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Issue: *Decision Making Over the Life Span***Future self-continuity: how conceptions of the future self transform intertemporal choice**

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With life expectancy dramatically increasing throughout much of the world, people have to make choices with a longer future in mind than they ever had to before. Yet, many indicators suggest that undersaving for the long term often occurs: in America, for instance, many individuals will not be able to maintain their preretirement standard of living in retirement. Previous research has tried to understand problems with intertemporal choice by focusing on the ways in which people treat present and future rewards. In this paper, the author reviews a burgeoning body of theoretical and empirical work that takes a different viewpoint, one that focuses on how perceptions of the self over time can dramatically affect decision making. Specifically, when the future self shares similarities with the present self, when it is viewed in vivid and realistic terms, and when it is seen in a positive light, people are more willing to make choices today that may benefit them at some point in the years to come.

**Keywords:** future self-continuity; behavioral economics; intertemporal choice; temporal discounting; retirement saving

**Introduction**

People are living longer than they ever have before.<sup>1</sup> In the Western world, for example, more years have been added to average life expectancy in the last century than in all of the previous millennia combined.<sup>2</sup> In the blink of an eye, sixty-five has quite literally become the new fifty-five: the typical 65-year-old living in modern America can now expect to live as long as the average 55-year-old living in 1935 America once did.<sup>3</sup> Although the addition of these extra years can be viewed as an unprecedented example of human innovation and technological progress, there is still a downside to this new development. For most of human history, planning for the distant, long-term future was not necessarily essential. When reaching one's 60th birthday was relatively uncommon—as it was in the early 1900s<sup>1</sup>—considering one's preferences at age 70 or 80 would have been considered an unnecessary exercise (and one that most likely would have taken time away from making important and more consequential decisions in the present). But with newly added

years to the life span, plans must now be made with a longer future in mind. Saving behavior, though, has not kept pace with increasing life expectancy. In what follows, I will first briefly review previous research on the psychological determinants of undersaving, most of which examines the way individuals evaluate present and future rewards. I will then overview a burgeoning body of theoretical and empirical work that takes a different viewpoint, one that focuses on how perceptions of one's self over time can dramatically influence decision making.

**Saving behavior and temporal discounting**

For Americans in the earlier part of the twentieth century, the average length of time spent in retirement was approximately two years,<sup>4</sup> and consequently, one did not need to worry too much about accumulating a huge nest egg to ensure a comfortable end-of-life period. In today's world, however, people are retiring earlier than they have in years past, living longer, and saving less. In the United States, for instance, the average male adult

spends approximately 17.1 years in retirement, and for women it is 20.1 years.<sup>5</sup> Yet, planning behavior has not kept pace with these pronounced increases in life expectancy; humans are not suddenly gaining more foresight as more and more years have been added on to their lives. The National Retirement Risk Index,<sup>6</sup> which assesses the percentage of households who will fall short of meeting their retirement goals, for example, has been steadily increasing over time, and significantly so after the 2008 financial crisis.<sup>7</sup> Two-thirds of Baby Boomers will not be able to maintain their preretirement standard of living in retirement,<sup>8</sup> and perhaps most shockingly, more than half of working-age Americans have accumulated less than \$25,000 in savings.<sup>9</sup> Although the sheer magnitude of this undersaving may be surprising, the fact that it occurs may not be so. Indeed, according to research in psychology and economics, people characteristically care less about future outcomes than they do about present ones, a phenomenon known as *temporal discounting*.<sup>10–12</sup>

Theorists have suggested that such discounting may arise for several reasons,<sup>13</sup> not the least of which is that the needs of the present may simply overwhelm the needs of the future. A given individual may want to save for the future but not have the financial means to do so. The 44 million Americans who fall below the poverty line,<sup>14</sup> for instance, cannot be expected to contribute to tomorrow's saving account when today's groceries need to be bought. Yet there are many people who can afford to save but do not. To take one example, Choi, Laibson, and Madrian<sup>15</sup> surveyed employees across seven large companies and found that between 20% and 60% failed to even contribute an amount to their retirement accounts that their employers would match. By not doing so, these employees are essentially rejecting a "free lunch" that causes them to lose approximately 6% of their income annually.

On a more psychological level, present rewards may feel more arousing and emotional than future rewards do. Mischel and colleagues<sup>16–18</sup> have shown experimentally that children are much better able to postpone a desirable reward when they think about the "cool," informative properties of that reward (e.g., a marshmallow's shape and color) rather than the "hot," consummatory aspects of it (e.g., the marshmallow's taste). Thinking about the "hot" aspects of the reward can lead to a frustrating

situation in which the future reward becomes even more desirable, yet still unavailable.<sup>17</sup> Focusing on a reward's "cool" properties allows an individual to alleviate this frustrating situation without actually consuming the reward.<sup>19</sup> Thinking about rewards in this manner has a similar effect on decision making as taking on an abstract level of construal does (i.e., considering the "big picture" of an event rather than the details), which according to Trope and colleagues<sup>20–22</sup> is a key aspect of mitigating temporal discounting.

People also have a fundamental inability to project their thoughts and feelings into the distant future.<sup>23–25</sup> One might think, for example, that life will be happier and brighter if this week's lottery ticket is a winner; in a related fashion, assistant professors might view a future without tenure as bleak and depressing. But lottery winners and nonlottery winners are equally happy, and professors who fail to receive tenure still go on to lead meaningful, productive lives.<sup>26</sup> In other words, people overestimate the degree to which they will feel good about a positive outcome and bad about a negative outcome. According to Gilbert *et al.*,<sup>27</sup> individuals make poor predictions regarding the impact of a future emotional event because they tend to focus too much on the event in question and by so doing, fail to take into account the influence that other events and situations will be exerting on their feelings. Such errors in affective forecasting can frequently have deleterious results for decisions made in the present that have consequences in the future, or intertemporal choices. A hypothetical consumer might be inclined to spend his paycheck on a new electronics purchase, erroneously thinking that this will bring him more happiness in the future than, say, putting that same money into his 401(k) would. Conversely, losses or deficits may contribute less to unhappiness than anticipated (e.g., people consistently underestimate how happy they would be after a traumatic accident or injury<sup>28</sup>).

The previous accounts explain planning failures in the context of rewards that can be consumed now or at a delay. Recent work, however, suggests another possibility, one that deals not with present and future rewards, but with present and future selves. This review draws on theory from philosophy, psychology, and economics, and surveys empirical work suggesting that the way the future self is perceived is a strong predictor of decision making over time.

## Theoretical underpinnings of the future self-continuity model

Theorists have argued that problems with intertemporal decision making occur because of conflicts between temporally distinct selves.<sup>11</sup> For example, the self has been conceptualized as an organization of individuals composed of a long-term planner and a short-sighted doer.<sup>29–33</sup> Although the planner-self may plan to lose weight by this summer's beach season, the doer-self may indulge in several Girl Scout cookies in the office break room. In certain domains, such as dieting and substance abuse, people are often sophisticated enough to recognize that tensions will arise between the wishes of today's self and the desires of tomorrow's self.<sup>34</sup> It is this recognition that most likely leads many people to engage in precommitment strategies that attempt to constrain future behavior.<sup>35,36</sup> Ulysses plugged his ears with wax so that he would not succumb to the fatal songs of the beautiful Sirens;<sup>37</sup> alcoholics have taken Antabuse to avoid imbibing; and the Save More Tomorrow financial planning program allows employees to precommit to increasing their retirement allocations once they receive a paycheck raise.<sup>38</sup>

One problem with precommitment strategies is that it is not always an easy exercise to determine which self's interests to satisfy (i.e., the planner-self who advocates dieting, or the doer-self who supports indulging).<sup>36</sup> Although I may say today that I want to shed five pounds by June, why should the self who states that desire get privilege over the self who wants to eat the cookie in two weeks' time? It is difficult, according to Schelling,<sup>36</sup> "for two selves that do not simultaneously exist to compare their pains, joys, and frustrations" (p. 10). Rather than trying to determine who the authentic self is—that is, the self whose wishes should be met—one could instead conceptualize a person as a collection of selves over time, all of whom have authentic wants and desires. According to this view, espoused by Parfit<sup>39,40</sup> and Strotz,<sup>41</sup> among others, the self is a collection of distinct identities that overlap with each other over time. Each one of these overlapping selves may share a strong degree of psychological connection with the next one, or they may not. Parfit cites Proust<sup>42</sup> to illustrate this point: "...we are incapable, while we are in love, of acting as fit predecessors of the person whom we shall presently have become and who will be in love no longer..." (p. 631). We may at one

point in time think that our preferences and actions are reflective of our true, authentic selves, but as the years advance and situations change, we may find that we are suddenly completely different from the person we once thought we were.

Naturally, there will be less overlap between selves with a greater degree of temporal distance between them: with more time, psychological connectedness of oneself in the present with oneself in the future grows more tentative. People feel more connected to their potential self of five years than their potential self of forty years. Consequently, one might logically identify less with a more temporally distant future self to the point at which an extremely distant future self may seem like a different person altogether,<sup>39,43–45, a</sup> though Pronin *et al.*<sup>45</sup> find that even a not-so-distant self (i.e., one that is just a few days, weeks, or months away) is sometimes treated like another person. Here, it is not important whether in various senses, a person actually does change over time; rather, what matters is how much a given individual feels he or she will be the same person over time. Although trait-level personality characteristics<sup>47</sup> and general interests<sup>48</sup> remain relatively consistent over the course of a lifetime, many other aspects of our selves change over time: people can alter their names, noses, and reputations beyond recognition. What matters, for long-term planning, however, is that one person has but one identity, and it is with this link that the assets of the present and future selves are tied together. Individuals who feel as though the future self is a different person fail to acknowledge this connection, that is, fail to identify with themselves in the future.

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"This idea is not just germane to British philosophy, as it has found its way into popular culture as well. The comedian Jerry Seinfeld, for example, has a humorous take on distinct current and future selves: "I never get enough sleep. I stay up late at night because I'm 'night guy'. 'Night guy' wants to stay up late. 'What about getting up after five hours of sleep?' 'Oh, that's morning guy's problem. That's not my problem—I'm night guy! I stay up as late as I want.' So, you get up in the morning, with your alarm, and you're exhausted and groggy. . . Oh, I hate that 'night guy'! Ya see, 'night guy' always screws 'morning guy'. There's nothing 'morning guy' can do. The only thing 'morning guy' can do is try to oversleep often enough so that 'day guy' loses his job and 'night guy' has no money to go out anymore."<sup>46</sup>

Recent research has demonstrated that, in important ways, people often treat the future self as if it is in fact another person. On a general level, individuals make attributions about the future self in the same manner that they do for others, for example, by attributing the future self's behavior to dispositional factors rather than situational ones,<sup>44,49</sup> and to make decisions for the future self using a similar process that they use to make decisions for other individuals.<sup>45</sup> These findings have important implications for intertemporal choice. If people tend to consider the future self as a stranger—that is, if that distant future self feels on an emotional level like another person—then they may rationally have no more reason to save their money for their future selves than to give that money to a stranger.

It is important to consider that Parfit's<sup>39,40</sup> model does not posit that the degree to which the future self is considered a stranger is a stepwise function: the future self does not necessarily have to be thought of as either totally connected to the current self or totally disconnected from it. Rather, just as there can be degrees of connection between people,<sup>50</sup> so too can there be gradations of connectedness between today and tomorrow's self. Critically, then, the degree to which an individual feels disconnected from his or her future self should correlate with the degree to which that individual discounts future rewards. The more continuity a person shares with his future self—that is, the more that future self feels like a direct extension of who he is now—the more motivated he will be to act in ways that will benefit himself in the future. Conversely, the more the future self feels like a stranger—that is, the more disconnected a person is from his future self—the less motivated he will be to plan for the future. In the domain of financial decision making, for example, if the future self is lacking in continuity with the current self, a given individual may be inclined to spend in the present rather than save for the future.

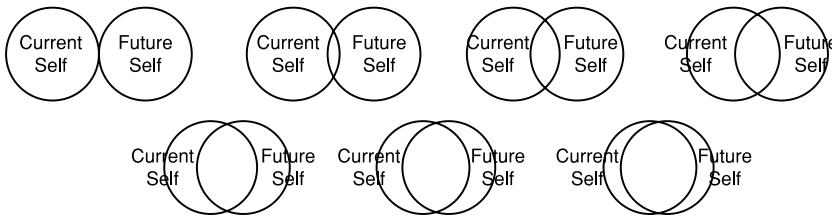
### *The composition of continuity*

But what aspects matter when judging connectedness to the future self? First, continuity with one's future self may be determined by the extent to which one feels similar to it. Parfit<sup>40</sup> explicitly discusses similarity in terms of one's likes, beliefs, values, ideals, etc. in making judgments about the self in the future. Indeed, a host of research examining empathy and prosocial behavior has found that people

are more likely to help others whom they perceive as similar along many of these dimensions (see Eisenberg and Miller<sup>51</sup> for a review). Recent work, in fact, has shown that on microfinance websites, people are more willing to donate when recipients are judged as being similar to the self.<sup>52</sup> Similarly, if the future self is viewed as being similar to the current self, one will be more likely to “donate” to that future self by way of saving money in the present.

Second, Parfit<sup>40</sup> observes “when we imagine pains in the further future, we imagine them less vividly, or believe confusedly that they will somehow be less real, or less painful” (p. 161). The reverse also seems to be true: Tversky and Kahneman<sup>53</sup> noted that outcomes or events that are easier to picture in one's mind are more “available” and, hence, seem more likely to occur. Along these lines, Loewenstein<sup>19</sup> theorized that a more vivid impression of oneself engaging in some action in the future might intensify the emotions that are linked to thinking about that scenario. These intensified emotions might, in turn, allow an individual to be better informed regarding the future consequences of a present decision. For example, pulmonologists tend to smoke less than other doctors, perhaps because seeing blackened and withered lungs on a daily basis increases the negative emotions that are associated with smoking.<sup>19</sup> A victim who is portrayed in vivid terms is more likely to elicit a sense of connection and sympathy, and subsequent charity than one who is not.<sup>54,55</sup> Similarly, if the future self is more vividly imagined—that is, if it is easier to picture—one should feel a greater sense of connection to it and consequently be motivated to save for the future.

Third, previous work has implied that the actual attitude one holds toward the future self—that is, whether it is viewed in positive or negative terms—can be a predictor of long-term decision making. In the health domain, for example, Levy *et al.* have used attitudes toward the elderly as a proxy for attitudes toward the future self, and found that negative views of the elderly held earlier in life can lead to worse cardiovascular health later in life (controlling for one's own health).<sup>56</sup> Moreover, holding positive views of one's own aging process is associated with increased longevity.<sup>57</sup> Theoretically, it should be easier to feel connected to another individual if that person is viewed in positive terms. Indeed, when forming a new relationship, people feel a greater sense of overlap with another person who elicits



**Figure 1.** Future self-continuity scale that has been used to assess similarity between current and future selves.<sup>59</sup>

positive emotions.<sup>58</sup> Along these lines, one should be more likely to perceive continuity with a distant self who is viewed in positive terms.

In what follows, I will review recent empirical work that has been conducted that speaks to each of these three domains of continuity: similarity, vividness, and positivity.

### Similarity to the future self

#### *Measuring the relationship between future self-similarity and saving*

To examine the degree to which people feel similar (or dissimilar) to their future selves, my colleagues and I<sup>59</sup> developed a novel psychometric task based on existing measure of self-other similarity.<sup>60</sup> In the task, participants choose a set of overlapping Euler circles that range from depicting no overlap to almost complete overlap (see Fig. 1). Participants picked the set of circles that best represents how similar they feel to their selves in ten years time. Importantly, in early research, we found that our measure of future self-similarity had strong test-retest reliability and correlated with scores on a “me/not me task” that examined the match between present and future self-descriptions.

To understand how similarity to the future self is related to saving behavior, we gave a group of college undergraduates the future self-similarity task as well as an ecologically valid measure of temporal discounting.<sup>61</sup> Each trial included one smaller immediate reward paired with one larger delayed reward. We had hypothesized that participants who felt a greater degree of similarity to their future selves would choose in a way that would benefit those future selves, and indeed, this is exactly what we found: there was a significant positive correlation between similarity to the future self and the number of larger later rewards that were chosen in the temporal discounting questionnaire. We have found this result using both hypothetical choices and incentive-

compatible ones (i.e., participants were paid in accordance with their choices on the temporal discounting task).<sup>59</sup>

To what extent, however, would the relationship between future self-similarity and saving behavior be found outside of the laboratory context, among people making actual financial decisions? To address this question, we surveyed a diverse group of working adults who lived in the San Francisco Bay area and who ranged in age from 18 to 86. In line with our prediction, we found a significant positive correlation between perceived similarity to the future self and the number of assets that had been accumulated over time.<sup>59</sup> Not surprisingly, age was also positively correlated with future self-similarity: as people grow older, life circumstances most likely become more stable, and each passing interval of time feels subjectively shorter (i.e., ten years represents a smaller fraction of time in the life of a 50-year-old than in the life of a 20-year-old). Nevertheless, the relationship between future self-similarity and accumulated assets remained robust even when controlling for age, as well as other factors that have been previously associated with saving behavior such as education.<sup>62</sup>

To make this research paradigm as simple as possible, we deliberately left the concept of similarity open to interpretation for our research participants. Recent research by Bartels and Rips,<sup>63</sup> however, has used a more specific conception of similarity, and found comparable—if not even stronger—results to ours by asking participants to judge similarity to their future selves in terms of likes, dislikes, values, ideals, and interests. Moreover, although Ersner-Hershfield, Garton *et al.*<sup>59</sup> found a correlational relationship between future self-similarity and intertemporal choice, recent work has shown that perceptions of similarity to the future self can be subtly manipulated. Bartels and Urminsky,<sup>64</sup> for example, had participants read a passage describing research in psychology that demonstrated stability in many

core aspects of identity over time. In another condition, the passage described research that came to the opposite conclusion. The researchers found that participants in the stability condition rated a higher degree of overlap with their future selves and also made more patient intertemporal choices. In addition, Bartels and Urminsky<sup>64</sup> demonstrated that future self-similarity accounted for unique variance in decision making, even when controlling for related constructs such as uncertainty about the future, affective appraisal of future outcomes, and the extent to which one is biased toward the present.

These previous findings, however, have relied on self-report to assess similarity to the future self, and thus the credibility of the results could benefit from complementary research that uses fewer explicit techniques. To this end, my colleagues and I drew on previous research in the field of social neuroscience to more implicitly gauge future self-similarity.

#### *Neurobiological basis of future self-similarity*

There is a growing body of neuroimaging research that suggests that the human brain differentially represents thoughts about oneself and thoughts about another person.<sup>65,66</sup> Previous work suggests that people show decreased activation in cortical midline structures when considering information about others versus the self,<sup>65,67</sup> and increased activation when engaging in self-reflection or introspection.<sup>68–70</sup> In an early examination of this topic, Kelley *et al.*<sup>66</sup> scanned subjects with event-related functional magnetic resonance imaging (fMRI) as they judged whether trait words applied to themselves or another person. The investigators found that judgments of self-relevance selectively maintained activation in the medial prefrontal cortex (MPFC) at a baseline rate, while judgments of other-relevance decreased MPFC activation below baseline.

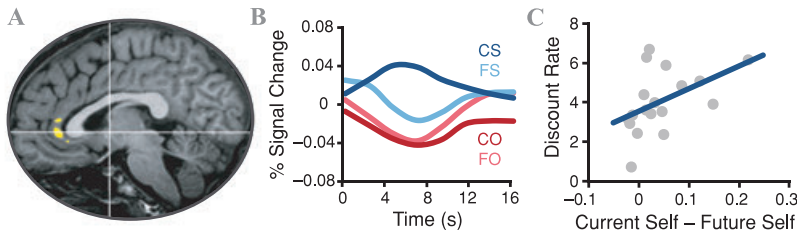
More broadly, Northoff *et al.*<sup>67</sup> found that processing other- versus self-relevant information elicited decreased activation in cortical midline structures, including the MPFC and rostral anterior cingulate (rACC). These neural differences are not only a function of thinking about the self versus another person; they also emerge when thinking about the self in the past: D'Argembeau *et al.*<sup>71</sup> found that processing past self-relevant information versus current self-relevant information decreased

activation in these same cortical midline structures. Furthermore, the neural differences that normally arise from comparing self to another are attenuated to the extent that the target other is perceived as being similar to the self. Mitchell *et al.*,<sup>72</sup> for example, found that a ventral region of the MPFC was more strongly active when participants made judgments about the mental states of others who were perceived to be similar to oneself compared to those perceived to be dissimilar from oneself.

We wanted to leverage these previous findings to further test the relationship between future self-similarity and intertemporal choice.<sup>73</sup> If people think of the future self as being dissimilar from the current self, judgments about the future versus current self should elicit reduced activation in cortical midline structures (just as judgments about another person compared to judgments about the self elicit a similar pattern of activation). Further, on an individual level, the greater the difference between activation elicited by the future self and activation elicited by the current self, the more future rewards should be discounted. The more the future self is represented neurally as another person, in other words, the less likely a given individual should be to save for the future. To test these hypotheses, we scanned research participants with event-related fMRI while they made judgments about the applicability of trait adjectives to their current self, their future self, a current other, or a future other. A week later, participants returned to the lab to complete the temporal discounting task we used in the laboratory studies mentioned above.<sup>61</sup>

Replicating previous research, we found that there was greater activation in the MPFC and rACC for self-judgments compared to other-judgments. Importantly, within this same region of the brain, thoughts about the current self elicited significantly greater activation than did thoughts about the future self. On a general level, then, neural activation associated with thinking about the future self showed a similar pattern to activation associated with thinking about another person (see Fig. 2A and B).

As expected, there was individual variability in these neural differences: for some participants, thinking about the future self elicited neural activation patterns that were almost exactly like patterns that were associated with thinking about another person; for other participants, thinking about the future self elicited neural activation patterns that



**Figure 2.** Neural activation differences between current self and future self-trials correlate with discounting rates. (A) Greater activation in the rostral anterior cingulate cortex (rACC) for current self versus future self trials; threshold  $P < .005$ , uncorrected. (B) Activation time courses for each condition in the right rACC volume of interest; CS, current self; FS, future self; CO, current other; FO, future other. (C) Scatterplot of individual differences in discount rates ( $\log(k) + 10$ ) and individual differences between peak current self and future self activation in the rACC volume of interest ( $r = 0.47$ ,  $P < 0.05$ ). Note: For display purposes and ease of interpretation, a constant of 10 was added to the  $\log(k)$  values. Figure adapted from Ref. 72.

were more or less in line with patterns associated with thinking about the current self. In line with our prediction, participants who showed the biggest difference between activation elicited by the current self and activation elicited by the future self also discounted future rewards most steeply. There was a positive correlation, in other words, between the extent to which the future self “looked” like another person on a neural level, and the degree to which participants chose to consume smaller rewards in the present rather than delay larger rewards for the future (see Fig. 2C). In general, this line of work identifies the neural systems supporting current self–future self overlap and points to one neurobiological mechanism that contributes to far-sighted behavior.

**Vividness of the future self**

In an early examination of the relationship between vivid perceptions of the future self and intertemporal choice, Klineberg<sup>74</sup> measured the extent to which adolescents were able to imbue future events in their lives with a sense of reality by asking them to list a number of typical life events in chronological order. The more these participants perceived their futures to follow a realistic and vivid course, the more likely they were to delay gratification on a subsequent intertemporal choice task (i.e., they opted to wait to consume a larger candy bar in a week’s time rather than eat a smaller candy bar immediately).

Such work, however, did not manipulate the extent to which the future self was seen as vivid, and the extent to which such manipulations influence saving decisions. My colleagues and I<sup>75</sup> thus conducted several experiments to examine the associ-

ation between a vivid perception of one’s self in the future and the propensity to save more for the long term. We used a combination of software and a novel technology, immersive virtual reality (VR), to make the perception of the future self more realistic. Namely, we used preset algorithms from a computer software package [Facegen Modeler<sup>76</sup>], which (i) locates key points on a research participant’s face from a photograph, (ii) builds a three-dimensional model of that face, and (iii) morphs the shape and texture of the model to simulate the aging process to create a persuasive visual analog of a 68-year-old version of a current college student (see Fig. 3 for an example of this procedure). To create the aged avatars—or digital representations of people—the age-progression algorithm of the FaceGen Modeler software package was applied with identical settings to each photo. Because the software is specifically designed to manipulate facial features and not hair, an artist next digitally retouched each image to change the original hair color from the photograph of the participant to gray. We used an identical procedure (i.e., creating the three-dimensional model) for the nonaged avatars, except that we did not use the aging algorithm nor did we change the color of the hair.

In one study, college undergraduates entered a VR environment in which they could view images of themselves in a virtual mirror.<sup>77</sup> A control group of college undergraduates viewed a digital representation of their current selves in a virtual mirror, while the experimental group of college undergraduates saw an age-progressed version of themselves in the mirror. While viewing these avatars, all participants spent approximately five minutes answering



**Figure 3.** Example of age progression procedure. (Left) Photo of the author; (Middle) computerized rendering of the author using Facegen and Photoshop; and (Right) age-progressed version of the same photo.

questions about themselves that have previously been shown to enhance identification with a viewed avatar.<sup>78</sup> Upon exiting the VR environment, all participants were given, among other tasks, a hypothetical monetary allocation task. As hypothesized, those participants who were exposed to their future selves were subsequently more likely to allocate money toward a hypothetical retirement savings account than were control participants.

It is possible, however, that participants who were shown the age-progressed images of themselves were merely primed with the concept of aging, and this prime prompted them to save more for retirement.<sup>79</sup> As such, in a follow-up study, we exposed participants to either their own aged avatar or another research participant's aged avatar, and did so after a lengthy experimental delay during which time participants completed filler tasks (to eliminate the possibility that results from our first study were simply due to demand effects). Results indicated that participants in the future self condition demonstrated significantly more patience on a series of intertemporal choice tasks than did participants in the future other condition. These results suggest that relevance matters: the extent to which the individuals identify with the aged image is a key component of positively affecting saving behavior.

Although these findings are encouraging, this approach to VR is expensive and time-consuming for participants, and most companies or banks will not be able to use immersive VR to convince their employees or customers to adopt a longer-term perspective when making decisions about retirement savings. Moreover, experimental condition participants in the studies mentioned above were simply shown a neutral image of their future selves. Loewenstein's<sup>19</sup> work suggests that in order to make a true connection to the future self the future emotional consequences of current decisions must be

made clear. Indeed, previous research has demonstrated that exposure to virtual cause-and-effect actions can change actual behavior. For example, compared to a control group, when participants were shown a virtual version of themselves gaining weight, they were more likely to go to the gym.<sup>80</sup> Accordingly, in two additional studies, my colleague Dan Goldstein and I used a more accessible format to address the cause-and-effect nature of retirement decision making.<sup>75</sup>

Namely, we used a web-based study design in which all participants were shown a slider bar that they could move to make allocations from a hypothetical paycheck to a hypothetical retirement account. As they moved the slider bar toward future consumption, their annual take-home pay decreased (indicated in today's dollars), but their annual retirement income increased (again, indicated in today's dollars). In one condition, participants were shown the monetary amounts as well as an image of their current self, which changed emotional expression as a function of the allocations that they chose to make (sadder as more money was allocated toward future consumption, happier as more money was allocated toward present consumption). In another condition, participants were shown the monetary amounts as well as an image of their future self, which changed emotional expression as a function of the allocations that they chose to make (happier as more money was allocated toward future consumption, sadder as more money was allocated toward present consumption). Again, results indicated that participants who were exposed to their future selves allocated a significantly higher percentage of pay toward retirement than did participants who were exposed to their current selves.<sup>75</sup>

It is possible, however, that instead of results of the previous study being due to exposure to the



future self, they were due to participants reacting to the valence the different faces present. Rather than being motivated to save more by the presence of the future self, participants could have merely been moving the retirement slider bar toward whichever face was smiling at them. To correct for this potential confound, we conducted an additional experiment that was identical in form, except that instead of being presented with emotional images of their current or future selves, participants were exposed to neutral versions of these selves (i.e., faces that neither frowned nor smiled). This design also allowed us to explore whether, in this nonimmersive environment (i.e., the web-based design) an emotional image of the future self was necessary to enhance saving behavior; as in the VR studies, could saving be boosted after exposure to an image of a future self with a neutral expression? Furthermore, to test for generalizability, we used working-aged adults as participants instead of college undergraduates. Once more, participants elected to contribute a significantly higher percentage of pay toward a retirement account when they were exposed to their future selves than when they were not.

### Positivity of the future self

When taking into account how positive views of the future self can influence saving behavior, consider that in an earlier examination of this relationship, we directly asked research participants how much they liked and cared for their future selves.<sup>59</sup> Neither construct, however, mapped robustly onto intertemporal choice. This may not be surprising given that most healthy adults have a bias toward seeing themselves improving over time.<sup>81</sup> Indeed, participants in the Ersner-Hershfield *et al.*<sup>59</sup> study seemingly held positive opinions of their future selves: both liking and caring variables were positively skewed and neither exhibited substantial variance. Yet, for any given topic (including positivity of the future self), people may quite obviously maintain different attitudes than the ones they report holding.<sup>82</sup> One method of eliciting more variance on a response item, then, is to ask people how they feel about others in the domain of interest. Accordingly, in recent work, Galinsky and I have attempted to ascertain feelings about the future self by assessing and manipulating attitudes about the elderly in general.<sup>83</sup> Namely, we examined one aspect of positivity, the degree to which people respected (or disrespected) older people.

Our first study examined the relationship between respect for the elderly and savings at a macroeconomic level.<sup>83</sup> Löckenhoff *et al.*<sup>84</sup> surveyed participants from 26 countries around the world about their attitudes toward the elderly, and asked participants to indicate in general how positively or negatively their society viewed the elderly. Using the same years in which the original Löckenhoff survey was conducted (2006–2007), we mapped these country level attitudes onto gross national saving rates (expressed as a percentage of gross domestic product), as reported by the World Bank.<sup>85</sup> We found a positive relationship between attitudes toward the elderly and national saving rates, and importantly, this association remained robust when controlling for a host of relevant variables (percent of population over age 65, amount of contact with the elderly, the GINI index, literacy rates, and land size).

Using experimental designs, we then assessed the causal relationship between respect toward the elderly and personal saving behavior. Because previous research has shown that perspective-taking enhances respect and positive attitudes toward social groups,<sup>86</sup> we showed participants a photograph of an individual (who was either an elderly or young male) and asked them to write a day-in-the-life narrative of this photographed individual by either taking his perspective or remaining detached. The experiment had three conditions: (1) take the perspective of an elderly man, (2) take the perspective of a young man, or (3) take a detached objective perspective of an elderly man. After the perspective-taking manipulation, all participants completed the Kirby and Marakovic<sup>61</sup> measure that my colleagues and I used in earlier work.<sup>59</sup> Participants in the elderly perspective-taking condition chose significantly more larger later rewards than did participants in the other two conditions; the detached perspective of the elderly and the perspective-taking of the young man did not differ significantly from each other. If these findings were a function of simply thinking about the elderly, then we would have observed elevated saving behavior in the elderly detached perspective condition. Similarly, if these results were merely due to taking any person's perspective, we would have observed increased saving in the young perspective-taking condition. Rather, a boost in saving behavior only occurred when participants took the perspective of an elderly individual.

Our next experiment directly manipulated respect for the elderly and examined its effects on saving by randomly assigning participants to one of four conditions: participants wrote about a time that they showed respect or disrespect toward a peer or an elderly individual. Participants then completed the same temporal discounting task from the previous studies. Again, participants in the elderly respect condition opted for more larger later rewards than did participants in any of the other three conditions; the elderly disrespect, peer-respect, and peer-disrespect conditions did not differ from each other. Only when participants thought about a time they respected the elderly did we observe increased saving behavior relative to all other conditions.

In a follow-up study, we examined saving over a longer time frame and also used a manipulation that was considerably more implicit than the previously described manipulations. Drawing on semantic priming procedures,<sup>87</sup> we presented undergraduates with a word search task (tables that contained words hidden among rows and columns of letters) that included either words related to respect (e.g., “esteemed”), words related to the elderly (e.g., “elderly”), or words related to both the elderly and respect (e.g., “elderly”, “esteemed”). Indeed, previous work has found that when words related to two separate concepts are put into the same word puzzle, implicit links between the two concepts are created.<sup>88</sup> In a control condition, participants did not complete a word-search task. Participants in all four conditions then answered a version of the Kirby and Maracovic<sup>61</sup> task in which they made choices between smaller rewards they could obtain immediately (e.g., \$2,694 tonight) and larger rewards that they could obtain at a significant delay (e.g., \$93,050 in 39 years). Demonstrating the robust link between positive perceptions of the elderly and saving behavior, participants primed with words related to the elderly and respect opted for significantly more larger later rewards than did participants in the other three conditions.

### Remaining questions and directions for future research

The research reviewed above provides initial evidence for the ways in which different conceptions of the future self can affect intertemporal decision making. Yet, several questions still remain. Below, I

review a sampling of them that provide possibilities for future research.

#### *Relationships among similarity, vividness, and positivity*

To start, the relationship among the concepts of similarity, vividness, and positivity is largely unknown. In the VR studies, exposure to images of the future self enhanced feelings of similarity to that self.<sup>75</sup> We do not yet know, though, whether manipulations that increase future self-similarity also produce more vivid perceptions of the future self. Theoretically, in order to judge whether one is similar to the future self, that future self may have to possess some degree of vividness and realism. Alternatively, it is possible that judgments of similarity do not necessarily rely on vividness and are instead a function of characteristics of the future self that are less concrete.

With respect to similarity and positivity, we found a significant correlation, albeit a relatively weak one, between similarity to the future self and how much one liked the future self.<sup>59</sup> Although liking and general positivity are not necessarily the same concept, it is not difficult to imagine a positive bidirectional, causal relationship between similarity and positivity: people often feel similar to (or at least want to feel similar to) those whom they hold in high regard,<sup>89</sup> and they like and respect people with whom they feel similar.<sup>90</sup> Future work could benefit from orthogonal manipulations of both of these constructs.

It is less clear, though, whether exercises that enhance perceptions of vividness can also lead to more positive views of the future self and vice versa. The two might be associated, but the strength of the connection may depend, in large part, on the effectiveness of the vividness manipulation. A degraded or extremely unattractive image of the future self might, not surprisingly, lead to a less positive conception of that self. Figure 4 depicts one possible model of the relationships among these three components of future self-continuity (similarity, vividness, positivity) and intertemporal decision making. Future research should certainly test which of these links exists and which does not.

#### *Changes in future self-continuity with age*

My colleagues and I have found that future self-similarity becomes positively skewed as people grow older.<sup>59</sup> As noted earlier, such a shift is somewhat



**Figure 4.** A possible model of future self-continuity. Untested relationships are represented by dashed lines.

expected given that life circumstances become more stable with age and many major life choices have already been decided in early adulthood (e.g., who to marry, what career to pursue, where to live, etc.). Nonetheless, there are still several important intertemporal choices that arise toward the end of life that may be impacted by future self-continuity. Upon entering retirement, for example, one must decide the optimal way to use the money that has (hopefully) accumulated in one’s retirement accounts over time.<sup>91</sup>

Certainly, one factor that influences retirement spending choices is an individual’s perceived sense of time left in life.<sup>92</sup> However, the way the future self is perceived may also play a role in these spending decisions, and in line with the research presented above, similarity, positivity, and vividness may all influence decision making during this decumulation phase of life. But whether they affect intertemporal decisions in the same way that they do for younger adults is an area of inquiry that should be undertaken by future research.

Moreover, it is possible that similarity, vividness, and positivity may not be the only aspects of future self-continuity that matter when one is older. Namely, to the extent that close loved ones are often part of the self-concept,<sup>93</sup> the image of the future self at the end of life may not be confined to just the self, but may also include one’s children and grandchildren. In this way, the future self may continue existing after one has died in the form of one’s offspring. The extent that they—that is, the future kin—are seen as similar, vivid, and positive, could influence saving and spending by influencing decisions regarding intergenerational transfers of wealth. If a given individual perceives continuity between himself and his children, then he may be more motivated to continue saving for their benefit;<sup>94</sup> if, on the other hand, no continuity is perceived, he may be more inclined to spend in the present.

**Connections to the past self**

Promoting self-continuity may help people not only prepare better for the future, but also come to better terms with the past. Theoretically, as people move through the life course and are faced with major life decisions, more opportunities for potential regret accumulate.<sup>95,96</sup> Yet, not everyone is paralyzed by the negative emotions that are associated with regret.<sup>97</sup>

One explanatory factor for these individual differences may be the way in which people relate to their past selves (i.e., the selves that made regrettable decisions). Just as a stronger sense of continuity to one’s future self could promote saving behavior, so could a stronger sense of continuity with one’s past self promote fewer severe regrets? It is possible that being able to take the perspective of one’s past self might lead to better understanding and ultimately acceptance with past regrettable decisions.

**Conclusions**

Our differing conceptions of our future selves can dramatically influence the long-term choices that we make. Future work will hopefully shed light on the various ways that similarity, vividness, and positivity interact so that future self-continuity, and its downstream effects on decision making, can be best understood. Nonetheless, the empirical work presented in this review suggests that when the future self seems similar to the present self, when it is imbued with realism and vividness, and when it is seen in positive terms, people are more willing to make sacrifices today that may benefit them at some point in the years to come.

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## Conflicts of interest

The author declares no conflicts of interest.

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