one's identity will (or will not) substantially change. Participants in the high connectedness condition (N = 69) began by reading a short description of recent research suggesting that adulthood is characterized by stability in identity (e.g., "*the important characteristics*

that make you the person you are right now... are established early in life and fixed by the end of adolescence"). Participants in the low-connectedness condition ($N = 68$) read about instability (e.g., "*the important characteristics that make you the person you are right now... are likely to change radically, even over the course of a few months....*"). To ensure comprehension, participants wrote a one-sentence summary of the passage they read. They then rated their connectedness to the future self as described in Study 1a. The manipulation influenced rated connectedness as intended ($M = 77.1$, SD = 16.3 in the high condition vs. M = 62.8, SD = 19.5 in the low condition; $t(135) = 4.68$, $p < .01$).

Participants were then presented with the choice below. The $100 price difference between the two products was left implicit in the control condition ($N = 67$), but stated explicitly for participants in the "salient opportunity cost" condition ($N = 70$). These prices were accurate at the time the study was run:

> *Imagine that you have been saving some extra money on the side to make some purchases, and that you are faced with the following choice. Select the option you would prefer.*
>
> *(A) Buy a 64 Gigabyte Apple iPad for $735*
> *(B) Buy a 32 Gigabyte Apple iPad for $635 [leaving you $100 for other purposes]*
> *(C) Not buy either iPad*

Results and Discussion

In the high connectedness condition, adding the opportunity cost reminder decreased the choice share of the premium iPad, from 35% to 6% ($\chi^2 = 9.3$, $p < .05$) but had no such effect in the low connectedness condition (27% vs. 23%, *n.s.*). The difference in connectedness reduced choices of the premium product when opportunity costs were cued (23% vs. 6%, $\chi^2 = 4.2$, $p < .05$), but not when the cue was absent (27% vs. 35%, *n.s.*). A logistic regression on choice of the premium product reveals no effect of connectedness, a significant effect of opportunity cost cue, and a significant interaction ($\beta = -.490$, Wald = 3.9, $p < .05$; see Table 6 of Appendix B).

To understand the average amount spent, we coded the cost of the chosen option ($0, $635, or $735) and regressed this measure on connectedness, opportunity cost cue, and their interaction. The predicted interaction was significant ($\beta = -59.97$, $t = -2.11$, $p < .05$, bootstrap $p < .05$ to correct for the ordinal DV) with no main effects (βs = -12.10 and -22.32, ts <1 for Connectedness and Opportunity Cost Cue; See Table 7 of Appendix B), suggesting that exercising financial restraint requires both high connectedness to one's future self and a reminder to consider opportunity costs of current expenditures. Similarly, to account for the ordinal dependent variable, an ordinal regression analysis revealed the predicted interaction ($\beta = -.377$, Wald = 4.4, $p < .05$; see Figure 4 and Table 8 of Appendix B) and no significant main effects. Likewise, the interaction

when predicting probability of any purchase was significant (β = -.490, Wald = 4.0, $p < .05$, Table 9 of Appendix B). These results suggest that exercising financial restraint requires both high connectedness to one's future self and a reminder to consider opportunity costs of current expenditures.

STUDY 4: CONNECTEDNESS TO THE FUTURE SELF AFFECTS CHOICES BY DECREASING TEMPORAL DISCOUNTING

Discount factors measure an in-the-moment time preference, which is sometimes viewed as a somewhat stable individual difference. However, prior work has found that manipulating connectedness to the future self affects time discounting, as measured by explicit tradeoffs between receiving lump sums of money at discrete times (Bartels and Urminsky 2011). Time discounting, in turn, is often theorized to underlie consumer decisions about spending and saving. Consistent with this view, parallel effects of measured connectedness and discount factors were found in Studies 1a and 1b, such that valuing the future corresponded to less purchasing only when opportunity costs were cued.

Study 4 tests for a direct link between connectedness and discount factors in influencing consumer choices. To do so, we manipulate both opportunity cost salience and connectedness, and we measure time preference (via discount factor), observing the effect on a discretionary purchase decision similar to that used in Study 3. Doing so allows us to test whether and when specifically *connectedness-induced changes in time preference* affect people's discretionary purchase choices.

Study 4 will also help address the puzzle of why estimates of discounting often weakly predict consumer behavior, as Study 1b did. Replicating our earlier result, we will again find that discount factors predict discretionary purchase behavior only when tradeoffs are highlighted. Specifically, the results indicate that (i) manipulating connectedness to the future self changes how people value the future (as reflected by discount factors), and (ii) it is primarily when opportunity costs are made explicit that these changes in discount factors explain changes in people's spending vs. saving decisions.

Method

We collected 146 complete surveys from adult online participants who indicated that they would consider buying a tablet computer. Connectedness was manipulated as in Study 3, and opportunity cost salience was manipulated by leaving the $230 price difference between two iPad 2 models implicit in the control conditions (N = 79) or highlighting the difference for participants in the "high opportunity cost salience" conditions (N = 67). These prices were accurate at the time the study was run:

> *Imagine that you have been saving some extra money on the side to make some purchases, and that you are faced with the following choice. Select the option you would prefer.*

(A) Buy a 64 Gigabyte iPad 2 with Wi-Fi and 3G for $829

(B) Buy a 32 Gigabyte iPad 2 with Wi-Fi for $599 [leaving you $230 for other purposes]

(C) Not buy either iPad 2

Following the iPad choice, an average annual discount factor was computed for each participant by averaging responses to four discounting tasks involving choices between smaller-sooner and larger-later monetary amounts, as shown in Appendix C (α = .86, although estimates of reliability can be inflated by common method variance; Kardes, Allen, and Pontes 1993).

Results and Discussion

Time preference. Making people feel more psychologically connected to their future selves increased the value respondents placed on explicitly-specified future outcomes, as assessed by the discounting tasks (average discount factor δ = 0.51, SD = .21 vs. average δ = 0.58, SD = .17; t (144) = 2.16, $p < .05$; see also Table 10 in Appendix B).

Spending on discretionary purchase. Increasing connectedness eliminated choices of the premium product when opportunity costs were cued (9% vs. 0%), but had no effect when the cue was absent (8% vs. 7%). Given the low rate of selecting the premium product and the zero cell (no purchases of the expensive iPad in the opportunity cost salient, high connectedness condition), we focused on amount spent, coding the cost of the chosen option (either $0, $599, or $829) for statistical analysis.

Making people feel more connected to their future selves only reduced spending when opportunity costs were cued (M = $311, SD =332 vs. M = $159, SD = 268; $t(65) = 2.08$, $p < .05$), but not when the cue was absent (M = $213, SD = 317 vs. M = $273, SD = 324, *n.s.*). We ran a linear regression predicting intended spend, with opportunity cost cue coded as -1 (no cue) vs. 1 (cue) and connectedness coded as -1 (low) vs 1 (high). There were no significant main effects, but the predicted interaction between opportunity cost and connectedness was significant (β = -53.25, t = 2.05, $p < .05$, bootstrap $p < .05$ to correct for the ordinal DV; Table 11 of Appendix B). Note that an ordinal regression yields the same results, but the linear regression is reported because the observed zero cell violates the assumptions of the significance tests used in ordinal regression. Figure 5 shows that the experimental induction of greater connectedness reduced spending only when opportunity costs were explicit.

The reduction in spending caused by high connectedness when opportunity costs were cued was driven by a marginally significant increase in not purchasing (52% vs. 74%, $\chi^2 = 3.47$, $p = .06$). When opportunity costs were not cued, there was no increase in refraining from purchasing between the low vs. high connectedness conditions (68% vs. 57%, $\chi^2 = .91$, $p > .3$). A logistic regression predicting non-purchase

reveals a significant interaction between opportunity cost salience and connectedness (β = -.352, Wald = 4.0, $p < .05$; Table 12 in Appendix B) and no significant main effects.

Role of time preference.

When opportunity costs are explicit, choosing whether to buy an expensive iPad or save the money for something else more closely resemble the choices used to impute the discount factor— both are decisions explicitly framed as a tradeoff. Consistent with this view, the more patient participants with higher discount factors (imputed from intertemporal choices, see Appendix C) chose to spend less in the scenario only when opportunity costs were explicit, (r = -.31, $p < .05$), and discount factor did not predict iPad choice otherwise (r = .08, *n.s.*). These results help explain why discount factors imputed from choices involving *explicit* tradeoffs may have limited predictive validity for a large variety of real-world choices—those where the tradeoffs are not spontaneously considered.

Our data suggest that the effect of connectedness on spending is both moderated by the opportunity cost cue and partially mediated by the discount factor (see Figure 6). When opportunity costs are cued, the connectedness-induced change in spending is mediated by connectedness-induced changes in time preference, as denoted by the significant bolded coefficients. In contrast, connectedness also induces changes in time preference when opportunity costs are not cued, but time preference no longer affects spending.

A significant main effect of manipulating connectedness on the discount factor ($p <$. 05, Table 10 in Appendix B), and a significant interaction between the connectedness and opportunity cost cue manipulations on spending ($p < .05$, Table 11 in Appendix B) support this interpretation. Also, the interaction between discount factor and opportunity cost cue ($p < .05$, Table 13 in Appendix B) on spend was significant. The interaction between connectedness and opportunity cost is reduced when the model includes an interaction between discount factor and opportunity cost (Table 14 in Appendix B).

Based on the framework of Muller, Judd and Yzerbyt (2005), this suggests that opportunity cost salience moderates the effect of connectedness on spending through its effect on the discount factor. Consistent with this interpretation, opportunity cost cue significantly moderates the indirect effect of connectedness on spending (via discount factor) (β = -335.8, t = -2.39, $p < .05$), in a moderated mediation model (Figure 6, based on Model 3 in Preacher, Rucker and Hayes, 2007).

Study 4 addresses both (i) why connectedness to the future self will *not* affect people's spending when opportunity costs are neglected and (ii) how connectedness *does* affect spending. Our results suggest that making a person feel more connected to the future self reduces their spending precisely because of changes in how they value the future. The effect of the connectedness manipulation on choices involving stylized monetary rewards parallels the effect on discretionary purchase decisions, provided that opportunity costs are highlighted. By making the opportunity costs of buying an iPad explicit, participants are invited to

think through the tradeoffs in this purchase decision, and the purchase choice is therefore predicted by the discount factor imputed from choices involving explicit tradeoffs. In contrast, the same discount factor may have limited validity for predicting those choices that the decision maker does not view as tradeoffs.

STUDY 5: CHANGES IN CONNECTEDNESS REDUCE CONSEQUENTIAL PURCHASES FOR PEOPLE WHO SPONTANEOUSLY CONSIDER OPPORTUNITY COST

Studies 1-4 have used realistic but hypothetical choice scenarios. In the next study, we investigate how manipulated connectedness and the measured tendency to consider opportunity costs jointly affect a consequential decision by having participants make a purchase in the lab.

Method.

A sample of adults (N = 102) in a Midwestern city participated in a study in a decision laboratory for $2. Participants were told that they would also be eligible for a performance-based bonus. In the study, participants completed four rounds of a task where they were asked to count the number of ones in an 8x8 matrix of zeros and ones, and to enter that number. This task, adapted from Abeler et al. (2011), is designed to be tedious. Participants could not proceed to the next trial until they had entered the correct number. After completing these four trials, participants were notified that they had received a $2 bonus for correctly completing the four counting tasks.

Next, we manipulated connectedness using the information-based method described in Study 3. On the following screen, participants were offered a chance to spend some of their $2 in bonus money to buy zero, one, two, three, or four Ghiradelli chocolate squares for 50 cents each, a typical retail price. A bowl with multiple flavors of individually wrapped chocolates was displayed in the testing room. After indicating their choice, participants then filled out the Propensity to Plan scale, as in Study 2. Any unspent money was paid to participants as a bonus.

Results and Discussion.

In a regression analysis, we predicted the number of chocolates purchased by connectedness condition (-1 = low connectedness, +1 = high connectedness), propensity to plan score (z-scored), and their interaction. This analysis revealed no main effect of connectedness (β = .06, $t < 1$), a marginal main effect of Propensity to Plan (β = -.13, t = -1.80, p = .08), and the predicted interaction (β = -.19, t = 2.62, p = .01, Table 15 in Appendix B). As predicted, people higher in Propensity to Plan bought fewer chocolates in the high connectedness condition (r = -.32, p = .009), but not in the low connectedness condition (r = .09, p = .50).

As a robustness check, we also ran a logistic regression predicting people's decision to buy versus not buy. This analysis revealed the predicted interaction (β = - .52, χ^2 = 4.14, p = .04), but no significant main

effect of connectedness condition (β = .10, χ^2 = .16, p = .69) nor propensity to plan (β = - .18, χ^2 = .52, p = .47, Table 16 in Appendix B).

This study replicates our prior findings in the context of an actual purchase in the lab. Next, we test the joint effects of manipulated connectedness and opportunity cost reminders on consumers' actual purchases in a field setting.

STUDY 6: THE IMPACT OF CONNECTEDNESS AND OPPORTUNITY COST REMINDERS ON PURCHASES IN THE FIELD

Method.

Potential participants were approached while waiting to order at a coffee shop over the course of six mornings, in exchange for $2. Participants who agreed (N=138) filled out a brief survey before making their purchase. We used the information-based manipulation from Study 3 and highlighted opportunity cost using a novel reminder paradigm.

Participants in the high opportunity cost salience condition were asked to think about five categories of spending (debt repayment, entertainment, coffee and pastries, savings, and transportation) and to rate whether, one year from now, they would wish they spent more or less in each category (1 = I will wish I spent much less; 5 = I will wish I spent much more). The manipulation was intended to promote thinking about the purchases displaced by overspending in any of these categories, where one category (i.e., coffee and pastries) represented the purchase decision they were about to make. Note that this activity is similar to what people often do when budgeting—consider how to prioritize their spending across categories.

Participants in the low opportunity cost salience condition were instead asked to rate whether they would wish they had spent more/less time reading about five categories (history, world events, entertainment, politics, and science). Thus, these participants were also reminded of tradeoffs, but not between spending categories. After making their purchases, participants showed their receipt to a research assistant and rated how often they visited this coffee shop (0 = This is my first time; 6 = I visit this store almost daily).

Results and Discussion.

To test the effect of the manipulations, we regressed the amount spent on the connectedness (-1 = low connectedness, +1 = high connectedness) and opportunity cost salience (-1 = no opportunity cost cue, +1 = opportunity cost cue) conditions and their interaction, controlling for the frequency of visiting and fixed effects for each day (see Table 17 in Appendix B). The regression revealed that the predicted interaction (β = -.72, t = 2.29, p = .023) was significant. There were no main effects for connectedness or opportunity cost (t < 1) and frequency of visit (β = -.54, t = -3.16, p = .002) was significant, along with two of the six day-level

fixed effects ($ts \geq 2.4$, $p \leq .05$). The estimate of the predicted interaction is similar ($\beta = -.59$, $t = 1.84$, $p = .07$, Table 18 in Appendix B) when omitting the number of visits control and the fixed-effects, but the model fit is substantially worse ($R^2 = .03$, as opposed to $R^2 = .16$ in the full model). The regression-predicted mean spending in each condition is plotted in Figure 7.

This study extends our findings to a real world decision context, where consumers' choices about which items and how many to buy were jointly affected by manipulating connectedness and opportunity cost consideration. In the next study, we provide a further investigation of multiple product choices, by having participants repeatedly make purchase decisions, in multiple categories.

STUDY 7: CHANGES IN CONNECTEDNESS CAUSE CHANGES IN PRICE SENSITIVITY WHEN TRADEOFFS ARE CUED

The prior studies suggest that people who think of current choices as affecting future selves that they care for will make more far-sighted choices—foregoing the impulse to purchase goods they covet but can sensibly forego. One interpretation of these results is that the combination of connectedness to the future self and highlighting opportunity cost merely makes people less willing to spend in the present and therefore more likely to reject any purchase.

Alternatively, those people who are both more connected and aware of opportunity costs may be more likely to trade off the short-term consumption value of the available product against the long-term utility of not spending (e.g., the value of money in the bank), resulting in spending that is more focused on what the person values most highly. If this happens, a greater reduction in spending will be concentrated among products that provide low value to the person. To test this, in the following study we investigate the multi-purchase context, and examine which purchases are most affected by our connectedness and opportunity cost manipulations. As in Study 6, we use a common task (considering the relative desirability of multiple product categories before shopping) to highlight tradeoffs.

Method

We collected 130 complete surveys from online participants. We crossed a connectedness manipulation with a tradeoff salience manipulation. The procedure consisted of three stages: First, we manipulated connectedness by randomly assigning respondents to estimate the difficulty of generating 10 [2] reasons why their own identity would re-main very stable over the next year, after reading that most participants in a previous study could do so. Based on prior research (Bartels and Urminsky 2011), we expected that participants considering two reasons would find the task easy, and therefore have no reason to doubt the stability of their identity. In contrast, those considering ten reasons would anticipate difficulty

generating the reasons, and would therefore interpret this experience as evidence of lower connectedness to their future selves.

In the final two stages, participants completed two tasks: (i) ranking the desirability of six product categories (pocket video cameras, blenders, bed sheets, pocket watches, laser printers, and nonstick frying pans) from 1 = "Most desirable; the kind of product I want the most" to 6 = "Least desirable; the kind of product I want the least", and (ii) choosing between a more and less expensive product from each of those categories.

In the high tradeoff salience condition, the ranking task was done first, before choosing which products to purchase. The ranking task was intended to make tradeoffs between different priorities more salient, encouraging recognition that satisfying one purchase goal subordinates others. At a minimum, the task makes participants contemplate at least five other uses of their money before their first decision of whether to splurge or save. In the low tradeoff salience condition, the same ranking task was completed after making the choices.

We expected the connectedness manipulation to have the strongest effect when tradeoffs were highlighted by the ranking task. Our analyses focused on how often and when participants "splurged" by buying the more expensive product in each of the six categories. This design also allows us to examine how closely that choice relates to the ranked desirability of the product category, testing whether the combination of high connectedness and high tradeoff salience motivates thrift across the board, or whether knowing and caring about future outcomes causes people to reduce spending specifically for less-valued categories.

Results and Discussion

Number of Expensive Purchases. As predicted, people prompted to consider tradeoffs (by initially ranking the categories) chose fewer premium products (vs. cheaper products) when made to feel more connected (1.45 vs. 2.36, $t = 3.08$, $p < .01$), but connectedness had no effect when the ranking task came second (2.19 vs. 2.03, *n.s.*). A linear regression confirmed that the predicted interaction was significant ($\beta = -.27$, $t = -2.38$, $p < .05$; see Table 19 in Appendix B), but found no effect of tradeoff salience and a marginal main effect of connectedness. Analyzing the amount spent yields a similar result: when tradeoffs are cued, higher connectedness yields lower spending ($489 vs. $503, $t = 2.99$, $p < .01$) but otherwise has no effect ($500 vs. $498). A linear regression predicting total intended spend confirms the significant interaction ($\beta = -3.78$, $t = -2.16$, $p < .05$; see Table 20 in Appendix B) and finds a marginal main effect of connectedness and no effect of opportunity cost.

Price Sensitivity. Participants ranked the six categories, from most to least preferred. For each participant, we computed the correlation between the rank assigned to that category of product (1 through 6) and their decision to purchase the more expensive (vs. less expensive) item within the category. Across all

conditions, the average within-subjects correlation was significantly less than zero (average r = -.12, t = -3.64, p < .001)—respondents were less likely to splurge for categories they cared less about. Next, a regression analysis used connectedness condition (low vs. high), the tradeoff salience condition (low vs. high), and their interaction to predict these within-subject correlations. The regression reveals a significant effect of connectedness (β = -0.09, SE = 0.03, t = -2.89, p = .005), no effect of tradeoff salience (t < 1), and a significant interaction (β = -0.06, SE = 0.03, t = -1.99, p = .048, Table 21 in Appendix B).

Simple effects tests reveal that connectedness did not appreciably affect the magnitude of this correlation when tradeoffs were not cued (i.e., when participants chose before ranking the product categories; M_{low} = -0.09, SE = 0.06 vs. M_{high} = -0.15, SE = 0.07, F < 1). In contrast, inducing high connectedness increased the magnitude of this correlation when tradeoffs were cued (i.e., when participants ranked the categories before choosing; M_{low} = 0.06, SE = 0.07 vs. M_{high} = -0.25, SE = .06, F(1, 126) = 12.13, p < .001) A mixed within-between ANOVA confirmed the three way interaction between category ranking, connectedness and opportunity cost salience (see Table 22 in Appendix B).

These results suggest that among participants who were made to feel more connected to the future self, the tendency to splurge was not only reduced, but spending was more concentrated in the most personally important product categories. This pattern was especially pronounced in the high tradeoff salience conditions (i.e. when people ranked categories before choosing). To illustrate, Figure 8 presents the fraction of times respondents chose to splurge in the higher ranked (top 3) vs. lower ranked (bottom 3) product categories. As predicted, only those in the high connectedness, high tradeoff salience condition had fewer choices of the premium product for the lower-ranked (vs. higher ranked) categories (M = .14, SD = .21 vs. M = .34, SD = .29, t(37) = 3.73, p < .001). No such difference was observed in the other conditions (all ps > .10). Only when opportunity cost is highlighted *and* connectedness is heightened do people significantly reduce spending, *specifically* on less desirable products (relative to all other conditions).

We used actual list prices from Amazon.com in this study and so we assume that the differences in observed desirability stem primarily from individual preferences. However, when prices (and perceived value) vary, a similar pattern might also hold, such that people high in connectedness who do consider opportunity costs will reduce spending by either purchasing products perceived as providing better value or choosing not purchase when perceived prices are high.

Studies 6 and 7 manipulate the awareness of opportunity costs by prompting consideration of relevant tradeoffs before making a decision. These findings raise the question of how related a ranking decision process needs to be to have an opportunity-cost reminder effect. To test the boundaries of ranking interventions, we subsequently ran a second version of Study 7 as a post-test, where 395 participants were instead asked to rank six *irrelevant* items—products unrelated to those in the purchase decision: running

shoes, sunglasses, indoor grills, carry-on luggage, light fleece jackets, and noise-cancelling headphones. We also measured Propensity to Plan. In a regression predicting the number of expensive choices (out of the six pairs), by (i) connectedness condition, (ii) tradeoff salience—ranking before vs. after choosing, (iii) Propensity to Plan, and all possible interactions, no simple effects of any variables and no two-way or three-way interactions appeared ($-.03 \leq \beta s \leq .05$, $-.48 \leq \underline{t}s \leq .83$, $ps \geq .41$, Table 23 in Appendix B). These results suggest that for prioritization to affect purchasing, the tradeoffs considered may need to directly involve the goods to potentially be purchased, and simply cueing the idea of prioritization more generally, as a mindset, may be insufficient.

Study 7 generalizes our findings to a more typical multi-product purchase situation. A task that people often do before shopping—prioritizing categories of spending under consideration—can highlight tradeoffs, and this facilitates the effect of connectedness on fiscal restraint. In particular, the restrained spending occurs for purchases of product categories that are less personally desirable. As a result, higher-connectedness respondents' tastes for spending are both reduced and more focused after completing the ranking task.

GENERAL DISCUSSION

Seemingly myopic behavior is often attributed to consumers' failure to anticipate future consequences and to consider them at the moment of decision. This assumption motivates requirements for restaurants to post detailed calorie information and for credit card companies to specify the long-term costs of debt. Such informational interventions sometimes do affect consumer behavior. However, an alternative view is that seeming shortsightedness is not due to lack of information about future outcomes, but instead arises from undervaluing those outcomes, which suggests different interventions. Little is known about how the efficacy of interventions might vary across different types of consumers, nor about how multiple interventions would work in concert. Our findings suggest a potential resolution of this problem.

The general framework of consumer financial decision making that we advance in this paper recognizes two key factors that jointly determine choices: (i) valuation of one's future interests (which is partially determined by connectedness) and (ii) awareness of the intertemporal tradeoffs entailed by current choices. These key factors have been studied before, but largely in isolation, and examining them together yields insights that are distinct from prior theories and not apparent when either is studied alone.

The mere awareness of opportunity costs, by itself, is insufficient to motivate fiscal restraint among people low in connectedness, who place lower value on the future consumption made possible by current thrift, and therefore may be least prone to save. Furthermore, the motivation to provide for future selves is insufficient to motivate far-sighted behavior, absent explicit reminders of the future consequences of current expenditures. These findings are inconsistent with Hypotheses 1 and 2.

It is plausible that under some circumstances a lack of caring about the future could contribute to a lower likelihood to consider future consequences, or vice versa. In particular, it seems possible that greater awareness of future outcomes could boost valuation of those outcomes. The evidence on this relationship is mixed in our studies. Highlighting opportunity costs had no effect on measured connectedness in Study 2 (r = -.02, p = .82). Manipulating opportunity cost salience both modestly increased discount factors (in Study 4, r = .17, p = .04), and decreased discount factors (in Study 1b, r = -.12, p = .06), inconsistent with the idea that highlighting opportunity costs consistently prompts higher valuation. However, measures of Propensity to Plan and Consideration of Future Consequences were significantly correlated with connectedness in Study 2 (r = .22 PTP, r = .18 CFC, both ps < .01) Overall, we conclude that while the two factors do consistently interact in predicting spending (per Hypothesis 3) and are far from redundant (contrary to Hypothesis 1), they may not be completely independent traits, particularly when measured.

In some of the studies we observe a seeming reversal of the connectedness effect when opportunity costs are not highlighted. Could it be that when people don't consider opportunity costs, being more connected would actually lead to higher spending? We did a meta-analysis, using correlation as the effect size statistic, to test this in the studies (1, 2, 3, 4, 6 and 7) where opportunity cost salience was manipulated. In the non-reminder conditions, the weighted average correlation did not reveal a significant positive effect of connectedness (measured or manipulated) on purchasing (r = .07, 95% CI [-.02, .15], p = .12, N = 472).

However, in a floodlight analysis of Studies 2 and 5, we do see a significant reversal effect of connectedness for low Propensity to Plan. Those high in Propensity to Plan (more than .4 SD above the mean) spend significantly less under high connectedness than low connectedness, consistent with H3. However, those people who are low in Propensity to Plan (more than .5 SD below the mean) spend significantly *more* under high connectedness than low connectedness, which is not predicted by any of the three candidate hypotheses. One potential explanation of this unanticipated finding is that people who don't plan their future expenses are only focused on the benefits of the purchase (and not the alternative uses of money), but construe those benefits differently depending on their connectedness. People higher in connectedness may value the future benefits of future consumption from the purchase, whereas those lower in connectedness may only value more immediate benefits, making purchase less attractive. It would be useful for future research to investigate this possibility.

We also note that the efficacy of highlighting tradeoffs may depend on the *specific* opportunity costs that are highlighted. We would expect discounting and connectedness (via its influence on discounting) to matter more if the opportunity costs were explicitly characterized as *future consumption* (as in a commercial by *Sun America* that characterizes the cost of a $70,000 luxury car as the removal of $326,000 from one's retirement account). Since our opportunity cost reminders were generic and, with the exception of Study 5,

were *not* tailored to prompt thoughts of the *future* opportunities displaced by current indulgences, our findings may be a conservative test of the interaction we posit.

Overall, consistent with Hypothesis 3, time preferences matter most when opportunity costs are salient – whether through overt reminders to consider opportunity costs, through individual differences in how spending is construed (as assessed by the Propensity to Plan scale), or by having consumers rank the importance of different categories of goods before making purchase decisions. This relationship is seen for both discount factors (as a measure of general time preference) and connectedness to the future self (which affects the motivation to preserve resources for the future). Alternative interpretations of connectedness are ruled out in the pretest reported in Appendix D of this paper, as well as in Bartels and Urminsky (2011).

These findings relate to issues that arise in the empirical modeling literature on dynamic decision making, where the distinct effects of time discounting and planning horizon are often not identifiable in the available data. One common approach is to set the discount factor to some level (e.g., one set by aggregate asset returns or cost of capital, or sometimes just by picking a reasonable number, such as $\delta = .995$ in Erdem and Keane 1996) and to assume that consumers are fully forward-looking, in that they accurately take into account all future outcomes (Erdem and Keane 1996; Sun, Neslin, and Srinivasan 2003; Nair 2007). More recently, research that tries to estimate discount factors from dynamic behavior has treated consumers as fully forward-looking either by assumption (Yao et al 2012) or by experimentally providing full information (Dube, Hitsch, and Jindal 2013). Our findings imply that time preference and planning horizon are not equivalent, and highlight the importance of qualifying the interpretation of models that make strong assumptions about either factor. In Appendix F, we present an illustrative model of consumer decisions that captures the assumptions and predictions of our framework as it relates to this literature.

Implications for Interventions in Financial Decision Making.

The literature on financial decision making has explored interventions aimed at promoting far-sighted behavior. Such interventions often target people's presumed lack of information to optimize their decisions. For example, credit card companies are required to disclose the monthly payment needed to pay off one's accumulated debt in three years, cigarette packaging requirements mandate explicit warnings of the long-term health consequences of smoking, and New York requires chain restaurants to post calorie information.

Related interventions assume that people may fail to fully process information or to summon it at the right time. For example, studies have found increased savings or reduced debt from interventions like reminding people of the consequences of failing to save (e.g., Koehler et al. 2011). Presumably these manipulations affect behavior by bolstering the accessibility of intertemporal tradeoffs in the face of competing cognitive demands. Other interventions, such as surveys about banking and savings (Dholakia and

Morwitz 2002), or collecting deposits in person (Ashraf, Karlan, and Yin 2006) may provide inadvertent reminders, with similar effects, as can simply experiencing resource constraints which has been suggested make opportunity costs more salient (Spiller 2011).

However, informational interventions have not always been found to be effective (e.g., Karlan, Morten and Zinman 2012). The current studies suggest that these interventions can fail, even when sufficiently salient and memorable, either because such tradeoffs are spontaneously taken into account (a person may have a high propensity to plan) or because people have low connectedness with the future selves their current forbearance would benefit. So, efficacy of interventions will vary markedly across people for reasons unrelated to the intervention's potential benefit. Our analysis suggests that connectedness-increasing interventions may therefore complement and increase the efficacy of informational manipulations. However, informational interventions that undercut connectedness man not have such positive synergies. For example, an ad that emphasizes the costliness of medicating our frail older selves, portrayal of the older selves as very different could well undermine the feelings of connectedness that provides our motivation to save for those older selves in the first place.

If intertemporal preferences are stable, our results are consistent with the characterization of informational interventions as "nudges" (Sunstein and Thaler 2008) that affect the choices of those who want to make far-sighted choices but not those of people who have a preference for current consumption. However, research on connectedness suggests that intertemporal choices may not represent fully stable preferences, and therefore bolstering people's sense of connectedness with their future self could also be seen as an alternative type of intervention (Bartels and Urminsky 2011) that acts on preferences. Interventions that shift intertemporal preferences will primarily affect decisions where tradeoffs are explicit or spontaneously considered. When a non-planner passes by Starbucks, merely shifting her relative valuation of present versus future consumption is unlikely to impact her coffee purchasing, unless she happens to view that purchase as a tradeoff—unless she finds her "latte factor," as David Bach describes it.

The current studies suggest that greater attention should be paid to the interactions between factors underlying intertemporal cognition and behavior. Interventions that succeed in both facilitating the recognition of tradeoffs and in fostering feelings of connectedness will most effectively promote the interests of people's future selves. Prudence may require the convergence of specific thoughts and specific feelings at the moment of decision: an explicit consideration of the costs of an indulgence, and empathy for those future selves who bear those costs. Once we recognize and identify with the future beneficiaries of our sacrifices, fiscal restraint may feel more like buying ourselves a future gift and less like self-deprivation.

REFERENCES

Abeler, Johannes, Armin Falk, Lorenz Goette, and David Huffman (2011), "Reference points and effort provision," *The American Economic Review*, 470-492.

Adams, Jean and Daniel Nettle (2009), "Time perspective, personality and smoking, body mass, and physical activity: An empirical study," *British Journal of Health Psychology*, 14(1), 83-105

Ainslie, George (1975), "Specious Reward: A Behavioral Theory of Impulsiveness and Impulse Control," *Psychological Bulletin*, 82 (4), 463–96.

Ainslie, George (1992), "Hyperbolic discounting," in Choice Over Time, George Loewenstein and Jon Elster, eds; Russell Sage Foundation, New York, NY

Ashraf, Nava, Dean Karlan, and Wesley Yin (2006), "Tying Odysseus to the Mast: Evidence from a Commitment Savings Product in the Philippines." *Quarterly Journal of Economics*, 121 (2), 635-72.

Bach, David (2002) [Interview with Fredericka Whitfield, Anchor of CNN Sunday Morning], CNN, Aired December 29, 2002 - 11:23 ET

Bartels, Daniel M., Trevor Kvaran, and Shaun Nichols (2013), "Selfless giving," *Cognition*, *129*(2), 392-403.

Bartels, Daniel M. and Lance J. Rips (2010), "Psychological Connectedness and Intertemporal Choice," *Journal of Experimental Psychology: General*, 139, 49-69.

Bartels, Daniel M. and Oleg Urminsky (2011), " On Intertemporal Selfishness: The Perceived Instability of Identity Underlies Impatient Consumption," *Journal of Consumer Research*, 38, no. 1 (2011): 182-198.

Chabris, Christopher F., David Laibson, Carrie L. Morris, Jonathon P. Schuldt, Dmitry Taubinsky (2008), "Individual Laboratory-Measured Discount Rates Predict Field Behavior," *Journal of Risk and Uncertainty*, 37(2-3), 234-69.

Dholakia, Utpal M. and Vicki G. Morwitz (2002), "The scope and persistence of mere-measurement effects: Evidence from a field study of customer satisfaction measurement," *Journal of Consumer Research*, 29 (2), 159-167.

Dube, Jean-Pierre H., Gunter Hitsch, and Pranav Jindal (2013), "Measuring subjective consumer beliefs and heterogeneous discount factors for durable goods adoption," Working paper, University of Chicago Booth School of Business.

Erdem, Tülin and Michael P. Keane (1996), "Decision-Making under Uncertainty: Capturing Dynamic Choice Processes in Turbulent Consumer Goods Markets," *Marketing Science*, 15 (1), 1-20

Feldman, Jack M. and John G. Lynch, Jr. (1988), Self-Generated Validity and Other Effects of Measurement on Belief, Attitude, Intention, and Behavior," Journal of Applied Psychology, 73, 421-435.

Frederick, Shane, George Loewenstein and Ted O'Donoghue (2002) "Time Discounting and Time Preference: A Critical Review," *Journal of Economic Literature*, 40(2), 351-401

Frederick, Shane, Nathan Novemsky, Jing Wang, Ravi Dhar, and Stephen Nowlis (2009), "Opportunity Cost Neglect," *Journal of Consumer Research*, 36, 553-61.

Hartmann, Wes R. (2006), "Intertemporal Effects of Consumption and Their Implications for Demand Elasticity Estimates," *Quantitative Marketing and Economics*, 4(4), 325-49.

Hershfield, H. E., Cohen, T. R., & Thompson, L. (2012), "Short horizons and tempting situations: Lack of continuity to our future selves leads to unethical decision making and behavior," *Organizational Behavior and Human Decision Processes, 117*(2), 298-310.

Hershfield, Hal E., Daniel G. Goldstein, William F. Sharpe, Jesse Fox, Leo Yeykelis, Laura L. Carstensen, and Jeremy N. Bailenson (2011), "Increasing saving behavior through age-progressed renderings of the future self," *Journal of Marketing Research* 48, no. SPL: S23-S37.

Kardes, Frank R., Chris T. Allen, and Manuel J. Pontes (1993), "Effects of Multiple Measurement Operations on Consumer Judgment: Measurement Reliability or Reactivity?" *Advances in Consumer Research, 20*, 280-283.

Karlan, Dean, Melanie Morten and Jonathan Zinman (2012), "A Personal Touch: Text Messaging for Loan Repayment," working paper, Yale University

Koehler, Derek, Rebecca White and Leslie John (2011), "The Price of Good Intentions," *Social Psychological and Personality Science*, 2(1), 90-96.

Loewenstein, George, and Drazen Prelec (1992), "Anomalies in intertemporal choice: Evidence and an interpretation," *The Quarterly Journal of Economics* 107, no. 2: 573-597.

Logue, A.W. (1988), "Research on self-control: An integrating framework," *Behavioral and Brain Sciences*, 11, 665-709.

Lynch, John G., Jr., Richard G. Netemeyer, Stephen A. Spiller, and Alessandra Zammit (2010), "A Generalizable Scale of Propensity to Plan: The Long and the Short of Planning for Time and for Money," *Journal of Consumer Research*, 37(1), 108-28.

Meyer, Richard F. (1976), "Preferences Over Time," in *Decisions with Multiple Objectives*. Ralph Keeney and Howard Raiffa, eds. NY: Wiley, p. 473-89.

Muller, Dominique, Charles M. Judd, and Vincent Y. Yzerbyt (2005), "When Moderation is Mediated and Mediation is Moderated," Journal of Personality and Social Psychology, 89 (6), 852-63.

Nair, Harikesh (2007) "Intertemporal price discrimination with forward-looking consumers: Application to the US market for console video-games" *Quantitative Marketing and Economics*, 5 (3), 239-292.

Nenkov, Gergana Y., J. Jeffrey Inman, and John Hulland (2008), "Considering the Future: The Conceptualization and Measurement of Elaboration on Potential Outcomes," *Journal of Consumer Research*, 35(1), 126

Parfit, Derek (1984), *Reasons and Persons*, Oxford, UK: Oxford University Press.

Preacher, Kristopher J., Derek D. Rucker, and Andrew F. Hayes (2007), "Addressing Moderated Mediation Hypotheses: Theory, Methods, and Prescriptions," *Multivariate Behavioral Research*, 42(1), 185-227.

Radu, Peter T., Richard Yi, Warren K. Bickel, James J. Gross, and Samuel M. McClure (2011), "A Mechanism For Reducing Delay Discounting By Altering Temporal Attention," *Journal of the Experimental Analysis of Behavior*, 96, 363-385.

Rick, Scott and George Loewenstein (2008), "Intangibility in intertemporal choice," *Philosophical Transactions of the Royal Society B*, 363, 3813-3824.

Scholten, Marc and Daniel Read (2010), "The psychology of intertemporal tradeoffs" P*sychological Review*, 117(3), Jul 2010, 925-944.

Simpson, Cathy A. and Rudy E. Vuchinich (2000), "Reliability of a measure of temporal discounting," *The Psychological Record*, 50, 3-16.

Spiller, Stephen A. (2011), "Opportunity cost consideration," *Journal of Consumer Research* 38, no. 4: 595-610.

Spiller, Stephen A., Gavan J. Fitzsimons, John G. Lynch Jr, and Gary H. McClelland (2013), "Spotlights, floodlights, and the magic number zero: Simple effects tests in moderated regression." *Journal of Marketing Research* 50, no. 2: 277-288.

Strathman, Alan, Faith Gleicher, David S. Boninger, and C. Scott Edwards (1994), "The Consideration of Future Consequences: Weighing Immediate and Distant Outcomes of Behavior," *Journal of Personality and Social Psychology*, 66(4),742-52

Sun, Baohong, Scott A. Neslin, and Kannan Srinivasan (2003), "Measuring the Impact of Promotions on Brand Switching When Consumers Are Forward Looking," *Journal of Marketing Research*, 40 (4), 389-405.

Sunstein, Cass R., and Richard Thaler. (2008). *Nudge: Improving decisions about health, wealth, and happiness*. New Haven: Yale University Press.

Urminsky, Oleg and Ran Kivetz (2011), " Scope Insensitivity and the "Mere Token" Effect," *Journal of Marketing Research*, Vol. 48, No. 2: 282–295.

Urminsky, Oleg and Gal Zauberman (2014), "The Psychology of Intertemporal Preferences," Blackwell Handbook of Judgment and Decision Making, George Wu and Gideon Keren (eds), Wiley-Blackwell

Venti, Steven F. and David Wise (2001), "Choice, Chance, and Wealth Dispersion at Retirement," in S. Ogura, T. Tachibanaki and D. Wise (eds.) Aging Issues in the United States and Japan. University of Chicago Press

Winer, Russell S. (1997), "Discounting and its impact on durables buying decisions," *Marketing Letters* 8, no. 1:109-118.

Yao, Song, Carl F. Mela, Jeongwen Chiang, and Yuxin Chen (2012), "Determining consumers' discount rates with field studies," *Journal of Marketing Research*, Vol. 49, 822-841

Zauberman, Gal, B. Kyu Kim, Selin Malkoc, and James R. Bettman (2009), "Discounting Time and Time Discounting: Subjective Time Perception and Intertemporal Preferences," *Journal of Marketing Research*, 46 (4), 543–56.

FIGURES

Figure 1: Stylized Illustration of the Alternative Hypotheses: Potential Effects on Purchase Probability of Jointly Manipulating Consideration of Opportunity Costs and Valuation of the Future (via Affirming Connectedness)

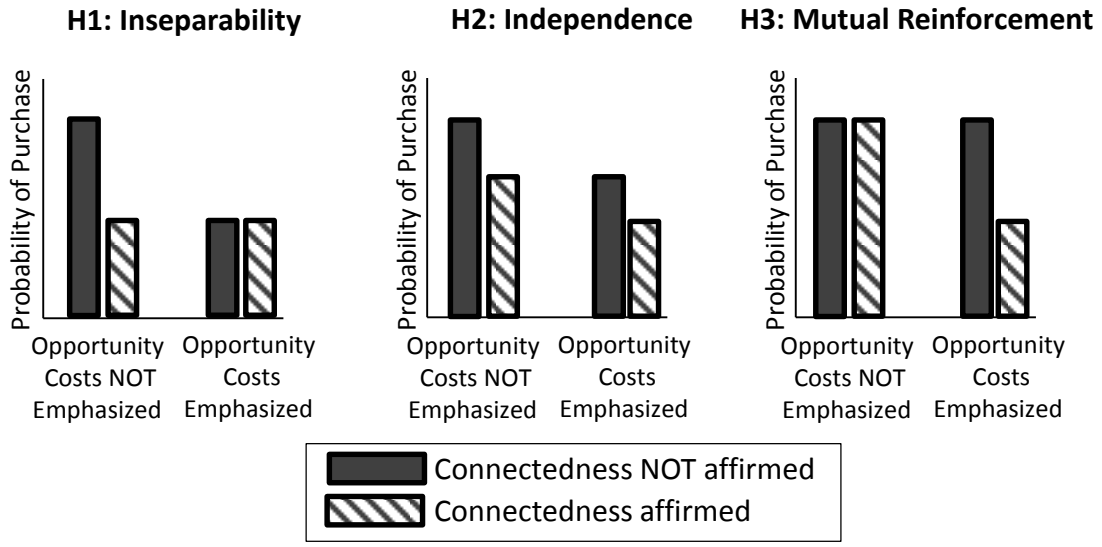


Figure 2: Effects of Manipulated Reminders to Consider Opportunity Costs and Measured Valuation of the Future (Connectedness and Discounting) on Purchase Probability

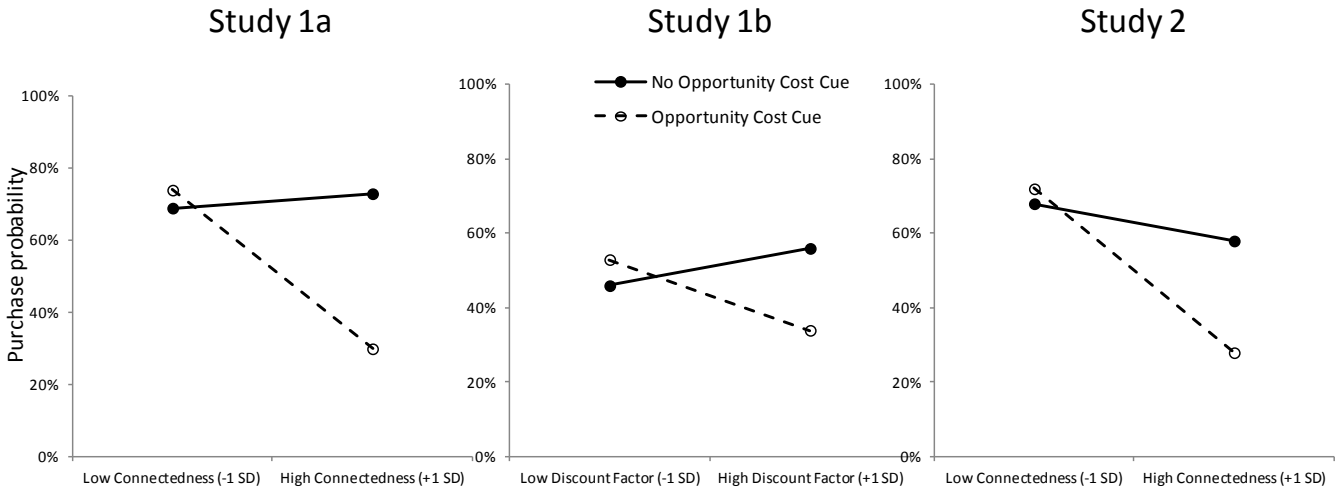


Figure 3: Effect of Opportunity Cost Cue, Connectedness and Planning

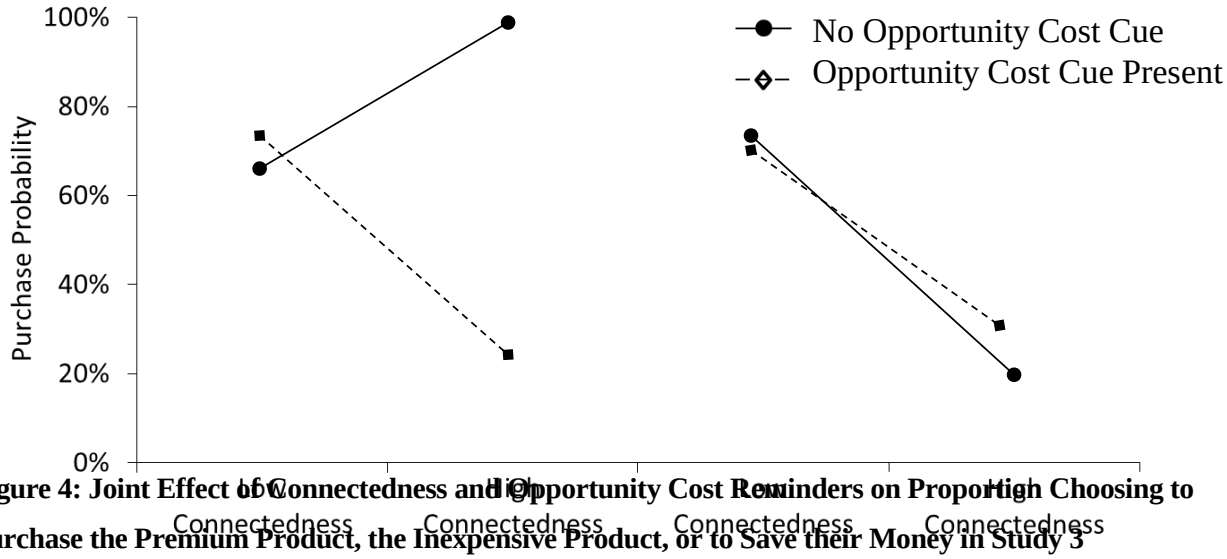


Figure 4: Joint Effect of Connectedness and Opportunity Cost Reminders on Proportion Choosing to Purchase the Premium Product, the Inexpensive Product, or to Save their Money in Study 3

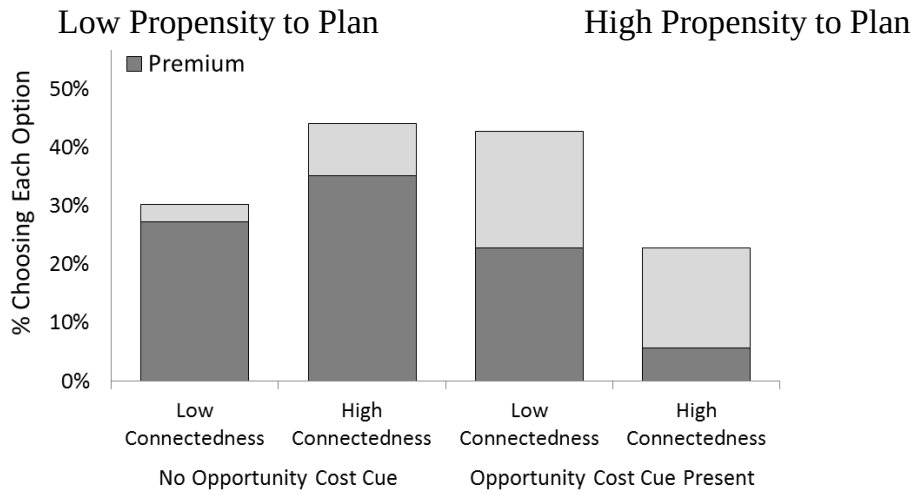


Figure 5: Joint Effect of Connectedness and Opportunity Cost Reminders on Proportion Choosing to Purchase the Premium Product, the Inexpensive Product, or to Save their Money in Study 4

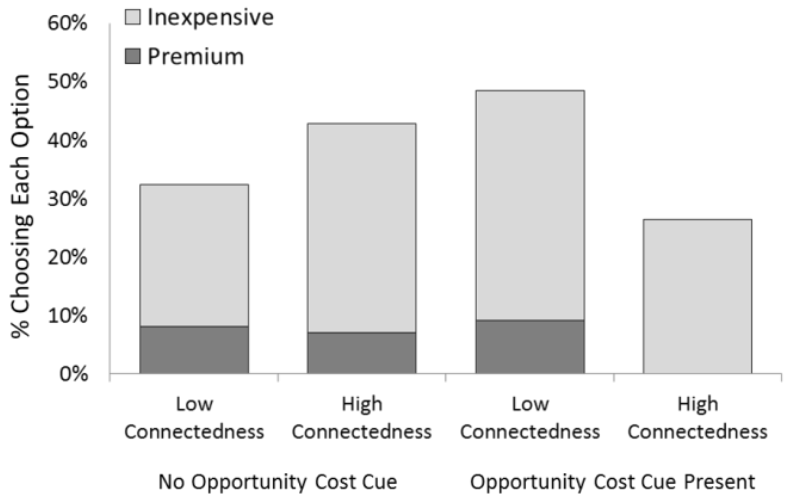


Figure 6: Diagram of Moderated Mediation Model in Study 4

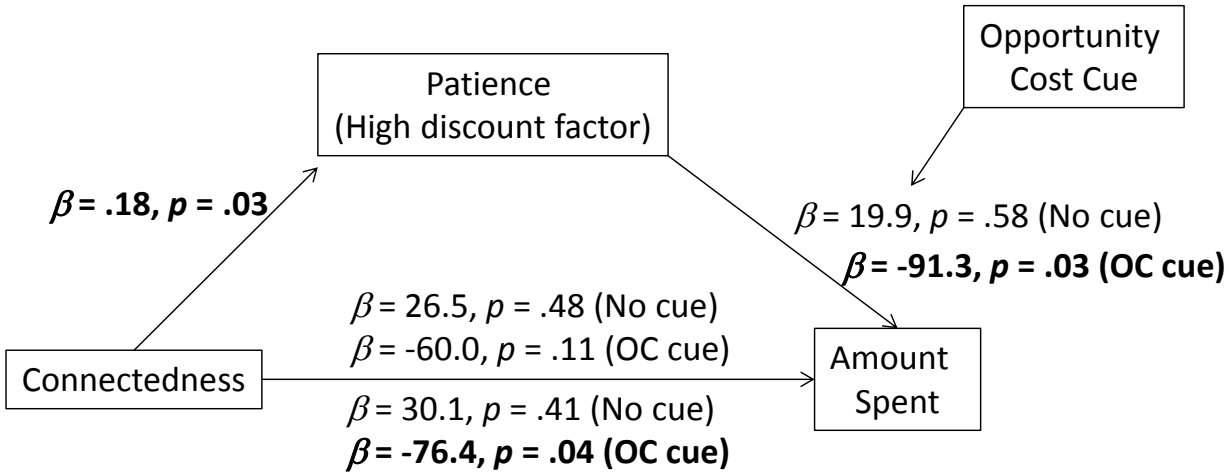


Figure 7: Joint Effect of Connectedness and Opportunity Cost Reminders on Coffee Shop Spending in Study 6.

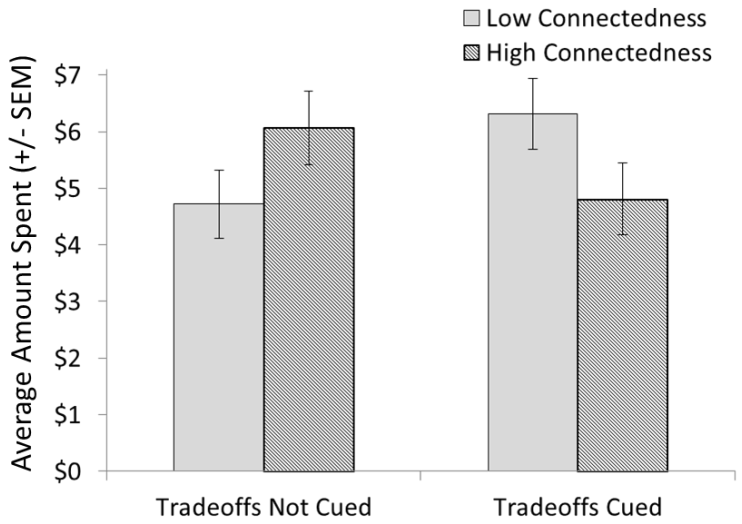
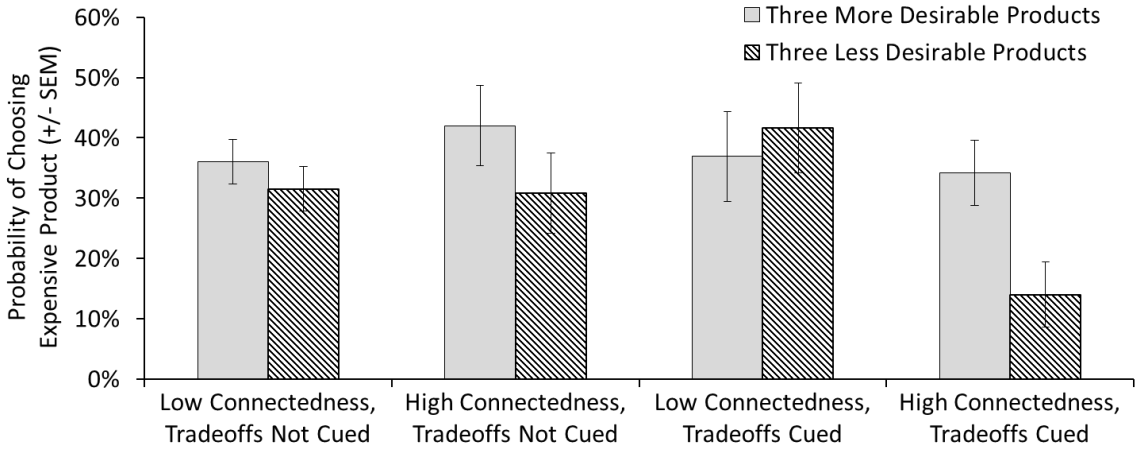


Figure 8: Joint Effect of Connectedness and Opportunity Cost Salience (Rank First = High; Choose First = Low) on Price Sensitivity (Choosing the More Expensive Option). Because of the repeated measures test, error bars represent standard errors of the difference score

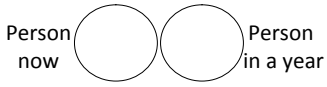


APPENDIX A: CONNECTEDNESS MEASURES

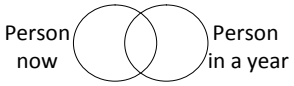
1) Please think about the important characteristics that make **you** the person you are now—your personality, temperament, major likes and dislikes, beliefs, values, ambitions, life goals, and ideals—and please rate the degree of connectedness between the person you expect to be in a year compared to the person you are now, where 0 means "I will be completely different in the future" and 100 means "I will be exactly the same in the future."

My rating is: _____

2) Please think again about these important characteristics and indicate your opinion about the degree of connectedness held between the person you are now and the person you will be in a year by drawing a mark on the line below, where no overlap means "completely disconnected" and complete overlap means "completely connected".



"completely disconnected"



"somewhat connected"

"completely connected"

APPENDIX B: SUPPLEMENTAL STATISTICAL RESULTS

Coding of Variables:

[a] 0 = not purchase, 1 = purchase
[b] Z-scored continuous scale measures
[c] -1 = no opportunity cost cue, 1 = opportunity cost cue
[d] Discount factor, between 0 (no valuation of future) and 1 (no discounting of future)
[e] -1 = low connectedness condition, 1 = high connectedness condition
[f] 1 = no purchase, 2 = cheaper option, 3 = more expensive option
[g] Amount in dollars
[h] Number of premium items chosen, out of six pairs, ranging from 0 to 6
[i] 0 = choose lower cost item, 1 = choose higher cost item
[j] Linear contrast for Ranking, 1= most preferred to 6 = least preferred

Table 1: Logistic Regression Predicting Choosing to Purchase DVD[a] (Study 1a)

Source	β	Std Error	Wald	p
Constant	.498	.235	4.479	.034
Connectedness[b]	-.432	.250	2.986	.084
Opportunity Cost Cue[c]	-.406	.235	2.982	.084
Cue x Connectedness	-.525	.250	4.413	.036

Table 2: Logistic Regression Predicting Choosing to Purchase DVD[a] (Study 1b)

Source	β	Std Error	Wald	p
Constant	.102	.342	.089	.766
Discount factor[d]	-.344	.506	.461	.497
Opportunity Cost Cue[c]	.517	.342	2.283	.131
Cue x Discount factor	-1.088	.506	4.617	.032

Table 3: Logistic Regression Predicting Choosing to Purchase DVD[a] (Study 2)

Source	β	Std Error	Wald	p
Constant	.255	.153	2.763	.096
Connectedness[b]	-.575	.174	10.893	.001
Opportunity Cost Cue[c]	-.274	.153	3.202	.074
Cue x Connectedness	-.368	.174	4.464	.035

Table 4: Logistic Regression Predicting Choosing to Purchase DVD[a] (Study 2)

Source	β	Std Error	Wald	p
Constant	.633	.203	9.701	.002
Connectedness[b]	-.232	.226	1.053	.305
Opportunity Cost Cue[c]	-.673	.203	10.996	.001
Propensity to Plan (PTP)[b]	-.741	.242	9.405	.002
Cue x Connectedness	-.683	.226	9.106	.003
Cue x PTP	.750	.242	9.636	.002
Connectedness x PTP	-.795	.248	10.270	.001
Cue x Connectedness x PTP	.917	.248	13.666	.000

Table 5: Logistic Regression Predicting Choosing to Purchase DVD[a] (Study 2)

Source	β	Std Error	Wald	p
Constant	.445	.176	6.401	.011
Connectedness[b]	-.527	.210	6.316	.012
Opportunity Cost Cue[c]	-.498	.176	8.030	.005
Consideration of Future Consequences (CFC)[b]	-.298	.203	2.149	.143
Cue x Connectedness	-.385	.210	3.378	.066
Cue x CFC	.211	.203	1.085	.298
Connectedness x CFC	-.737	.273	7.286	.007
Cue x Connectedness x CFC	.954	.273	12.204	.000

Table 6: Logistic Regression Predicting Choosing to Purchase Premium iPad[a] (Study 3)

Source	β	Std Error	Wald	p
Constant	-1.402	.247	32.278	.000
Connectedness[e]	-.303	.247	1.509	.219
Opportunity Cost Cue[c]	-.608	.247	6.077	.014
Cue x Connectedness	-.490	.247	3.951	.047

Table 7: Linear Regression Predicting Amount of Intended Spend[g] (Study 3)

Source	β	Std Error	t	P
Constant	245.249	28.493	8.607	.000
Connectedness[e]	-12.100	28.493	-.425	.672
Opportunity Cost Cue[c]	-22.320	28.493	-.783	.435
Cue x Connectedness	-59.972	28.493	-2.105	.037

Table 8: Ordinal Regression Predicting iPad Purchasing Choices[f] (Study 3)

Source	β	Std Error	Wald	*P*
Threshold 1 (Not buy)	.633	.184	11.765	.001
Threshold 2 (Buy cheaper)	1.267	.210	36.495	.000
Connectedness[e]	-.091	.180	.257	.612
Opportunity Cost Cue[c]	-.211	.180	1.370	.242
Cue x Connectedness	-.377	.181	4.351	.037

Table 9: Logistic Regression Predicting Any Purchase (Study 3)

Source	β	Std Error	Wald	*P*
Constant	-1.40	.247	32.3	.000
Connectedness[e]	-.303	.247	1.51	.739
Opportunity Cost Cue[c]	-.608	.247	6.08	.014
Cue x Connectedness	-.490	.247	3.95	.047

Table 10: Linear Regression Predicting Discount Factor[d] (Study 4)

Source	β	Std Error	t	*p*
Constant	.548	.016	35.363	.000
Connectedness[e]	.034	.016	2.195	.030
Opportunity Cost Cue[c]	.035	.016	2.229	.027
Cue x Connectedness	.00005	.016	.003	.997

Table 11: Linear Regression Predicting Amount of Intended Spend[g] based on Cue and Connectedness (Study 4)

Source	β	Std Error	t	*p*
Constant	238.99	25.937	9.214	.000
Connectedness[e]	-23.138	25.937	-.892	.374
Opportunity Cost Cue[c]	-4.042	25.937	-.013	.876
Cue x Connectedness	-53.250	25.937	-2.053	.042

Table 12: Logistic Regression Predicting Any Purchase (Study 4)

Source	β	Std Error	Wald	*P*
Constant	-.526	.176	8.98	.003
Connectedness[e]	-.129	.176	.537	.463
Opportunity Cost Cue[c]	-.015	.176	.007	.985
Cue x Connectedness	-.352	.176	4.02	.045

Table 13: Linear Regression Predicting Amount of Intended Spend[g] based on Cue and Discount Factor (Study 4)

Source	β	Std Error	t	*p*
Constant	366.017	82.373	4.443	.000
Discount Factor[d]	-210.014	140.301	-.128	.137
Opportunity Cost Cue[c]	187.005	82.373	2.270	.025
Cue x Discount Factor	-337.664	140.301	-2.407	.017

Table 14: Linear Regression Predicting Amount of Intended Spend[g] based on Cue, Connectedness and Discount Factor (Study 4)

Source	β	Std Error	t	*p*
Constant	351.469	83.347	4.217	.000
Connectedness[e]	-16.658	26.138	-.637	.525
Discount Factor[d]	-187.047	142.419	-1.313	.191
Opportunity Cost Cue[c]	162.173	83.347	1.946	.054
Cue x Connectedness	-43.164	26.138	-1.651	.101
Cue x Discount Factor	-291.536	142.419	-2.047	.043

Table 15: Linear Regression Predicting Number of Chocolates Purchased (Study 5)

Source	β	Std Error	t	*p*
Constant	.413	.071	5.800	.000
Connectedness[e]	.061	.071	.857	.393
Propensity to Plan (PTP)[b]	-.132	.073	-1.798	.075
Cue x PTP	-.191	.073	-2.615	.010

Table 16: Logistic Regression Predicting Purchase of Chocolates (Study 5)

Source	β	Std Error	Wald χ^2	p
Constant	-1.052	.235	19.983	.000
Connectedness[e]	.095	.235	.163	.686
Propensity to Plan (PTP)[b]	-.183	.254	.518	.472
Cue x PTP	-.517	.254	4.135	.042

Table 17: Linear Regression Predicting Dollars Spent (Study 6)

Source	β	Std Error	t	p
Constant	6.081	1.064	5.714	.000
Connectedness[e]	.084	.310	.271	.787
Opportunity Cost Cue[c]	-.040	.314	-.129	.898
Cue x Connectedness	-.715	.312	-2.293	.023
Visit Frequency	-.542	.172	-3.155	.002
Day 1	.646	1.148	.563	.575
Day 2	2.401	1.157	2.076	.040
Day 3	1.582	1.131	1.399	.164
Day 4	2.722	1.190	2.288	.024
Day 5	.170	1.266	.134	.893

Table 18: Linear Regression Predicting Dollars Spent without control variables (Study 6)

Source	β	Std Error	t	p
Constant	5.615	.324	17.357	.000
Connectedness[e]	-.004	.324	-.013	.989
Opportunity Cost Cue[c]	.153	.324	.472	.638
Cue x Connectedness	-.594	.324	-1.837	.068

Table 19: Linear Regression Predicting Number of Premium Products Chosen[h] (Study 7)

Source	β	Std Error	t	p
Constant	2.004	.112	17.88	.000
Connectedness[e]	-.188	.112	-.146	.096
Opportunity Cost Cue[c]	-.102	.112	-.079	.365
Cue x Connectedness	-.267	.112	-2.382	.019

Table 20: Linear Regression Predicting Amount of Intended Spend[g] (Study 7)

Source	β	Std Error	t	*p*
Constant	497.452	1.748	284.618	.000
Connectedness[e]	-3.135	1.748	-1.793	.075
Opportunity Cost Cue[c]	-1.648	1.748	-.943	.348
Cue x Connectedness	-3.775	1.748	-2.160	.033

Table 21: Linear Regression Predicting Correlation Between Choice and Ranking (Study 7)

Source	β	Std Error	t	*p*
Constant	-.107	.031	-3.42	.001
Connectedness[e]	-.090	.031	-2.89	.005
Opportunity Cost Cue[c]	.011	.031	.370	.714
Cue x Connectedness	-.062	.031	-1.99	.048

Table 22: Repeated Measures ANOVA Predicting Choice of Premium Option in Each Category[i] (Study 7)

Source	Sum of Squares	F	*p*
Between-Subjects Effects:			
Intercept	84.947	319.708	.000
Connectedness[e]	.747	2.810	.096
Opportunity Cost Cue[c]	.220	.827	.365
Cue x Connectedness	1.507	5.673	.019
Error	33.478	--	--
Within-Subjects Contrasts:			
Category Rank[j]	1.742	11.724	.001
Rank x Connectedness	1.090	7.340	.008
Rank x Opportunity Cost Cue	.004	.030	.862
Rank x Cue x Connectedness	.617	4.153	.044
Error	18.720	--	--

Note: Only the linear trend is shown for the within-subjects factor, Rank. No higher order polynomial effects were significant as a main effect or in an interaction.

Table 23: Linear Regression Predicting Amount of Intended Spend[g] (Study 7 post-test)

Source	β	Std Error	t	p
Constant	502.64	3.96	126.8	.001
Connectedness[b]	-.366	1.33	-0.27	.784
Opportunity Cost Cue[c]	.247	1.33	0.18	.853
Propensity to Plan (PTP)[b]	-.049	.135	-0.36	.716
Cue x Connectedness	.374	1.33	0.28	.779
Cue x PTP	.068	.135	0.50	.618
Connectedness x PTP	-.003	.135	-0.02	.985
Cue x Connectedness x PTP	.068	.135	0.50	.617

APPENDIX C: DISCOUNTING MEASURES USED IN STUDY 4

Imagine that you have the option of receiving some money tomorrow or one year from now.

We will show you a series of such options, one in which you would receive money tomorrow and the other in which you would receive money in a year.

In each row below, choose which ONE of the two options you would prefer to receive. Imagine that both payments are guaranteed to occur when promised.

(Note: Each battery of choices was presented on a separate screen. The order of these screens was randomized.)

$260 tomorrow ----- OR ----- $260 in one year
$260 tomorrow ----- OR ----- $312 in one year
$260 tomorrow ----- OR ----- $364 in one year
$260 tomorrow ----- OR ----- $416 in one year
$260 tomorrow ----- OR ----- $468 in one year
$260 tomorrow ----- OR ----- $520 in one year
$260 tomorrow ----- OR ----- $572 in one year
$260 tomorrow ----- OR ----- $624 in one year

$260 tomorrow ----- OR ----- $429 in one year
$260 tomorrow ----- OR ----- $405 in one year
$260 tomorrow ----- OR ----- $381 in one year
$260 tomorrow ----- OR ----- $357 in one year
$260 tomorrow ----- OR ----- $332 in one year
$260 tomorrow ----- OR ----- $308 in one year
$260 tomorrow ----- OR ----- $284 in one year
$260 tomorrow ----- OR ----- $260 in one year

$40 tomorrow ----- OR ----- $40 in one year
$40 tomorrow ----- OR ----- $56 in one year
$40 tomorrow ----- OR ----- $71 in one year
$40 tomorrow ----- OR ----- $87 in one year
$40 tomorrow ----- OR ----- $103 in one year
$40 tomorrow ----- OR ----- $119 in one year
$40 tomorrow ----- OR ----- $134 in one year
$40 tomorrow ----- OR ----- $150 in one year

$40 tomorrow ----- OR ----- $158 in one year
$40 tomorrow ----- OR ----- $141 in one year
$40 tomorrow ----- OR ----- $124 in one year
$40 tomorrow ----- OR ----- $107 in one year
$40 tomorrow ----- OR ----- $90 in one year
$40 tomorrow ----- OR ----- $73 in one year
$40 tomorrow ----- OR ----- $57 in one year
$40 tomorrow ----- OR ----- $40 in one year

APPENDIX D:

PRE-TEST OF CONNECTEDNESS MANIPULATION IN STUDY 7

To ensure that the procedure manipulates people's sense of connectedness to their future selves and to assess potential confounds, we ran a pretest of the fluency manipulation's effect on connectedness and other factors. We asked a separate sample of participants (N = 77) to estimate the ease of generating 2 or 10 reasons why their identity would remain stable. We then asked them to rate their connectedness to their future selves and to respond to a battery of items that measure other potential influences on intertemporal tradeoff-making—such as their uncertainty about future states or their future preferences, and their anticipated changes to spending money or to their tastes.

Consistent with expectations, participants in the high connectedness (2 reasons) condition rated themselves as more connected to the future self on a normalized two-item measure than participants in the low connectedness (10 reasons) conditions (M = 0.17 vs. -0.29, t = 2.17, p <.05); they also judged that the task would be easier than participants in the low connectedness (10 reasons) condition (M = 5.45 vs. 4.14, t = 3.40, p < .01). In contrast, there was no significant effect of the manipulation on people's beliefs about upcoming changes in their disposable income or free time, their general uncertainty about the future or their preferences, nor on their subjective perceptions of how long a year is (Zauberman et al. 2009). The manipulation did not affect people's beliefs that their preferences would be different in the future, or that they would derive less enjoyment from future consumption (e.g. future anhedonia, Kassam et al 2008). So, this pretest provides evidence that the fluency manipulation primarily impacts people's sense of connectedness to their future selves rather than other beliefs about the future that might affect financial decision making.

APPENDIX E: STIMULI USED IN STUDY 7

Product Category	Less Expensive Product			More Expensive Product		
	Picture	Title	Amazon Price	Picture	Title	Amazon Price
Pocket Video Cameras		Flip UltraHD Video Camera	$78		Sony MHS-PM5 bloggie HD Video Camera	$96
Blenders		Oster 5 Cup Fusion Blender Food Processor	$75		KitchenAid 5-Speed Blender w/ Polycarbonate Jars	$90
Bed Sheets		Pinzon Hemstitch 400 Thread Count Cotton Sheet Set, Smokey Blue	$60		Olympic 1200 Thread Count Cotton Sheet Set, Stripe Blue	$76
Pocket Watches		Charles Hubert 3846 Two-Tone Mechanical Pocket Watch	$90		Stuhrling Original Lifestyle Collection Monarch Moon Mechanical Pocket Watch	$108
Laser Printers		Samsung ML-2525W Mono Laser Printer	$73		Brother HL-2240 Mono Laser Printer	$86
Nonstick Frying Pans		Calphalon One Infused 12-Inch Anodized Nonstick Fry Pan	$90		All-Clad Stainless 12-Inch Nonstick Fry Pan	$103

APPENDIX F:
AN ILLUSTRATIVE MODEL OF FAR-SIGHTEDNESS IN DECISION MAKING

We present a model of consumer decisions that is based on and extends the intuition in econometric models of the dynamic decision maker (Erdem and Keane 1996). This illustrative model outlines a strategy for integrating the findings of the paper into a quantitative framework. It is important to note, however, that the additional parameters introduced into this model may not be identified in many empirical settings.

In the simplest case, a consumer i at time t=0 makes a single choice from a set of mutually exclusive options J. Each potential choice j can lead to different outcomes, over the T_i discrete time periods t that define the decision for consumer i. The decision maker operates under the general planning horizon T_i, and a more specific planning horizon for non-salient outcomes, H_i, where $-1 \leq H_i \leq T_i$. Both T_i and H_i are bounded and can be thought of as externally determined (e.g., a draw from a common distribution), but susceptible to interventions.

The state of the consumer at each time t consists of two components. Outcomes $X_i(j,t)$ are explicit in the choice and therefore salient at the time of decision, and can include factors such as the price of the purchase and the utility from anticipated uses of the purchased item. In addition, there are potentially components $Z_i(j,t)$ which are only salient to the consumer the a bounded horizon H_i (i.e. when $t < H_i$), including opportunity costs, future liquidity constraints, "hidden" costs and unanticipated uses. Both sets of outcomes can be thought of as the utility from states influenced by or determined by the chosen option j.

Hence, the utility at a time t is equal to:

$$U_{ij}(t) = w_0 U_0 + w_S X_i(j,t) + w_{NS} Z_i(j,t) + e_{it} \qquad [1]$$

Thus, future utility depends on the baseline utility U_0 that is not affected by the choice, the portion of choice-related utility X that is salient at the time of choice and the portion of choice-related utility Z that may not be fully salient at the time of choice, depending on the planning horizon H_i. The w's are weights capturing the subjective utility of each component, and the e_{it} are the typical random component of utility for person i at time t, and are independent of choice j.

Conditional on the endowed planning horizon H_i, a rational consumer at time $t = 0$ will choose option j from choice set J, in order to maximize expected utility. However, those non-salient outcomes $Z_i(j,t)$ for which $t > H_i$ will not influence the choice. If $H_i = -1$, the consumer ignores all the non-salient outcomes, even those occurring at the time of choice. If $H_i = 0$, the consumer only takes into account the non-salient outcomes occurring at the time of choice. Conversely, if $H_i = T_i$, there are no non-salient outcomes, and all potential outcomes are taken into account, as in a standard model. However, for intermediate values ($0 < H_i < T_i$), the sufficiently proximal non-salient outcomes will be considered, while those that are farther off, after the planning horizon, will not be incorporated into the decision.

The consumer's initial decision at time $t = 0$ can then be written as:

$$\text{Max } E_j\{\Sigma_{t=0..T}\, \delta_i(t)\ w_S\, X_i(j,t) + \Sigma_{t=0..H}\, \delta_i(t)\, w_S\, Z_i(j,t)\} \qquad [2]$$

Here, $0 \leq \delta_i(t) \leq 1$ is the consumer specific discount factor at time t. This could be modeled as either exponential, with $\delta_i(t) = \delta_i^t$, or as quasi-hyperbolic, with $\delta_i(t) = \beta_i\, \delta_i^t$, or as another functional form.

This model allows us to distinguish between several psychologically distinct forms of consumer myopia. First, a consumer may have a short maximum planning horizon T for all outcomes, simply failing to take into account future consequences past a certain date. Next, a consumer may in general have a high long-term discount factor δ_i, consistently giving higher weight to sooner outcomes. Furthermore, in quasi-hyperbolic discounting, the consumer may also have inconsistent time preferences, penalizing all future outcomes relative to present outcomes, as captured by the present-bias component of the discount factor, β_i. Finally, the consumer may fail to anticipate specific non-salient outcomes, either completely (if H_i= -1) or any in the future (if H_i= 0), or just those in the more distant future (after time period $H_i > 0$).

The proposed model reflects the findings in this paper. For a consumer who fails to consider some non-salient outcomes (e.g. $H_i < T_i$), the discount factor will have less of an impact on the decision as long as there are non-salient outcomes $Z_i(j,t)$ for $t \geq H_i$. In the extreme case, if the salient outcomes all occur in the first period (i.e., $X_i(j,t)$ =0 for $t > 0$) and any non-salient outcomes occur after the planning horizon (i.e, $Z_i(j,t)$ = 0 for $t < H_i$.), then discounting will have no effect on the decision. Thus, the impact of discount factor on the consumer's decision will depend on the degree to which future outcomes are considered.

Likewise, if the consumer has a low discount factor, the decision will be less sensitive to whether or not all future outcomes are considered and how long the planning horizon H_i for non-salient outcomes is. At the extreme, if the consumer simply ignores all future outcomes, either because the discount factor $\delta_i(t)$ is zero for $t > 0$ or the overall planning horizon T_i is constrained to the first period (i.e., $T_i = 0$), then the distinction between salient and non-salient outcomes is irrelevant. Thus, the impact of factors such as opportunity cost consideration will depend on the valuation of future outcomes, as determined by $\delta_i(t)$ and T_i.

Lastly, note that if a product under consideration is a durable good (or a consumable good with salient long-term benefits), a consumer with a lower discount factor will not necessarily have a lower probability of purchase. If the long-term benefits of purchase are salient (i.e., in $X_i(j,t)$) and there are also unanticipated (in $Z_i(j,t)$) future direct or indirect costs or reduction in experienced benefits (Wang et al 2009), the failure to consider future consequences can lead to a counter-intuitive higher likelihood of purchase among more patient consumers (i.e. those with higher discount factors). In such situations, however, prompting consideration of future consequences would reverse this counter-intuitive pattern, reducing purchases more for those with higher discount factors.

The simple single-decision model presented here could be extended to describe dynamic decision-making, in which the consumer makes repeated decisions over time. Such a model would need to account for additional complexities, including the degree to which the consumer is naïve or sophisticated in anticipating

the likelihood of non-salient outcomes being realized later. Furthermore, it will be important to consider the possibility that some non-salient outcomes (e.g. launch of a competitor product) may occur at a fixed time, and therefore be more likely to be considered when choices are made later. For other non-salient outcomes (e.g., post-warranty product failure), the time horizon may move with decision time, and decisions made later may not be more likely to take it into account.

APPENDIX REFERENCES

Erdem, Tülin and Michael P. Keane (1996), "Decision-Making under Uncertainty: Capturing Dynamic Choice Processes in Turbulent Consumer Goods Markets," *Marketing Science*, 15 (1), 1-20

Kassam, Karim S., Daniel T. Gilbert, Andrew Boston, and Timothy D.Wilson (2008), "Future Anhedonia and Time Discounting," *Journal of Experimental Social Psychology*, 44 (6), 533–37.

Wang, Jing, Nathan Novemsky, and Ravi Dhar (2009), "Anticipating adaptation to products," *Journal of Consumer Research*, 36(2), 149-159.

Zauberman, Gal, B. Kyu Kim, Selin Malkoc, and James R. Bettman (2009), "Discounting Time and Time Discounting: Subjective Time Perception and Intertemporal Preferences," *Journal of Marketing Research*, 46 (4), 543–56.