

# On Intertemporal Selfishness: How the Perceived Instability of Identity Underlies Impatient Consumption

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How does the anticipated connectedness between one's current and future identity help explain impatience in intertemporal preferences? The less consumers are closely connected psychologically to their future selves, the less willing they will be to forgo immediate benefits in order to ensure larger deferred benefits to be received by that future self. When consumers' measured or manipulated sense of continuity with their future selves is lower, they accept smaller-sooner rewards, wait less in order to save money on a purchase, require a larger premium to delay receiving a gift card, and have lower long-term discount rates.

Many of the most important and difficult decisions we face in life hinge on the same underlying dilemma: how to choose, when trading off consumption or happiness in the immediate future with (more) consumption or happiness delayed to the more distant future. In making decisions about one's career, about spending time and money promoting one's health, about what to buy and how much to spend or save, maximizing current welfare and maximizing lifetime welfare are often in conflict. Research on such dilemmas has been broadly defined as concerning

choices between one option with higher immediate benefits but lower (or negative) long-term utility and another with lower immediate benefits but higher long-term utility. People's widely documented tendency to prefer smaller rewards sooner over larger rewards later has been characterized as revealing shortsightedness or impatience (Elster 1979; Read 2004). In this paper, we focus on a fundamental question raised by the literature on intertemporal choice: why do people's choices often seem so shortsighted or impatient, and why do people differ in their degree of impatience, as inferred from the choices they make?

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*Debbie MacInnis served as editor and Rebecca Ratner served as associate editor for this article.*

*Electronically published January 4, 2011*

Much of the work on intertemporal choice has centered on the specific issue of temporal discounting: how people choose between smaller amounts of money or other goods in the immediate future and larger amounts of money or goods to be received at a later date (see Frederick, Loewenstein, and O'Donoghue [2002] for a detailed review). In this context, the discount rate, the degree to which an outcome loses value by being delayed for a given period of time, can be interpreted as a measure of impatience (Ainslie 1975; Mischel, Shoda, and Peak 1988). Thus, we can restate the general question of (im)patience in intertemporal choices as asking why people exhibit such *high discount rates* (compared to market interest rates or some other norm) in their behavior and why different people exhibit different discount rates. Note that this question is distinct from the widely studied question of why people express inconsistent or present-biased time preferences, as captured by nonconstant discount rates (e.g., hyperbolic discounting; Ainslie 1975; Thaler 1981). Although nonconstant discount rates are important as a violation of normative theory, the motivation

in this paper is to provide further insight into why, for a given choice between the present and future, people tend to systematically advance their short-run interests at the expense of their long-run interests.

We will argue that our understanding of what constitutes a “reasonable” discount rate (or, more generally, prudent vs. impatient choices) has been limited by the implicit assumption that people should maximize the utility of a constant self over one’s lifetime. An alternative position, proposed by the philosopher Derek Parfit (1984), is that a decision about consuming now or later should depend not only on the temporal distance between events but also on the perceived continuity between one’s present and future selves. This view implies that the degree of concern one has for one’s future self should be scaled by the degree of “psychological connectedness”—overlap in personality, temperament, major likes and dislikes, beliefs, values, ambitions, life goals, ideals, and so on—held between one’s current and future self. These properties have been proposed to define the mental ties between selves that comprise identity over time (Lewis 1983; Perry 1972; Unger 1991).

We employ the notion of psychological connectedness—drawn from a literature in which there is an ongoing debate over its specifically normative implications (Parfit 1984; but see Dancy [1997] for an entire edited volume of dissenting views)—to empirically test a descriptive account of people’s intertemporal choices. In our view, the greater the perceived connectedness to the future self, the greater people’s willingness to defer benefits to the future self, all else equal. Conversely, feeling disconnected from the future self will undercut the general underlying motivation to preserve resources for the future self, resulting in a reduction in patience that is distinct from other factors that affect valuations of present and future outcomes.

Across five studies, we will show that connectedness contributes to differences in impatience across people and can be systematically manipulated by inducing different beliefs about the degree of change in one’s future identity, resulting in differing degrees of impatience in subsequent choices. In study 1, we show that being exposed to information about how one’s identity will or will not change due to an upcoming life event that could decrease connectedness (college graduation) leads to either more or less impatience in real monetary trade-offs. In study 2, we address an uncertainty-of-preferences alternative account by demonstrating that people who are made to feel disconnected choose impatiently even in a context in which their uncertainty about the future or about their own future preferences should not affect their choices. In study 3, we show that merely increasing the perceived difficulty with which participants think of their identities as stable over time leads to more impatient purchase decisions and steeper discounting of money. In study 4, we distinguish the effect of connectedness on impatience (high longer-term discount rates), from both present-bias (high shorter-term discount rates) and time inconsistency (changes between short-term and long-term discount rates). Finally, in study 5, we show that partici-

pants’ naturally occurring degree of connectedness predicts choices made 3 weeks later, and we compare the influence of connectedness with several other time-varying processes that have been proposed to affect impatience.

## THEORETICAL BACKGROUND AND PROPOSED FRAMEWORK

### Evidence for High Discount Rates

Contemporary views of intertemporal choices often characterize people’s behavior as shortsighted (Ainslie 2001). In some models, an “appropriate” level of discounting is determined by economic considerations, such as how much interest could be earned in the intervening time (Fisher 1930), liquidity constraints (e.g., Fuchs 1982; Meyer 1976), and inflation. Empirical research has found that actual behavior is generally more impatient than what would be predicted by these economic factors (Laibson 1997) and is characterized by disproportionate preference for smaller short-run outcomes, as compared either to one’s own long-term preferences (e.g., constituting preference reversals) or as compared to market norms.

Numerous studies have attempted to estimate discount rates, using field and experimental studies, real and hypothetical outcomes, and a range of elicitation methods. Frederick et al. (2002, 389) summarize the literature as characterized by a “predominance of high discount rates—discount rates well above market interest rates,” although they note that many potential confounds may inflate estimates of the discount rate. While extremely high annualized rates over short time periods (per hyperbolic discounting) contribute to this observation, even equivalently annualized long-term discount rates tend to be surprisingly high. In addition to experimental studies with hypothetical choices, field studies have documented high discount rates (i.e., impatience) in everyday decisions, such as people’s preferences for lower priced appliances with substantially higher long-term usage costs (Hausman 1979) and military employees’ preferences for a large lump-sum payment over an annuity representing a higher than market interest rate (Warner and Pleeter 2001). Thus, an examination of impatience, as evidenced by the magnitude of discount rates (in contrast to an examination of time inconsistency), provides a direct test of general shortsightedness.

### Heterogeneity in Discount Rates and Moderators of Discounting

In the research that has shed light on high discount rates, the primary focus has been on the moderators of discount rates, both across people and across decision contexts. While generally high, discount rates have been shown to be sensitive to the specific experimental elicitation methods used (e.g., choice, willingness to pay, matching, titration of indifference points). Furthermore, discount rates vary based on aspects of the broader choice context, such as the nature and magnitude of the good being discounted (Chapman

1996; Green, Myerson, and McFadden 1997; Madden et al. 1997), the accessibility of justification cues (Kivetz and Zheng 2006), and the degree of goal conflict experienced in choosing (Urminsky and Kivetz 2010). These moderators have provided further support for the view that impatient choices and high rates of discounting arise from an underlying process of reasoning about the personal and situational benefits of trading off delay and money, rather than being based primarily on calculations involving market rates, risk, and opportunity cost.

Furthermore, while discount rates are generally high, not everyone has equally high discounting. Discount rates have been shown to vary systematically by age, gender, income, and education (e.g., Cairns and van der Pol 2000; Green, Fry, and Myerson 1994; Kirby and Marakovic 1996) as well as by individual differences in whether and how people think about the long-term implications of their choices (Husman and Shell 1996; Nenkov, Inman, and Hulland 2008; Strathman et al. 1994; Zimbardo and Boyd 2009). Higher discount rates have also been found for heavy drinkers (Simpson and Vuchinich 2000), gamblers, and drug users (e.g., Kirby, Petry, and Bickel 1999; Madden et al. 1997; Petry and Casarella 1999). This large literature on interpersonal differences in discounting provides strong evidence that people can have fundamentally differing discount rates, often in ways that map onto (or at least correlate with) more generalized shortsightedness.

### Connectedness to the Future Self and Discounting

We propose that the notion of connectedness to the future self is fundamental for understanding impatience, shedding light on why discount rates are generally high, why some people are more impatient than others, and what kinds of interventions may lead to higher or lower discount rates. In doing so, we draw on the views of philosopher Derek Parfit, who has theorized that changes over time in the psychological properties that comprise one's identity should warrant a reduction in concern for a later self: "We care less about our further future . . . because we know that less of what we are now—less, say, of our present hopes or plans, loves or ideals—will survive into the further future. . . . We may, because of this, act knowingly against our own long-term self-interest. . . . [If] what matters holds to a lesser degree, it cannot be irrational to care less" (Parfit 1976, 99). In this view, the future self, given an extremely large reduction in connectedness, may be reasoned about almost as a distinct individual. We do not mean to overstate the analogy of regarding the future self as you would regard another—in our account, rather, the future self is seen as a continuation of the current self, to varying degrees. The future instantiations of the self may be seen as nearly identical to the current self or they may be substantially different, and we will argue that this perceived degree of continuity leads to differences in patience.

In extending the notion of connectedness to a descriptive account of impatience, we define connectedness between the current self at time  $t_0$  and a future self at time  $t_1$  as the

proportion of the defining psychological features of the current self believed to persist in the self that will exist at time  $t_1$ . Thus, if a person feels that they have a very stable identity, such that the defining features of the self are expected to remain unchanged over time, this person will be more psychologically connected to their future self than will someone who expects their identity to vary over time. We will therefore use the terms *connectedness* and *stability of identity* interchangeably in the paper.

In our view, a person values future outcomes in proportion to how much she feels, at that moment, that the current self's important psychological characteristics will persist in the future self. When people feel highly connected to the future self, benefits received by the future self are valued much as if they were received by the present self. However, when a discontinuity in identity is perceived, deferred benefits accrue to a disconnected future self (i.e., a somewhat different person), and this outcome is valued less than having those benefits consumed by the present self. Thus, when people are faced with explicit intertemporal trade-offs, their allocations of benefits to the future selves are driven, in part, by how psychologically connected they feel to those future selves. As a result, decisions that might appear shortsighted (i.e., decisions characterized by a low decision weight on future consequences or an inflated discount rate) may instead merely reflect this notion of intertemporal selfishness—an unwillingness to share resources with a future self who is evaluated to be substantially different from the current self.

It should be noted that continuity of identity, as defined here, is independent of the valence of one's identity (i.e., degree of self-liking), the beliefs in volitional positive change (e.g., incremental theorists; Dweck 1999; Mukhopadhyay and Johar 2005), or the clarity of self-concept (the degree of insight into one's identity; Campbell et al. 1996). Consistent with the recent empirical literature on how people judge the continuity of identity over time (e.g., Nichols and Bruno 2010; Rips, Blok, and Newman 2006), our definition hinges specifically on the stability of one's psychological properties. We provide evidence that the perceived stability of personal identity is not only sensitive to information that alters the degree of anticipated personal change but that it is also highly responsive to subtle internal cues that can make people feel more or less connected to their future selves.

It is important to distinguish the view we are proposing from several seemingly related accounts of shortsighted choices. The notion of "future connectedness" that Husman and colleagues have linked to farsighted behaviors refers to perceiving how present actions are causally connected to future consequences and not to the connectedness of present and future selves. Previous discussions of "multiple selves" in intertemporal choice (Milkman, Rogers, and Bazerman, 2009; Schelling 1984; Thaler and Shefrin 1981), on the other hand, have posited selves with different, competing interests and temporal horizons (e.g., myopic vs. farsighted). Our connectedness account, in contrast, is specifically about allocating less to a future self that is seen as different from

the current self in the defining aspects of one's identity rather than just in one's outlook or preferences. This is a key distinction, as changes to a person's identity may, in some cases, also entail the anticipation of changing preferences, which could lead a person to consume sooner (when she knows she will enjoy the outcome) rather than later. Our claim is that anticipated change in identity will affect patience, over and above any effects of anticipating changes in specific preferences. We will revisit this distinction in studies 2 and 5.

While Parfit's views have been recognized as potentially having profound implications for how we think about intertemporal preferences (Baron 2002; Frederick 2006; Read 2004), few empirical studies have directly investigated the role of connectedness in intertemporal choice. Frederick (2002) investigated the relationship between perceived connectedness to the future self and intertemporal choices and found no correlation between his measure of connectedness and higher discount rates across people. In contrast, in a paper reporting a provocative correlational result, Ersner-Hershfield, Wimmer, and Knutson (2009) asked participants to make judgments about the current self, future self, and other people and found that those people for whom thinking about the current self most resembled thinking about the future self (in terms of the neural activation elicited) tended to show less devaluation of monetary rewards over time. Ersner-Hershfield et al. (2009) also present evidence that people who report having accrued greater total assets—more money invested in a home, in securities, in other material goods, and in the bank—tended to rate themselves as more similar to who they would be in 10 years than people who had fewer assets. Insofar as asset accrual is indicative of having acted in a forward-looking manner, this correlational result is also broadly consistent with the predictions tested in the current paper.

Bartels and Rips (2010) investigated the role of connectedness in nonconstant discount rates for a given person over time and found that declines in discount rates over time correlated with perceived reduction in connectedness over time. They also showed that people making choices on behalf of third parties allocate more of the funds to be received before (vs. after) an identity-changing, connectedness-reducing event in those third parties' lives.

In this paper, we will provide the first direct, experimental evidence that changing a person's connectedness to their future self induces differences in their patience (specifically, their long-term discount rate) and that the influence of psychological connectedness on patience is distinct from the factors already identified in the literature as affecting people's relative preference for sooner versus later outcomes. Using both experimental manipulations of connectedness and naturally occurring variation in connectedness, we demonstrate that the role of connectedness in choices contributes to overall high discount rates as well as to differences across people in discounting. In contrast with the view of connectedness as an individual difference (which can potentially be affected by major life changes), we present evidence that

connectedness depends directly on people's feelings of stability in their personal identity and is subject to change by very subtle metacognitive cues.

## STUDY 1: CHANGES IN CONNECTEDNESS DUE TO COLLEGE GRADUATION

### Method

As an initial test of our hypotheses, in study 1, we investigate the effect of manipulating people's sense of connectedness to the person they will be in a year on subsequent choices between the immediate receipt of a gift card versus delayed receipt of a higher-valued gift card, with the possibility of winning one of their choices.

One hundred forty-one graduating seniors at a large Midwestern university were approached 1–2 weeks before their graduation date and asked to fill out a short survey in return for entry into a lottery for which they could receive a gift certificate. The college seniors were assigned to one of two conditions and read a passage that described their imminent graduation as a major event involving general life changes in both conditions, that would either impart changes specifically to one's identity ( $N = 77$ , low-connectedness condition) or that would specifically not change one's identity ( $N = 64$ , high-connectedness condition). Specifically, they read:

Day-to-day life events change appreciably after college graduation, but what changes the most [*least*] between graduation and life after college is the person's core identity. . . . The characteristics that make you the person you are . . . are likely to change radically around the time of graduation [*are established early in life and fixed by the end of adolescence*]. . . . Several studies conducted with young adults before and after college graduation have found large fluctuations in these important characteristics [*have shown that the traits that make up your personal identity remain remarkably stable*].

Participants then wrote a one-sentence summary of the passage, and data from seven participants were dropped due to blank or incorrect summaries. Next, participants chose between lotteries for delayed gift cards of increasing value over time (for either Target or for Expedia.com, between subjects). Specifically, in the Expedia version, they read:

We will be giving away a free gift certificate to one of the participants in this survey. If your survey is chosen, you will receive a free Expedia.com gift certificate that could be used towards the purchase of a short weekend (2-night) trip to the U.S. city of your choosing. If your survey is chosen, you will receive the gift certificate either next week, when the drawing will occur, or in one year. What you would receive is determined by selecting at random one of the choices you make below. Since you may actually receive the option you choose, please make each of the following choices carefully.

Participants then made choices between either receiving a

\$120 gift certificate in 1 week (when the drawing would be held) or receiving a larger-valued gift card in a year, using eight values (\$120, \$137, \$154, \$171, \$189, \$206, \$223, and \$240). Last, participants were asked to indicate in two questions how much more or less free time and spending money they anticipated having a year from now (0 = much less, 6 = much more).

## Results and Discussion

*Relationship between Perceived Connectedness and Patience.* Our measure of patience was the number of deferred options (waiting 1 year for the gift certificate) chosen over the eight tasks, such that choosing more deferred options indicated greater patience. When participants were told that their impending graduation presaged a major (vs. trivial) change in their identity, they exhibited more impatience and were more likely to choose the smaller-sooner gift card. Participants in the low-connectedness conditions were less patient, requiring a larger delay premium, on average (\$67), than did participants in the high-connectedness conditions (\$51).

The effect of the connectedness manipulation was robust and similar in size across both types of certificates. A  $2 \times 2$  ANOVA finds only the predicted main effect of low versus high connectedness ( $F(1, 134) = 5.89, p = .017, \eta_p^2 = .04$ ) and no significant effects for type of good nor the interaction term ( $F_{\text{good}} = 2.42$  and  $F_{\text{interaction}} = 0.02, p$ 's = .12 and .90), indicating that the effect generalizes across different gift certificates. Furthermore, the connectedness manipulation did not significantly affect beliefs about the availability of money or free time in the future ( $t_{\text{money}} = 0.86$  and  $t_{\text{free-time}} = 1.22, p$ 's = .39 and .22), and the effect of manipulation is robust ( $F(1, 135) = 5.27, p = .023, \eta_p^2 = .04$ ) when controlling for these beliefs about the future in an ANCOVA ( $F_{\text{money}} = 1.09$  and  $F_{\text{free-time}} = 5.47, p$ 's = .30 and .02—greater anticipated free time predicted greater patience). We replicate this finding in a separate study that investigates people's "delay premiums" for receiving a fixed-value gift certificate (i.e., their willingness to accept a cash payment for a delay; see app. C, available in the online version of *JCR*).

The results of study 1 demonstrate that manipulating the perceived stability of one's identity over a period of time that is punctuated by a major life event (and thereby changing the degree of connectedness between the present and future self) exerts an influence on one's patience in a real choice situation (decisions for a chance of winning a real gift card). This study highlights the key distinctions between our connectedness-based explanation for impatience and traditional discounting models. In our view, impatience over a given time period for an individual is determined not only by the length of the time interval and the economic circumstances (availability of money, opportunity costs entailed by consuming sooner) but also by the changes to the self anticipated to occur in that time period. In particular, important life events—marriage, divorce, entry or exit from college, the death of a loved one, and so on—can impart changes

to the properties that define the self in ways that go beyond changes due to the mere passing of time (Liu and Aaker 2007; Pillemer, Rhinehart, and White 1986).

## STUDY 2: DISTINGUISHING BETWEEN LOW CONNECTEDNESS AND FUTURE UNCERTAINTY

In the previous study, we made the assumption that reading the passages manipulated connectedness (i.e., the perceived overlap in important psychological characteristics of the present and future selves) but did not affect other factors. Next, we address the concern that the manipulations used may have inadvertently affected factors other than connectedness, using both manipulation checks and experimental conditions.

In particular, a key driver of choice over time is that we have less information about the future than about the present. Thus, outcomes delayed to the further future can involve more uncertainty and risk, and intertemporal choice might be explained, in part, by differences in risk between immediate and delayed options (e.g., Mischel, Ayduk, and Mendoza-Denton 2003). While the temporal delay between choice options is the same in both conditions in our studies, which rules out delay-induced uncertainty as a confound, a related concern is that our low-connectedness manipulation might lead participants to have more uncertainty, either about the future in general or specifically about changes in their preference over time (March 1978; Salisbury and Feinberg 2008). If this were the case, people who choose sooner-smaller options in the low-connectedness condition may be doing so due to an uncertainty-induced inability to choose for the future self rather than solely due to the impact of perceived disconnectedness on impatience.

We address the aforementioned concerns in two ways. First, we conducted pretests of our manipulation of connectedness to rule out systematic variation in future uncertainty (and a host of other factors; see app. A) as a consequence of the manipulations. Second, we conducted a study to directly test the adequacy of alternative accounts in which less-connected participants might be more unwilling to commit themselves to a delayed option because they either do not know what the future will be like or are not sure what they will want when it arrives. To assess the relative contributions of uncertainty and connectedness on impatience, we independently manipulate both connectedness and the level of choice flexibility available to participants in a  $2 \times 2$  between-subjects design. This allows us to contrast the effect of connectedness on impatience in conditions in which uncertainty regarding either the future or one's preferences should and should not affect people's intertemporal choices.

## Method

This study used a  $2$  (connectedness: high, low)  $\times$   $2$  (choice flexibility: fixed, flexible) between-participants de-

sign. One hundred eighteen young adults (aged 18–29) in a large Midwestern city agreed to fill out a short survey in return for \$2 and entry into a lottery for which they could receive a gift certificate. Connectedness was manipulated by having participants read passages which were structurally similar to those used in study 1, only the more general passages used here described the stability or instability of identity in young adulthood, without referencing graduation. Specifically, in the high-connectedness condition, participants ( $N = 57$ ) began by reading a short description of “recent research” suggesting that young 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”). In the low-connectedness condition, participants ( $N = 61$ ) read about instability (e.g., “the important characteristics that make you the person you are right now . . . are likely to change radically in young adulthood”). We also conducted extensive pretests of this manipulation with two separate samples from the same population ( $N$ 's = 110 and 73). We assessed connectedness in the pretests by asking participants to “think about the important characteristics that make you the person you are now and circle the one diagram out of the six below that best reflects your opinion about the degree of connectedness between the person you are now and the person you will be in a year, where no overlap means ‘completely different’ and complete overlap means ‘exactly the same.’” Participants circled one of the six Euler circles (see fig. 1), which were coded as numeric scores (e.g.,  $a = 1$  to  $f = 6$ ).

In the study itself, the connectedness manipulation was crossed with a manipulation of choice flexibility. After the connectedness manipulation, participants read that they had been entered into a lottery to receive a gift certificate from a retailer of their choosing, which could be received either

next week (after the drawing was held to decide a winner) or a year later, based on their choices. They were presented with a menu of 20 popular online shopping sites from which to choose. We used multiple different retailers to highlight the problem of potentially choosing poorly if the future self turns out to have differing needs or preferences. Participants in the “fixed” conditions ( $N = 56$ ) were asked to commit to a retailer, reading that “if you win, the gift certificate will be from the retailer you write on the line below and you cannot change your choice later.” Participants in the “flexible” conditions ( $N = 62$ ), in contrast, indicated only an initially preferred retailer, reading that “if you win, the gift certificate will be from ANY of the retailers listed above and you will make your final choice when the gift certificate becomes usable (in one week or one year).”

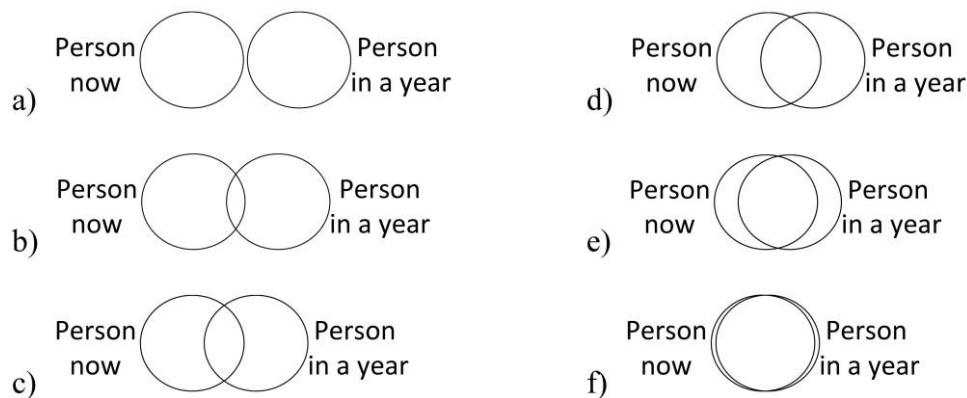
After selecting a retailer, participants made choices between receiving smaller valued gift certificates in a week, using 11 values (\$10, \$20, \$30, \$40, \$50, \$60, \$70, \$80, \$90, \$100, and \$110) or receiving a \$120 gift certificate in a year.

## Results and Discussion

*Pretests of Manipulations.* The results of the pretests are reported in appendix A and briefly summarized here. Most importantly, we found that reading about the instability of one’s identity over time significantly reduced connectedness ratings but did not produce significant differences in other dimensions that might influence preferences. In particular, we found no effect of the manipulation on people’s reported liking of their future self, the perception that the future self would be a better or worse person than the current self, their construal level (Vallacher and Wegner 1989), mood (Watson, Clark, and Tellegen 1988), or the accessibility of future-oriented words or the salience of mortality. Most relevant

FIGURE 1

### MEASURE OF CONNECTEDNESS



Note: Options (a) through (f) were presented to participants vertically.

to the specific concern that our manipulation of connectedness might be affecting uncertainty associated with the future, we found no effect of the manipulation on the perception of the future as generally uncertain or unpredictable, nor did the manipulation significantly affect participants' uncertainty concerning their own future preferences.

*Fixed versus Flexible Gift Certificates.* In the study itself, our measure of patience was the number of deferred options (waiting 1 year for the gift certificate) chosen out of the 11 choice tasks, where choosing more deferred options indicated greater patience. If feeling disconnected from the future self increases impatience, as we propose, then we should see a similar effect of the connectedness manipulation in both conditions, regardless of whether the gift certificate retailer was fixed or flexible. Alternatively, reading about stability versus instability of identity might instead affect choices by increasing uncertainty (e.g., about one's future tastes and preferences) in the instability condition. If this were the case, we should find a larger effect of our connectedness manipulation in the fixed conditions, where the risks of committing to future outcomes are higher due to uncertainty, than in the flexibility condition where the future self chooses the retailer.

The results of a 2 (connectedness: high, low)  $\times$  2 (choice flexibility: fixed, flexible) analysis of variance revealed two main effects ( $F$ 's (1, 114) = 5.85 and 5.67,  $p$ 's < .05,  $\eta_p^2$ 's = .05 for connectedness and choice flexibility) but no interaction ( $F < 1$ ). Figure 2 shows that people were more patient when made to feel connected than when made to feel disconnected, as predicted by our framework. People were also more patient in the flexible conditions than in the fixed conditions (i.e., flexibility does increase the value of future options), consistent with the view that the future is generally seen as uncertain. However, the effect of the connectedness manipulation on patience—that feeling disconnected from the future self results in impatience—was unaffected by the manipulation of choice flexibility. Thus, the effect of connectedness on choices cannot be explained by the presence of an uncertainty-induced desire to avoid committing to future options in the low-connectedness conditions.

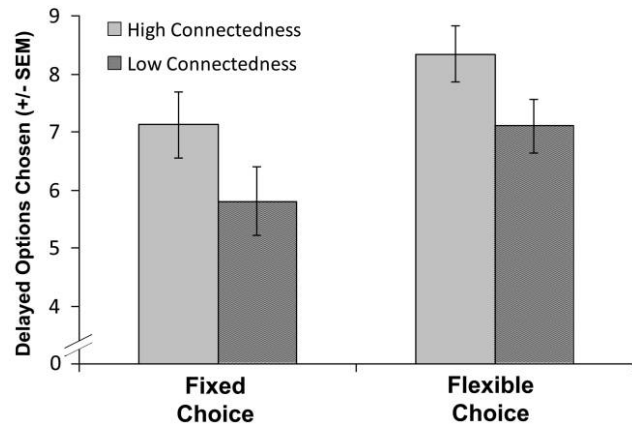
The results of study 2 distinguish the effects of connectedness on patience from the ability to choose for the future self, finding that a lack of psychological connectedness induces impatient consumption even in a context in which any presumed inability to choose for the future self is mitigated (in the flexible choice conditions).

### STUDY 3: ACCESSIBILITY-INDUCED FEELINGS OF CONNECTEDNESS AND PURCHASE TIMING

The results of the prior studies show that over periods of time in which one might reasonably expect meaningful change in the properties that comprise one's identity, providing information that highlights the likelihood of decreased connectedness leads to more impatience in decision making than does providing information about the stability

FIGURE 2

PATIENCE BY HIGH VERSUS LOW CONNECTEDNESS AND FIXED VERSUS FLEXIBLE CHOICE



of identity. A potential concern, however, is that participants' choices may have reflected a lay theory about what the appropriate effect of changes in identity on patience should be, rather than reflecting their true preferences. This concern is mitigated to an extent by study 1's use of incentive-compatible choices regarding winning actual gift certificates. It is also possible that presenting different information in the two conditions promoted different beliefs or differentially highlighted certain aspects of the future across the two conditions (e.g., the ways in which the future might be more or less uncertain, as addressed in study 2 above). To address these concerns, study 3 manipulates connectedness by using the inferences that participants reached from a metacognitive cue while keeping the information content the same across the two conditions.

In this study, we test the generalization of our hypotheses to two additional assessments of patience in intertemporal choice. One common intertemporal decision that consumers face is when to purchase a product if they believe that prices will decline over time (Winer 1985). In particular, given the prevalence of price-skimming strategies, discussion of expectations for declining prices is widespread in the popular press for technology products and has been shown to affect decision making (Ronen, Lucas, and Eden 1990). Thus, we presented participants with a realistic scenario in which they decided when to buy a computer, given an expected schedule of declining prices over the next 12 months, as well as a simple battery of preference matching tasks that assessed the discounting of money over time. We expect that asking participants to imagine generating two reasons why their identity will remain stable will induce greater connectedness and they will thus exhibit greater patience (e.g., will choose to purchase later and will discount money less) than will participants asked to imagine generating 10 such reasons.

TABLE 1

1) I would be indifferent between \$500 today	and	\$___ in 12 months.
2) I would be indifferent between \$___ today	and	\$100 in 12 months.
3) I would be indifferent between \$100 today	and	\$___ in 12 months.
4) I would be indifferent between \$___ today	and	\$500 in 12 months.

## Method

Ninety-seven undergraduates at a large Midwestern university participated in exchange for \$2. All the participants were presented with a passage that conveyed that the evidence for the stability of identity over time is mixed and that experts reach widely varying conclusions on the basis of these findings. Then, drawing from the work on “accessibility experiences” (Schwarz 1998, 2004), we asked participants in the high-connectedness condition to judge how easily they could generate two reasons ( $N = 51$ ) why their own identity would remain very stable over the next 12 months, after reading that most participants in a previous study were able to generate two reasons. In the low-connectedness condition ( $N = 46$ ), participants judged how easily they could generate 10 such reasons, after reading that most participants previously had been able to generate 10 reasons. (Both passages were, in fact, true. In a pretest, most participants were able to generate 10 reasons.) Participants marked their responses on a 1–7 scale, ranging from “No, I’m quite sure that I cannot retrieve 2 (10) reasons” to “Yes, I’m quite sure that I can retrieve 2 (10) reasons.” Participants who were asked to imagine how difficult it would be to generate two reasons should find the task easy and therefore have no reason to doubt the stability of their identity. Conversely, participants in the 10 reasons condition should anticipate that the task would be more difficult and are likely to use this anticipated difficulty as a cue to question the stability of their identity, yielding a feeling of low connectedness. This procedure has been widely used to manipulate consumers’ evaluations (e.g., Novemsky et al. 2007). We chose this manipulation to induce anticipated ease (difficulty) without having participants list reasons because (a) research has shown that anticipated ease and experienced ease of reason generation have analogous effects on evaluation (Wanke, Bohner, and Jurkowsch 1997), and (b) we were concerned that having participants list reasons might introduce potentially confounding information arising from the reasons themselves or that it might otherwise influence a construct other than connectedness (e.g., mood, mental fatigue, etc.).

Participants then rated the degree of connectedness they perceived between the person they are now and the person they would be in a year. Next, they were presented with a choice about when to buy a computer that was expected to decline in price over the next 12 months. They read:

Imagine that you have a laptop that you use for your work. The laptop is pretty old, and it works, but it’s slow, heavy, and is lacking in some features you desire. You would really like to get a new laptop, and after doing some research you

are considering purchasing the brand new laptop described below.

The laptop has just been introduced and is currently on sale for \$2000. You have a credit card to which you could charge the full amount. However, in doing your research, you find out that the price is expected to drop over the next year. So, you can buy it now at full price or get it for cheaper by waiting.

They then chose among five timing options, ranging from buying now for \$2,000 to waiting a year and paying \$1,000, in increments of saving \$250 for each additional 3 months of waiting. Last, after giving a rating of their current need for the computer, participants gave four preference matching responses, as in table 1.

## Results and Discussion

*Manipulation Checks.* Participants in the two reasons (high-connectedness) condition indicated that the reason-generation task would be relatively easy ( $M = 4.78$ ,  $SD = 1.91$ ) compared to the ratings of the participants in the 10 reasons (low-connectedness) condition ( $M = 3.93$ ,  $SD = 1.89$ ;  $t(95) = 2.22$ ,  $p = .029$ ,  $\eta_p^2 = .05$ ). Also, participants in the two reasons condition rated themselves as more connected to their future selves ( $M = 4.71$ ,  $SD = 0.97$ ) than did participants in the 10 reasons condition ( $M = 4.29$ ,  $SD = 0.82$ ;  $t(95) = 2.30$ ,  $p = .023$ ,  $\eta_p^2 = .05$ ).

*Relationship between Perceived (In)stability and Discounting.* In order to account for the effect of people’s current need for a new computer on their purchase timing, we included it as a covariate in an ANCOVA. (The manipulation did not affect people’s perceived need for a computer.) We find that the manipulation of connectedness affects purchase timing ( $F(1, 94) = 5.47$ ,  $p = .022$ ,  $\eta_p^2 = .06$ ), controlling for computer need ( $F(1, 94) = 8.70$ ,  $p = .004$ ,  $\eta_p^2 = .09$ ). In particular, we find that, after residualizing on computer need, participants in the high-connectedness condition waited 1.8 months longer on average than did participants in the low-connectedness condition. This finding provides further support for our claim that higher connectedness to the future self promotes patience in a broad array of decisions that involve intertemporal trade-offs.

We also looked at the degree of patience expressed in the matching task for each participant to assess whether inducing belief in the stability of one’s identity affects patience for money. Consistent with the findings for the computer purchase task, participants in the high-connectedness (two reasons) condition had higher discount factors (computed



as average ratio of sooner-smaller amount/average later-larger amount given for the four responses;  $M = 0.65$ ,  $SD = 0.26$ ) than participants in the low-connectedness (10 reasons) condition ( $M = 0.48$ ,  $SD = 0.25$ ;  $t(95) = 3.25$ ,  $p = .002$ ,  $\eta_p^2 = .10$ ). These results are also consistent with the view that our manipulation of connectedness gave rise to a generalized increase in patience, and our findings are not limited to a given elicitation method or product domain.

The results of study 3 provide evidence that psychological connectedness influences patience as expressed by purchase timing and intertemporal matching tasks, using a more nuanced manipulation of connectedness. Specifically, in this study we reduce connectedness by having people anticipate the difficulty of listing many stable aspects of their identity (and thus lead them to question the stability of their identity) rather than by providing people with information about the stability or instability of their identity as in the previous studies. Participants who were given no metacognitive cue to doubt the stability of their identity-comprising features over the next year waited longer to buy a computer that declined in price and discounted money less than participants who were made to feel they would be more likely to change over time. Thus, manipulating specifically the feeling of connectedness (as opposed to information about future change) significantly affects intertemporal choices.

#### STUDY 4: THE EFFECT OF MANIPULATED CONNECTEDNESS ON SHORT VERSUS LONG-TERM DISCOUNT RATES

Studies 1–3 show that manipulating connectedness affects patience, as measured by discount rates defined over a single time period. An additional factor that may contribute to impatience is “present-bias”—the general tendency for people to be more impatient for outcomes in the imminent future than for distant future outcomes. This has been modeled in “quasi-hyperbolic” frameworks by assuming one parameter ( $\beta$ ) reflecting weight given to near future outcomes (e.g., present-bias) and another parameter ( $\delta$ ) reflecting discounting of later outcomes (Laibson 1997; O’Donoghue and Rabin 1999; Zauberman 2003). Many papers on the correlates of discounting have studied only the hyperbolic parameter  $k$ , which conflates time inconsistency with the average magnitude of discount rates. However, some recent research has shown that present bias and long-term magnitude of discounting are both conceptually and empirically distinct constructs (i.e., they are predicted by different demographic factors and they predict different behavioral outcomes; Ashraf, Karlan, and Yin 2006; Meier and Sprenger 2008; Tanaka, Camerer, and Nguyen 2010).

Our connectedness framework predicts that the greater the drop-off in perceived connectedness over a period, the less patience will be observed over that period. Therefore, it is instructive to determine whether our manipulations of connectedness affect patience (i.e., long-term discounting over a specified period of time), as we have been arguing,

or whether our findings could be attributed to the manipulation of connectedness making people more present-biased.

#### Method

We conducted an online survey in which participants were paid \$2. We collected 71 complete and validated surveys from adult native English speakers. We manipulated connectedness as in study 3, asking participants in the high- (vs. low-) connectedness condition to judge how easily they could generate two (vs. 10) reasons why their own identity would remain very stable over the next 12 months. After the manipulation, we measured discounting by asking participants for four preference matching responses, as in study 3. Participants matched the value of receiving \$200 tomorrow to receiving some (larger) amount in a year, then matched a (smaller) amount to the value of receiving \$100 in a year. They also answered these same questions about outcomes delayed 1 month, rather than a year.

#### Results and Discussion

*Manipulation Checks.* Participants in the two reasons (high-connectedness) condition indicated that the reason-generation task would be relatively easy ( $M = 5.36$ ,  $SD = 1.56$ ) compared to the ratings of the participants in the 10 reasons (low-connectedness) condition ( $M = 4.26$ ,  $SD = 1.86$ ;  $t(69) = 2.68$ ,  $p < .01$ ).

*Relationship between Manipulated (In)stability and Short-versus Long-Term Discount Factors.* For each time horizon (1 month, 1 year), we computed the average implied annual discount factor for both the 1-year task and the 1-month task. Participants in the 10 reasons (low-connectedness) condition were less patient (i.e., expressed a lower discount factor) for the 1-year task ( $M = .54$ ,  $SD = .21$ ) than did participants in the two reasons (high-connectedness) condition ( $M = .66$ ,  $SD = .24$ ;  $t(69) = 2.14$ ,  $p < .036$ ,  $\eta_p^2 = .06$ ). The implied annual discount factors for the 1-month matching task were lower than for 1 year, as would be expected, but the effect of manipulating connectedness was not significant ( $M = .16$ ,  $SD = .22$  vs.  $M = .23$ ,  $SD = .29$  for low vs. high connectedness;  $t(69) = 1.14$ ,  $p = .26$ ,  $\eta_p^2 = .02$ ). Next, we calculated the difference in annualized discount factors expressed over a year and over the month for each participant, as a measure of inconsistent discounting. This difference was also not affected by the manipulation of connectedness ( $M = .38$ ,  $SD = .21$ , low connectedness vs.  $M = .43$ ,  $SD = .20$ , for low vs. high connectedness;  $t(69) < 1$ ). Last, we applied the continuous version of the quasi-hyperbolic discounting model (Laibson 1997) to the data and calculated each person’s long-term discount factor ( $\delta$ ) controlling for their present-bias ( $\beta$ ). Comparing the discount factors corresponding to the estimates of  $\delta$ , we find that participants in the low-connectedness condition were indeed less patient ( $M = .70$ ,  $SD = .20$ ) than were participants in the high-connectedness con-

dition ( $M = .82$ ,  $SD = .16$ ;  $t(69) = 2.67$ ,  $p = .01$ ). Thus, the impact of manipulating a participant's connectedness to the person she will be in a year primarily affects her long-term discount factor defined over that year, and this effect is not attributable to differences in present-bias or inconsistency in discount rates between 1 month and 1 year.

This study also provides evidence that the effects of manipulating connectedness on long-term patience generalize to a demographically broader adult population (in particular, we find no reduction in the effect of the manipulation on older participants). We consistently find that when connectedness is expected to be lower at a defined point in the future (e.g., a year), the observed impatience over the intervening period of time is greater. Furthermore, this finding cannot be explained by an effect of connectedness on present bias or changing levels of patience over time. However, it should be noted that we would predict connectedness to induce greater discounting even over short periods of time when changes in identity are expected to occur immediately (e.g., for a college senior who will graduate today and who sees graduation as an identity-changing event). This is consistent with the aforementioned finding that patience is lowest over those periods of time for which people expect the largest reductions in connectedness (Bartels and Rips 2010).

### STUDY 5: TRAIT-LEVEL CONNECTEDNESS AND SUBSEQUENT DECISIONS

In the studies above, we have provided the first evidence that directly manipulating connectedness systematically affects people's patience for the outcomes they will receive. In this final study, we test whether naturally occurring individual differences in perceived connectedness to the future self relate to individual differences in patience. This approach addresses two potential limitations of the previous studies. First, in manipulating connectedness, we might be highlighting the notion of connectedness to the respondents, potentially magnifying the effect. Second, while our prior manipulations were designed to isolate the effect of connectedness from other constructs, it is possible that connectedness in people's spontaneous thoughts does in fact co-occur with these factors, raising the question of whether connectedness has a unique impact on patience.

Therefore, in this study, we extend the findings to more natural contexts in which people might or might not spontaneously reflect on connectedness when making choices. To avoid suggesting the link between connectedness and discounting to participants, in this study we instead employed a recontact methodology. In the first stage, we measured connectedness (without manipulating it). Three weeks later, in a separate study, we recontacted participants and collected intertemporal preference data, followed by measures of other psychological constructs known to affect intertemporal choice. By simultaneously assessing the relationship of individual differences in both connectedness and

alternative psychological factors with patience, we can gauge how large an impact connectedness has on patience relative to the impact of other factors related to intertemporal preference. Previous research has shown that, when elicitation method is held constant, discount rates exhibit reasonably high test-retest reliability as individual traits (Simpson and Vuchinich 2000), and we therefore anticipate that the initial measure of connectedness will correlate with subsequently measured discount rates, controlling for the other constructs.

Importantly, the participants in the online follow-up study did not know that any of the subsequent questions would be asked when making their initial intertemporal choices. We included measures of (i) anticipated similarity of current and future preferences, or degree of "projection bias"; (ii) future anhedonia; (iii) time perception; (iv) reward responsiveness; and (v) nonplanning impulsiveness at the end of the second survey (see app. B). The first factor—projection bias—is, in some sense, actually a component of psychological connectedness. Whereas connectedness concerns a global assessment of all of the psychological factors that comprise one's identity, projection bias is a measure that captures whether people believe that specifically their tastes and preferences will be different in the future. Compared to the case in which a high degree of similarity between current and future preferences is projected (Loewenstein, O'Donoghue, and Rabin 2003), when people do not project their current tastes onto a later self, they might choose to consume sooner, rather than later, because the delayed benefit might not fit the future self's taste as well as it fits the current self's tastes. While we addressed this as a possible manipulation confound in studies 1 and 2, we want to also distinguish effects of naturally occurring differences in projection bias from spontaneous differences in the broader notion of connectedness.

The second variable captures an affective forecasting phenomenon in which people view both positive and negative outcomes as less extreme the farther into the future these outcomes occur. This "future anhedonia" might induce people to consume benefits sooner, when their positive qualities are more intense, rather than later (Kassam et al. 2008). The third variable, time perception, has been implicated by Zauberman et al. (2009) as a partial explanation for hyperbolic discounting and for high discount rates in the near future. In this view, people may have stable discount rates when scaled by their subjective perceptions of time. That is, the proportion of value retained over a given delay is linearly related to the perceived duration of the delay rather than the actual duration. In this view, the documented effects of shortsightedness may be attributable to a perceptual bias in which near future time periods are perceived as longer in duration than equivalent but more distant time periods.

The fourth and fifth variables represent standard components of the multiple-selves self-control theories, which assume that the exercise of self-control involves an impulsive agent who desires some reward but is overruled by the farsighted agent. The reward responsiveness subscale of the

Behavioral Activation Scale (Carver and White 1994) measures individual differences in the degree of desire, and the self-control subscale of the Nonplanning Impulsiveness Scale (Patton, Stanford, and Barratt 1995) measures individual differences in the ability to resist such temptations. People who score high in reward responsiveness may be more susceptible to factors that induce impulsivity in discounting tasks (Van den Bergh, DeWitte, and Warlop 2008), and nonplanning impulsiveness has been linked to higher discount rates (Hinson, Jameson, and Whitney 2003).

## Method

Ninety four undergraduates at a large Midwestern university participated in the first round of data collection, and 57 participated in the second round of data collection when recontacted. Participants in the first survey were paid \$1 for their time, and those who agreed to participate in the second survey participated in exchange for entry into a lottery for a \$50 gift certificate.

*First Survey.* Participants gave three sets of connectedness ratings. First, they were instructed to “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 circle the one diagram out of the six below that best reflects your opinion about the degree of connectedness between your current and future selves, where no overlap means “completely different” and complete overlap means “exactly the same.” Participants selected a pair of Euler circles to indicate perceived connectedness.

Next, participants were asked to think again about these identity-comprising properties and to give a similarity rating to indicate connectedness, where “0 means ‘completely different’ and 100 means ‘exactly the same’.” Finally, participants were asked to draw a mark on a line to rate connectedness, as seen in figure 3.

The use of multiple measurement procedures enabled us to limit the impact of elicitation method-specific biases. Participants were told that we would like to contact them later in the academic quarter to participate in a later study and were asked for their e-mail addresses.

*Second Survey.* Approximately 3 weeks later, we recontacted our participants, offering them an opportunity to par-

**TABLE 2**  
EFFECTS OF CONNECTEDNESS AND ADDITIONAL FACTORS ON DISCOUNTING

Factor	<i>r</i>	<i>B</i>	SE
Connectedness	.29*	.78*	.36
Projection bias	-.24+	-.22	.21
Future anhedonia	.13	.22	.19
Time perception	-.12	-.01	.01
Nonplanning impulsiveness	-.13	-.06	.05
Reward responsiveness	-.17	-.07	.08
Constant		8.24**	2.66

+*p* < .10.

\**p* < .05.

\*\**p* < .01.

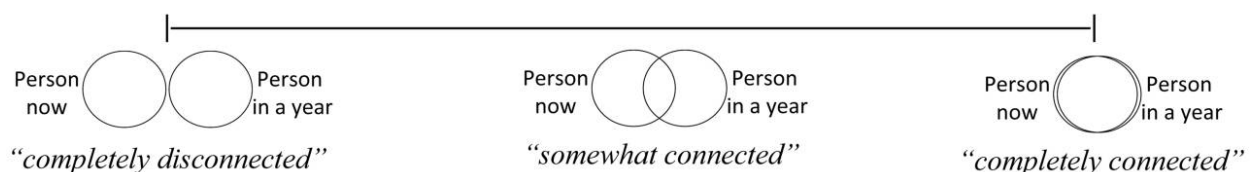
ticipate in a second round of data collection. Those who agreed were first presented with a titration task similar to the one used in study 1. Specifically, they made choices between receiving a \$50 gift card for Amazon.com (if their survey was chosen) in a week, when the drawing would be held, or to receive a larger-valued gift card in a year, using eight values (\$50, \$58, \$66, \$74, \$82, \$90, \$98, and \$106). Next, they responded to the items described above (also see app. B), which measured (i) projection bias (reverse-scaled—participants rated the degree of anticipated change in future preferences), (ii) future anhedonia, (iii) time perception, (iv) reward responsiveness, and (v) nonplanning impulsiveness.

## Results and Discussion

To measure the unique impact of psychological connectedness on discounting, for each participant, we *z*-transformed each of their three connectedness ratings (Euler circles, *M* = 4.4 on a 1–6 scale; similarity rating, *M* = 71.5 on a 0–100 scale; and line scale, *M* = 94.6 on a 0–137 millimeter scale). We then computed the average of these *z*-scores to arrive at an index of connectedness that yields high internal reliability (Cronbach’s  $\alpha$  = .906). We used this index, along with the alternative variables, to predict people’s discounting, as expressed in their choices of gift certificates. Notably, those who agreed to participate in the second survey did not differ in connectedness from those who declined (mean composite *z*’s = 0.00 and –0.02, *t* < 1).

**FIGURE 3**

### CONTINUOUS MEASURE OF CONNECTEDNESS



As in previous studies, our measure of patience is simply the number of deferred, larger rewards chosen. Table 2 reports the results of simple correlations between patience and each of our predictor variables in the first column, and the results of a multiple regression fitting each predictor variable simultaneously in the next two columns. Table 3 reports the intercorrelations among the predictor variables used in the multiple regression.

Our index of psychological connectedness in the first survey was significantly correlated with patience for receiving a gift card, as measured 3 weeks later. In addition, projection had a marginally significant effect, such that those who anticipated that their tastes would change exhibited less patience (table 2). Consistent with the notion that one's preferences are a subset of the features involved in the global assessment of connectedness, these two variables correlate  $-.35$ , such that greater connectedness with the future self corresponds to less preference change (table 3). None of the other measures had a significant bivariate correlation with patience in the gift card task.

Most importantly, the connectedness index predicts patience in a multiple regression controlling for these other factors that have been proposed elsewhere to exert their own influences on patience (table 2). This finding is particularly striking, given that we measured each construct (connectedness and patience) uncontaminated by the other construct. Specifically, the measures of connectedness from the initial survey were elicited without intertemporal choices having already been made salient, and the measure of patience from choices in the second survey collected 3 weeks later was elicited without connectedness having been made salient in that survey. Psychological connectedness remains a significant predictor of patience when all of the factors are entered in the regression simultaneously (model  $R^2 = .20$ ), while the model without connectedness has a substantially weaker fit ( $R^2 = .12$ ), providing strong evidence for both the distinctiveness and pervasiveness of psychological connectedness as a driver of discounting.

We should note that, for each of the other predictor variables of interest, the direction of correlation is consistent with what has been proposed in the literature. The nonsig-

nificant main effects (i.e., correlations between factors and discounting) we found for these variables do not represent any discrepancy with the effects reported in the aforementioned papers: (i) the relationship between projection bias and discounting was not empirically tested (Loewenstein et al. 2003); (ii) reward responsiveness was identified as a moderator of susceptibility to factors that can induce higher discount rates over short periods rather than as a main effect (Van den Bergh et al. 2008); (iii) significant between-subject correlations between subjective time perception and discounting, and between nonplanning impulsiveness and discounting, were not shown in the cited papers (Hinson et al. 2003; Zauberman et al. 2009); and (iv) the magnitude of the reported significant correlation between future anhedonia and discounting in the original paper (Kassam et al. 2008;  $r = .36$ ,  $N = 35$ ) is not statistically different from the nonsignificant correlation obtained in the current study 5 ( $r = .13$ ,  $N = 57$ ;  $z = -1.09$ ,  $p = 0.28$ ). This study demonstrates that connectedness significantly predicts impatience, over and above other factors, even when the measurement of connectedness is separated over time and, thus, does not prompt participants to consider connectedness when expressing their time preferences.

## GENERAL DISCUSSION

A powerful determinant of people's future-oriented preferences, plans, and behavior is the person they expect to be when outcomes are realized. We argue that when this later person is more closely connected to the current self in terms of sharing important psychological properties, such as beliefs, values, and goals, the decision maker is more motivated to act patiently, furthering the later self's welfare. We have provided evidence that people who perceive relatively less connectedness to their future selves require a larger delay premium to wait for a gift card, are more likely to favor sooner-smaller-valued gift cards over larger-valued-delayed gift cards, are less willing to wait to buy a computer that declines in price, and discount the value of money more than people who feel highly connected to their later selves. Perceived connectedness, in turn, can be influenced not only

TABLE 3

CORRELATIONS AMONG VARIABLES

	Projection bias	Future anhedonia	Time perception	Reward responsiveness	Nonplanning impulsiveness
Connectedness	$-.35^{*a}$	$-.12$	$.07$	$-.01$	$.22$
Projection bias		$-.05$	$-.07$	$-.04$	$.08$
Future anhedonia			$-.07$	$.03$	$-.13$
Time perception				$.07$	$-.13$
Reward responsiveness					$.29^{*b}$

<sup>a</sup>An indication of lower connectedness (a belief that the defining features of current self will change and therefore not persist in the future self) may entail beliefs about greater preference change (a belief that future preferences will differ from current preferences).

<sup>b</sup>People who report a greater degree of desire for temptations also indicate having a harder time resisting those temptations.

\* $p < .05$ .

by information regarding the variability of identity-comprising characteristics over time but also by the ease with which reasons for expecting stability over time can be generated.

While prior papers have provided evidence of a link between connectedness and discounting, this study provides the first causal evidence that manipulating a person's sense of connectedness to their own later self induces her to make impatient choices in consequential, self-relevant contexts. This study also provides the first assessment of the discriminant validity of connectedness by empirically distinguishing connectedness from a host of other factors associated with time preferences in prior research. Our studies provide experimental and regression-based evidence that the impact of connectedness on long-term discount rates cannot be explained by factors such as change in general life circumstances (study 1), uncertainty about the future and one's future preferences (studies 2 and 5), present-bias (study 4), or differences in the affective appraisal of future outcomes (pretests and study 5).

Moreover, our results do not arise from inattention to the future. Our connectedness-reducing manipulations increase impatience whether they direct attention to the instability of identity in the future (studies 1 and 2) or to the stability of one's future identity (via the accessibility experiences manipulation in studies 3 and 4)—a finding that cannot be explained by other kinds of differential information accounts, such as construal level theory (Trope and Liberman 2003). In particular, we present evidence that even subtle metacognitive cues can inform the feeling of connectedness and have a strong impact on intertemporal choices. Developing a more detailed understanding of the informational and affective determinants of peoples' sense of connectedness to the future self is an interesting question for future research.

There have been some attempts to extend descriptive models such as hyperbolic (Ainslie 1975) and beta-delta discounting (Laibson 1997) to propose more fully integrative and interpretable models (Killeen 2009; Loewenstein and Prelec 1992). Since none of these models accommodate for how inferences about continuity of self over time affect preference, none can explicitly account for the effects we have demonstrated. In our view, a person values future outcomes in proportion to how much she believes that the current self's important psychological characteristics will persist in the future self. To capture this effect, a model would need to incorporate a parameter that represents the degree of connectedness, such as the proportion of the defining characteristics of the current self's identity believed to persist in the future self at future points in time. This parameter would scale the discounted utility, representing the partiality toward more connected selves that we hypothesize and provide evidence for. Such an approach would

capture how perceived connectedness contributes to both high annualized discount rates and nonconstant discount rates.

This approach provides a new way of thinking about traditional views of discounting, which often interpret impatience as a failure to accurately and fully evaluate and implement choices, thereby characterizing impatient choices as "mistakes." Although ours are strictly descriptive claims, we note that impatient behavior predicated on perceived lack of connectedness could in fact be considered conditionally normative, depending on the accuracy of one's beliefs about connectedness with the later self (Parfit 1984). Likewise, when people choose to maximize short-term goals at the expense of long-term goals, the traditional view is that such behavior represents a "failure" of self-control. However, based on people's regrets and precommitment choices, there is also evidence for hyperopia (Keinan and Kivetz 2008; Kivetz and Keinan 2006), the opposite self-control problem, in which people recognize the likelihood that in the future they may regret consistently choosing not to indulge. Thus, in viewing intertemporal dilemmas as an allocation problem between the current and future selves, we see that the current self may err either by underallocating to the future self (acting more impatiently than can be rationalized by diminution in connectedness) or by making the opposite mistake and overallocating to the future self.

Thinking more broadly of the full range of conflicts between short-term and long-term interests, it is noteworthy that self-control strategies are generally characterized by anticipating an upcoming desire not in keeping with longer-term utility and then using some means to forestall acting on that desire (Hoch and Loewenstein 1991). Such methods, including counteractive self-control, rationing, precommitment, and side bets, are a means to counter inconsistent preferences (i.e., nonconstant discount rates) but will not be relevant to consistently high impatience (i.e., high discount rates). Our findings that manipulating connectedness directly affects the patience exhibited in choices therefore suggests a completely different approach to resolving self-control dilemmas. Particularly in those contexts in which people consistently fail to implement and maintain self-control techniques in advance of temptation (e.g., having a late night snack or three, or overspending or undersaving relative to budgetary allowances), simply engendering or maintaining a sense of connectedness to the future self may help resolve these dilemmas, yielding more farsighted choices. Rather than employing guilt or complex incentive schemes pitting the interests of future and current selves against each other, simply fostering the sense that what matters most in defining us persists over time may represent a powerful means to help us persist in achieving important goals, including those that most help maintain what defines us.

APPENDIX A

TABLE A1

TABLE OF PRETEST RESULTS OF CONNECTEDNESS MANIPULATION

	Connectedness		t-value
	High mean (SD)	Low mean (SD)	
Pretest 1 factors (N = 110)			
Connectedness (circles task)	4.13 (1.27)	3.48 (1.26)	2.68**
Liking of future self	2.26 (1.51)	1.82 (1.55)	1.51, NS
Positive affect (PANAS)	3.63 (.78)	3.48 (.81)	< 1
Negative affect (PANAS)	1.77 (.83)	1.66 (.71)	< 1
Abstract construal (behavioral identification form)	.66 (.18)	.62 (.21)	1.25, NS
Pretest 2 factors (N = 73)			
Connectedness (three-item composite)	.24 (.75)	-.23 (.94)	-2.36*
General uncertainty (three-item composite)	-.09 (1.01)	.08 (.72)	< 1
Predicted change in spending money	3.94 (1.17)	3.81 (1.75)	< 1
Predicted change in free time	2.61 (1.42)	2.38 (1.62)	< 1
Time perception (Zauberman et al. 2009)	78.11 (29.67)	80.23 (41.04)	< 1
Future anhedonia (Kassam et al. 2008)	3.82 (2.77)	2.80 (2.37)	-1.69+
Predicted preference change	3.39 (1.62)	3.95 (1.81)	1.38, NS
Preference uncertainty	5.36 (2.25)	5.88 (2.41)	< 1
Positive affect (PANAS)	2.67 (.84)	2.80 (.84)	< 1
Negative affect (PANAS)	1.75 (.64)	1.61 (.58)	-1.02, NS
Abstract construal (behavioral identification form)	.48 (.08)	.45 (.12)	< 1
Mortality salience (word completion task)	.56 (.65)	.59 (.72)	< 1
Future salience (word completion task)	1.25 (1.08)	1.57 (.87)	1.39, NS
Present salience (word completion task)	.44 (.56)	.65 (.72)	1.36, NS
Limited self-control (Mukhopadhyay and Johar 2005)	3.56 (1.42)	3.88 (1.44)	< 1
Fixed self-control (Mukhopadhyay and Johar 2005)	2.89 (1.18)	3.43 (1.56)	1.68+
Consideration of future consequences	43.00 (7.40)	44.95 (7.48)	1.12, NS
Future time perspective scale (total score)	104.43 (16.71)	106.17 (15.61)	< 1
S <sub>1</sub> : Value (of future goals)	22.78 (4.98)	22.36 (6.38)	< 1
S <sub>2</sub> : Connectedness (between acts and future goals)	51.50 (10.87)	54.03 (9.58)	1.05, NS
S <sub>3</sub> : Extension (distance that thoughts are projected)	19.89 (4.48)	20.00 (4.46)	< 1
S <sub>4</sub> : Speed (at which time is passing)	10.50 (4.21)	9.78 (4.03)	< 1
Elaboration on potential outcomes scale (Nenkov et al. 2008):			
S <sub>1</sub> : Generation (thinking about the future)	3.71 (.90)	3.84 (.72)	< 1
S <sub>2</sub> : Positive outcome focus	3.34 (.99)	3.45 (.98)	< 1
S <sub>3</sub> : Negative outcome focus	3.50 (.83)	3.32 (1.01)	< 1
State self-esteem (Heatherton and Polivy 1991)	11.03 (14.08)	10.05 (14.39)	< 1

+p < .10.  
\*p < .05.  
\*\*p < .01.

APPENDIX B

ADDITIONAL MEASURES USED IN STUDY 5

Projection Bias:

Think about the person you expect to be in a year. How similar or different from your current preferences—your current likes and dislikes—do you think your future preferences will be one year from now? (1 = same as now; 7 = completely different)

Future Anhedonia:

Suppose that you unexpectedly receive a \$20 check in the mail, either today or in a year. At the moment that you received it, would you be happier receiving it tomorrow, or

would you be happier receiving it a year from now? (1 = much happier at the moment receiving it tomorrow; 7 = much happier at the moment receiving it in a year)

Time Perception:

How long do you consider the duration between today and 1 year from now? (Participants drew a line on a continuum with bookends labeled “very short” and “very long”).

Reward Responsiveness (subscale of the Behavioral Activation Scale; Carver and White 1994)

- I plan tasks carefully.
- I plan trips well ahead of time.
- I am self-controlled.
- I am a careful thinker.
- I plan for job security.

I say things without thinking.

Nonplanning Impulsiveness (self-control subscale of the Barratt Impulsiveness Scale, version 11; Patton et al. 1995)

When I get something I want, I feel excited and energized.

When I'm doing well at something, I love to keep at it.

When good things happen to me, it affects me strongly. It would excite me to win a contest.

When I see an opportunity for something I like, I get excited right away.

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