

# Don't stop thinking about tomorrow: Individual differences in future self-continuity account for saving

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## Abstract

Some people find it more difficult to delay rewards than others. In three experiments, we tested a “future self-continuity” hypothesis that individual differences in the perception of one’s present self as continuous with a future self would be associated with measures of saving in the laboratory and everyday life. Higher future self-continuity (assessed by a novel index) predicted reduced discounting of future rewards in a laboratory task, more matches in adjectival descriptions of present and future selves, and greater lifetime accumulation of financial assets (even after controlling for age and education). In addition to demonstrating the reliability and validity of the future self-continuity index, these findings are consistent with the notion that increased future self-continuity might promote saving for the future.

Keywords: Intertemporal choice, temporal discounting, future self-continuity, saving behavior.

## 1 Introduction

Self-continuity represents one of the most enduring puzzles of personal identity, pondered by ancient Greek and Buddhist thinkers alike (Conze, 1959; Plutarch, 1932). If the body changes over time — eventually being replaced by entirely new material — at what point does the old self become an entirely new and distinct being? Self-continuity might vary by individual, with some individuals endorsing greater connection to their future selves than others.

Beyond philosophical appeal, individual differences in the experience of self-continuity could have pragmatic consequences for financial well-being. According to one philosophical account (Parfit, 1971), if individuals consider their future selves as different people, they may have no more reason to reward the future self than to give resources to strangers (Ainslie, 1975; Elster, 1977; Parfit, 1971, 1987; Pronin, Olivola, & Kennedy, 2008; Schelling, 1984; Strotz, 1956; Thaler & Shefrin, 1981). A continuous variant of this account called the “future self-continuity” hypothesis predicts that people who experience no continuity with a future self should not save for that future self (Ersner-Hershfield, Wimmer,

& Knutson, 2009). Accordingly, neural indices of future self-continuity predict valuation of future rewards assessed one week later (Ersner-Hershfield et al., 2009). In three experiments, we further explored this future self-continuity hypothesis by devising an index of individual differences in future self-continuity and examining whether it would correlate with valuation of delayed rewards, both in laboratory tasks and with respect to real-world savings.

## 2 Study 1: Future self-continuity and temporal discounting

We devised a novel psychometric measure of future self-continuity, based on an extension of an existing measure of self- vs. other-connectedness (Aron, Aron, & Smollan, 1992)<sup>1</sup>, and we sought to establish its test-retest reliability and validity in predicting valuation of future rewards. The measure assessed an individual’s endorsement of similarity between present and future selves, as well as other potential dimensions of future self-continuity related to connectedness, liking, and caring for the future

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<sup>1</sup>The Aron et al. (1992) scale ranges from circles with no overlap to circles with nearly complete overlap. The original scale does not, however, include an “identity” option with completely overlapping circles. Though we suspect that a complete identity option would not greatly alter participant responses based on their roughly symmetric distribution, future research might include such an option.

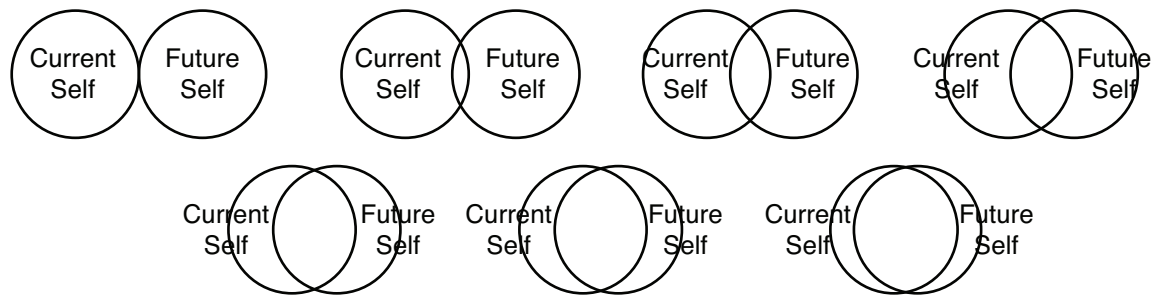


Figure 1: Future self-continuity scale.

self. To assess valuation of future versus present rewards, we used a temporal discounting task (Frederick, Loewenstein, & O'Donoghue, 2003; Laibson, Repetto, & Tobacman, 1998; Mitchell, 1999; Schelling, 1982). We predicted that individuals who endorsed greater future self-continuity would place a higher value on future rewards.<sup>2</sup>

## 2.1 Method

### 2.1.1 Participants

Undergraduates from the Stanford University Introductory Psychology pool participated for course credit. One hundred sixty-four individuals (66% female;  $M = 19.34$  years) participated in Wave 1, and ninety-three individuals (63% female;  $M = 19.32$  years) participated in Wave 2. Part of the Wave 2 sample ( $n = 65$ ) also participated in Wave 1; and so test-retest reliability was assessed in these overlapping individuals.

### 2.1.2 Measures

*Future Self-Continuity Measure.* The index of future self-continuity featured two questions on a 7-point scale marked at each point by two circles that ranged from depicting no overlap to depicting almost complete overlap (Figure 1). Participants selected the circle pair that best described how similar and how connected they felt to a future self ten years from now. They also rated how much they cared about and liked their future self ten years from now on 7-point Likert scales. To facilitate comprehension, both the “caring” and “liking” items included verbal anchors at each of the seven points (e.g., the “caring” scale ranged from “don’t care at all” to “completely care”).

<sup>2</sup>The only previous study of the relationship between future self-continuity and temporal discounting (Frederick, 1999) used a single item measure (i.e., “How similar/connected are you to your past and future selves?” for 5-, 10-, 15-, and 20-year intervals on a 1–100 scale). Correlation of this measure with hypothetical temporal discounting rates did not reveal a significant association. However, the reliability and validity of this single-item measure of future self-continuity were not reported.

*Temporal Discounting Task.* The temporal discounting task consisted of 21 choice trials (Kirby & Marakovic, 1996). Each trial included one smaller immediate reward paired with one larger delayed reward. Immediate values ranged from \$15–\$83, while the delayed values ranged from \$30–\$85 over delays of 10–75 days. Choices were hypothetical. The number of delayed choices was counted to index discount rate (Magen, Dweck, & Gross, 2008). While the Kirby and Marakovic (1996) procedure excludes data from individuals who either chose all of the immediate or all of the delayed options, the Magen et al. (2008) procedure has the advantage of retaining these individuals for subsequent analysis.

### 2.1.3 Procedure

In a first wave of questionnaires, participants completed the future self-continuity measure. In the second wave, participants completed the future self-continuity measure as well as the hypothetical discounting task (Kirby & Marakovic, 1996). Sixty-five individuals participated in both Waves 1 and 2 and thus, completed the future self-continuity measure twice (separated by a minimum of one week).

## 2.2 Results and Discussion

### 2.2.1 Reliability

To assess test-retest reliability, we correlated future self-continuity indices from Waves 1 and 2. Test-retest reliability for similarity was high ( $r_{63} = .66, p < .001; \alpha = .79$ ). Test-retest reliability was also high for connectedness ( $r_{63} = .66, p < .001; \alpha = .80$ ), caring ( $r_{63} = .45, p < .01; \alpha = .62$ ), and liking items ( $r_{63} = .64, p < .001; \alpha = .78$ ; see Table 1).

### 2.2.2 Validity

Consistent with the prediction that future self-continuity would promote valuation of future rewards, individual

Table 1: Zero-order correlation matrix of all self-continuity scale items, and number of later choices on the temporal discounting task. Numbers in parentheses refer to the data wave. “Aggregate” refers to the mean of similarity, connectedness, caring, and liking from Wave 1.

Variable	1	2	3	4	5	6	7	8	9	10
1. Similar (1)	–	0.47**	0.14	0.16*	0.66**	0.41**	0.22	0.32**	0.75**	0.42**
2. Connect (1)		–	0.20**	0.25**	0.56**	0.66**	0.31*	0.52**	0.82**	0.30*
3. Care (1)			–	0.35**	0.20	0.26*	0.45**	0.33**	0.47**	0.23
4. Like (1)				–	0.36**	0.47**	0.31*	0.64**	0.57**	0.17
5. Similar (2)					–	0.46**	0.13	0.23*	0.67**	0.37**
6. Connect (2)						–	0.37**	0.38**	0.66**	0.07
7. Care (2)							–	0.50**	0.41*	0.21*
8. Like (2)								–	0.61**	0.29**
9. Aggregate									–	0.39**
10. Later choices										–

\*  $p < .05$ ; \*\*  $p < .01$ , 2-tailed

differences in future self similarity (at Wave 1) significantly predicted the number of delayed choices at Wave 2 ( $r_{63} = .42, p < .001$ ; see Figure 2a). Future self connectedness (at Wave 1) also predicted the number of delayed choices at Wave 2 ( $r_{63} = .30, p < .05$ ). Future self caring and future self liking (at Wave 1), however, did not predict the number of delayed choices at Wave 2 (caring:  $r_{63} = .21, p = .11$ ; liking:  $r_{63} = .14, p = .27$ ).

Although these findings supported the prediction that individuals who endorse greater future self-continuity choose more delayed rewards in a temporal discounting task, future self-similarity most robustly predicted number of delayed choices and showed high test-retest reliability. Thus, in two additional studies, we operationalized future self-continuity with a measure of perceived similarity to the future self.<sup>3</sup> In Study 2, we sought to further establish the validity of the future self-continuity index by examining its association with a distinct and more implicit measure of future self-continuity, as well as with an incentive compatible measure of temporal discounting.

<sup>3</sup>We also explored the option of creating an aggregate measure of future self-continuity by averaging similarity, connectedness, caring, and liking scores. The aggregate had a high test-retest reliability ( $r_{63} = .79, p < .001, \alpha = .88$ ), but the within-test reliability was not impressive ( $\alpha = .57$ ). Therefore, we adopted the conservative strategy of testing the relationship between each of the four indices of future self-continuity and temporal discounting at a Bonferroni-corrected threshold ( $p = .0125$ ). Of the indices, only future self-similarity survived the threshold. Moreover, the correlation between the aggregate measure of future self-continuity and number of later choices on the temporal discounting task was not as high as for the one-item similarity measure ( $r_{63} = .39, p < .001$ ). Finally, the aggregate did not perform as consistently in predicting saving behavior across the three studies as did the one-item similarity measure. Thus, we used self-similarity to index future self-continuity.

### 3 Study 2: Future self-continuity and self-descriptive consistency

In Study 2, we sought to associate future self-continuity with performance on a trait-rating task (called the “Me/Not Me” task) in which participants endorsed positive, neutral, and negative trait words for both their current and future selves (Aron, Aron, Tudor, & Nelson, 1991; Wakslak, Nussbaum, Liberman, & Trope, 2008). We predicted that individuals with higher future self-continuity would show more matches in their endorsement or rejection of current and future self-descriptors in the context of the Me/Not Me task. We also sought to replicate the correlation between future self-continuity and valuation of future rewards by using an incentive-compatible temporal discounting task (i.e., in which participants received actual money for a subset of their choices).

#### 3.1 Method

##### 3.1.1 Participants

Forty individuals (47.5% female,  $M = 21.30$  years) from the Stanford University community received a flat fee of \$15 plus the monetary outcome of one randomly selected choice in the temporal discounting task (see below) for their participation.

##### 3.1.2 Procedure

After signing the consent form, participants read the following instructions:

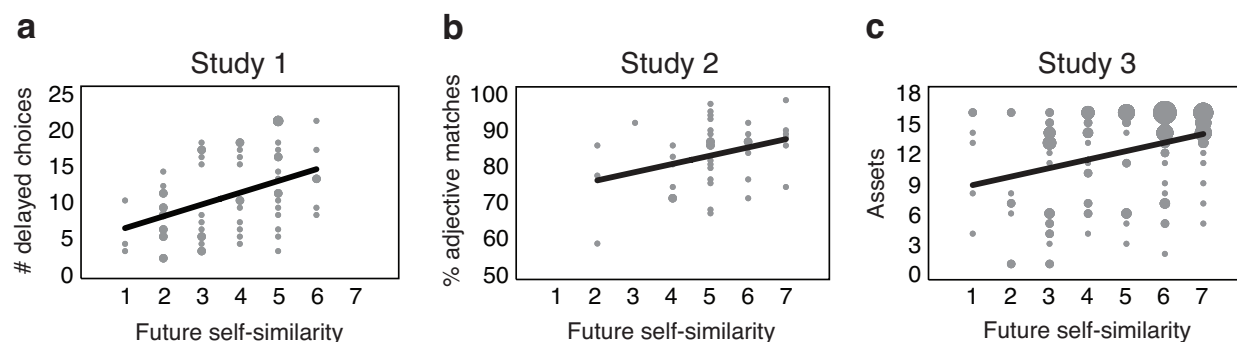


Figure 2: (a) Endorsement of future self-similarity positively correlates with number of choices of future (versus present) rewards (Study 1). (b) Endorsement of future self-similarity positively correlates with number of trait matches on the Me/Not Me task (Study 2). (c) Endorsement of future self-similarity positively correlates with assets (Study 3). In all three panels, circle size is weighted by number of respondents at each data point.

“In this study you will see a series of trait words. Some of the words will apply to you now, and some will apply to you ten years from now. In this part of the study, we are interested in how you view yourself now. We will show you a series of words, and we will ask you to indicate whether or not each word describes you now.”

The participant was then instructed to choose “yes” if the word described the specified person, and “no” if it did not by pressing correspondingly marked keys. After completing six practice trials, participants rated whether 96 randomly presented trait words applied to their current self, and the words remained on the screen until the participant made a choice. The trait words were selected from the Anderson (1968) word list, which was normalized for valence and word length, with one third of the words rated as positive, one third rated as negative, and one third rated as neutral, on average. After rating the applicability of these 96 trait words to the current self, participants rated the applicability of the same 96 trait words (again in a randomized order) to a future self (10 years hence), and were given the following instructions:

“In this part of the study, we are interested in how you view yourself in the future (ten years from now). We will show you a series of words, and we will ask you to indicate whether or not each word describes you in the future (ten years from now).”

Counterbalanced presentation ensured that half of the participants rated their current self first, while the other half rated their future self first. After completing the Me/Not Me task, participants completed a questionnaire with demographic information as well as the self-continuity scale from Study 1. Finally, participants completed an incentive compatible version of the temporal discounting task, in which they were informed that one trial would be randomly selected at the end of the task, and that they would receive a set percentage of their

choice (18%) for that trial in cash. If participants had chosen the delayed gain for the randomly selected trial, they received a dated receipt for that amount, which they were mailed on the appropriate date. Otherwise, if participants had chosen the immediate gain, they received cash corresponding to that gain.

### 3.2 Results and Discussion

We first examined whether future self similarity was associated with the number of matches in current and future self description (or number of trials in which trait adjective ratings were the same for current and future selves). Consistent with prediction, similarity ratings on the future self-continuity scale correlated with percentage of matches between current and future self-descriptions ( $r_{38} = .34, p < .05$ ; see Figure 2b). Further, replicating the findings of Experiment 1, higher levels of future self-similarity correlated positively with the number of delayed rewards chosen ( $r_{38} = .30, p < .05$ ).

## 4 Study 3: Future self-continuity and actual savings

The findings of Studies 1 and 2 suggested that future self-continuity is associated with valuing future rewards, as indicated by low rates of temporal discounting. Extended over time, low rates of temporal discounting may manifest as higher rates of saving, and have been theoretically linked to peoples’ tendency to save for the future (Diamond & Koszegi, 2003). The findings of Studies 1 and 2, however, did not establish whether future self-continuity might be associated with actual savings behavior. Thus, in Study 3, we examined the association between future

self-continuity and the amount of assets that individuals had accrued.<sup>4</sup>

## 4.1 Method

### 4.1.1 Participants

155 adult community members from the San Francisco Bay Area participated (45% Female; Age range: 20 — 86 yrs;  $M = 53.49$  yrs).<sup>5</sup> These individuals were recruited as part of a larger study on psychological factors that influence financial decision-making.

### 4.1.2 Procedure

All participants completed a packet of questionnaires that assessed self-reported assets (i.e., portion of home owned, total amount of money in bank accounts, total amount of money in investments, and worth of other material belongings), debts (i.e., outstanding home, car, and student loans, credit card debts, and medical debts), income, and other financial information. To facilitate the anonymity of responses, assets, debt, and income were rated categorically (16 categories: “\$0-\$500”, . . . , “More than \$1,500,000”). The future self-continuity questionnaire from Studies 1 and 2 was also administered. Based on previous theoretical work linking discounting to saving, we predicted that future self-similarity would correlate with the amount of accrued assets.

## 4.2 Results

As predicted, endorsement of future self similarity was positively associated with assets ( $r_{147} = .34, p < .001$ ), suggesting that the more similar an individual felt to his or her future self, the more assets he or she had accrued (Figure 2c).<sup>6</sup> Although previous research suggests that age is also positively correlated with saving behavior (Lea, Tarpy, & Webley, 1987), the association remained significant even after statistically controlling for age (partial  $r_{146} = .23, p < .01$ ).<sup>7</sup>

<sup>4</sup>Here, we used financial assets as a proxy for saving behavior. Previous research has indicated that inclusion of non-financial assets (e.g., home ownership) with financial assets (e.g., bank accounts and investments) may provide a more complete picture of an individual’s saving behavior (e.g., Rha, Montalto, & Hanna, 2006).

<sup>5</sup>Six participants failed to report their income or assets and were thus excluded from subsequent analyses.

<sup>6</sup>To rule out the possibility of a spurious relationship resulting from a correlation between response scale bias (e.g., responding on the right, left, or middle of the scale) and assets, we standardized (within-person) the self-continuity scale scores (i.e., by subtracting the mean across items from each item, and dividing this difference by the standard deviation) and reran the regression. Even after this transformation, the relationship between similarity and assets remained significant ( $r_{147} = .29, p < .001$ ).

<sup>7</sup>This relationship holds even after controlling for education as well, which represents another demographic variable with potential relevance

## 5 General discussion

In three studies, we found that individual differences in future self-continuity predicted valuation of future rewards in laboratory tasks, correlated with the match between present and future self-descriptions, and were associated with real world assets. Together, these findings indicate not only that individuals reliably differ in future self-continuity, but also that these individual differences may influence valuation of future rewards.

By establishing the reliability and validity of a measure of self-continuity, the present research could establish initial evidence for a connection between individual differences in future self-continuity and valuation of future rewards. While a previous study did not report a significant association between these variables (Frederick, 1999), the pictorial index used in the present study (based on Aron et al., 1992) may have provided individuals with a more tangible and concrete method of reporting their perceived future self-continuity. The relation of future self-continuity to temporal discounting is consistent with research indicating that neural discrimination of material related to the present versus future self predicts temporal discounting in a subsequent laboratory task (Ersner-Hersfield et al., 2009). The present study, however, utilized a simple, quick, and easy psychometric measure of future self-continuity rather than neural activity. Unexpectedly, future self similarity showed a more robust relation than future self connectedness to temporal discounting, so an improved measure might include multiple indices of future self similarity. Nonetheless, the single index of future self similarity showed high test-retest reliability. Beyond students in the laboratory, the association between individual differences in future self-continuity and choice of delayed rewards further generalized to real-world assets in a community sample.

Overall, we predicted that increased future self-continuity would promote saving for the future self, which requires people to trade present gains for future gains. However, the extent to which increased future self-continuity might also promote loss avoidance has not yet been systematically explored. Future self-continuity may promote valuation of future gains because people might find it both easier and more pleasant to imagine how their actions might lead to positive (rather than negative) future outcomes for a future self. Indeed, in a post-hoc analysis of the savings data from Study 3, we found that perceived similarity to the future self did not correlate significantly with debts accrued ( $r_{147} = .08, p = .36$ ). Still, further research is needed to better establish the relationships between future self-continuity, promotion of positive outcomes (e.g., savings), and avoidance of negative outcomes (e.g., debt).

to the study of saving behavior ( $r_{145} = .22, p < .01$ ).

Although the present findings establish a new measure, they cannot specify the causal direction of the association between future self-continuity and saving. Consistent with the analysis by Parfit (1987), individuals who felt more similar to their future selves may have made more prudent decisions because of their perceived connectedness to a future self. Alternatively, anticipated financial security and stability might promote future self-continuity such that individuals who imagine being well off in ten years prefer to identify with that financially secure future self. Only experimental manipulations of future self-continuity can address the causality of the observed associations, and the measure introduced here offers one tool for assessing the impact of such manipulations. If future self-continuity influences saving (as hypothesized), then interventions that enhance future self-continuity may promote saving. Future research, perhaps in the context of a longitudinal study, might tease apart the causal relationship between future self-continuity and saving (see, for example Bartels & Rips, submitted).

Based on methodological considerations, the timescale adopted for the self-continuity measure (i.e., 10 years) differed from that used in the temporal discounting tasks (i.e., 10–75 days). These timescales were primarily selected to match methods used in prior research on future self-continuity (Ersner-Hershfield et al., 2009) and on temporal discounting (Kirby and Maracovic, 1996). Beyond precedent, matching timescales might pose methodological problems, since a self-continuity scale with a shorter timescale might yield ceiling effects (i.e., with most subjects endorsing high degrees of similarity with future selves) and a temporal discounting task with a long timescale might conversely yield floor effects (i.e., with subjects discounting most future rewards). Longitudinal research, however, suggests some invariance in measures of temporal discounting (Ainslie & Haslam, 1992), suggesting for instance that pre-schoolers' ability to delay gratification on the order of seconds predicted major developmental outcomes assessed several years later (e.g., SAT scores, parental ratings of attention, competency, and intelligence; Mischel, Shoda, and Rodriguez (1989)). Nonetheless, use of similar timescales might strengthen the findings, and future studies will need to investigate parametric variations of the timescale used in both self-continuity and temporal discounting domains.

Together, these findings provide initial evidence that individual differences in perceived future self-continuity can promote valuation of future rewards. Specifically, the extent to which individuals perceive the present self as similar to a future self is associated with less discounting of future rewards in the laboratory and greater financial assets in the real world. From a pragmatic standpoint, enhancing future self-continuity might encourage people to save for the future. From a philosophical standpoint,

individuals who see their future selves as similar may be more likely to sacrifice present pleasure for the benefit of that potential person.

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