

When Does the Present End and the Future Begin?

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Abstract

Through the process of prospection, people can mentally travel in time to summon in their mind's eye events that have yet to occur. Such depictions of the future often differ than those of the present, as do choices made for these two time periods. Conceptually and semantically, this research tradition presupposes a division between the two: At some point in the progression of time, the present must yield to the future. Still, the field to date has offered little insight by way of defining the division that separates the present from the future. The basic scientific appeal and practical implications of prospection and future-oriented decision making beg two related questions: When do people believe that the present ends and the future begins, and do such perceptions affect decision-making? To the first question, perceptions of when the present ends vary across people (Study 1) and are reliable over time (Study 2). To the second, when people believe that the present ends sooner (rather than later), they are more likely to make future-oriented choices in correlational (Study 3) and experimental contexts (Study 5), even when controlling for potentially related constructs (Study 4). Finally, we identify a psychological mechanism underlying this relationship: A shorter present is associated with a sharper division from the future (Study 6a), and this sharp division accounts for future-oriented self-regulatory behavior toward both hypothetical (Study 6b) and incentive-compatible (Study 6c) outcomes. This research sheds light on a foundational but unexplored prerequisite for thinking and acting across time.

Keywords: time perception, future-oriented choice, future thinking, prospection

Word Count: 14,610

Understanding how one will feel in the future, how actions today will affect consequences later, and how to make decisions that optimize distant outcomes are important but difficult skills to acquire and are also susceptible to “errors of prospection” (Gilbert & Wilson, 2007). Such prospection requires mental time travel (Suddendorf & Corballis, 2007) from one state (the present) to another (the future). Inherent in this process of prospection lies the presumption that the mental time traveler crosses a division that separates the present from the future. A growing body of research recapitulates this presumption with every new conceptualization of how people navigate the passage of time between the present and the future (Ornstein, 1975; Seligman, Railton, Baumeister, & Sripada, 2013; White, 2017; Wittman, 2016), or new empirical investigation finding that planners make fundamentally different – and often erroneous – decisions for the “later” than for the “now” (e.g., Mischel, Shoda, & Rodriguez, 1989; Scholten & Read, 2010; Strathman, Gleicher, Boninger, & Edwards, 1994; Urminsky & Zauberman, 2016; Zimbardo & Boyd, 1999).

Surprisingly, the literature to date has offered little insight by way of defining this presumed division. Intuitively, 5 years forward in time departs sufficiently from the present to fall well within the future in a way that 5 seconds forward well may not. The ambiguity can be illustrated in considering 5 days forward, which might be considered part of the present or as belonging to the future. The basic scientific appeal and practical implications of prospection thus beg two related questions: When do people believe that the present ends and the future begins, and do such perceptions affect decision-making? In what follows, we first present our conceptualization of the present moment as a unique and evaluable construct, and then we integrate insights from cognitive and social-motivational psychology to predict how and why its

felt duration might alter how people behave with respect to their relative weighting of the present versus the future.

Judging the Duration of the Present

Their inherently egocentric perspective anchors humans in the present moment – a moment that must pass (becoming the past) before the future (their next present moment) can begin. People conceptualize the passage of time as flowing continually from the present to the future (Boroditsky, 2000; Caruso, Van Boven, Chin, & Ward, 2013), and time perception monitors this forward progress. After a former present moment has become the past, people can use their memory to provide duration judgments (in the present) of how long that previous period of time objectively was or subjectively felt (Block & Zakay, 1997; Maglio & Kwok, 2016). Before a future present moment has come to pass, people can make prospective duration judgments (in the present) in evaluating the subjective duration of a future period of time (Zauberman, Kim, Malkoc, and Bettman, 2009). Taken together, because people appear capable of reporting how long a past period of time *was* and how long a future period of time *will be*, our investigation targets the last remaining component in the progression of time – the present – in asking how long it *is*.

In grounding our treatment of this question, we make four major assumptions. First, people understand the definitions of and distinction between the present and the future as epochs that proceed in temporal succession, with the conclusion of the former expediting the onset of the latter. We emphasize expedition rather than *de facto* initiation insofar as we treat the concepts of the “present” and the “future” as prototype categories with fuzzy boundaries. This framework allows that there may be spaces in time that are perceived as neither “present” nor “future,” yet there remains some strong sense of what is considered the “present” and what is considered the

“future” (McCloskey & Glucksberg, 1978; Zadeh, 1965). We make this assumption based on qualitative interviews with respondents who observed that the concepts of the present and the future seemed inherently malleable. This interdependence of the present and the future, together with the duration judgments documented for the past and the future, suggests that people should be able to report how long the present *tends to last* before coming to an end. Thus, by way of a conceptual definition, our investigation concerns itself with lay theories regarding the duration of the present as a recurring phenomenological experience.

Second, we differentiate this lay conceptualization of the present from perceptual accounts positing a much narrower time scale (Wittman, 2016; White, 2017). Accordingly, we treat perceptions of when the present ends and the future begins as another aspect of human time perception that are mostly non-conscious processes that influence motivation and behavior (Zimbardo & Boyd, 1999). Like these other aspects of time perception, we suggest that although people might not regularly consider when they think the present ends, they can nonetheless explicitly report on it when prompted (cf. Nisbett & Wilson, 1977).

Third, reporting on one’s sense of the duration of the present *in general* must take place within a *particular* present moment. Nonetheless, our targeting of an ever-present construct differentiates our investigation from other duration estimation research (e.g., Block & Zakay, 1997) in that we explore not what makes a *given* experience seem to last for a long or short period of time but, rather, what makes people see a recurring, categorical period of time (the present) as long or short. We similarly differentiate our investigation from future timing for *isolated* events, like asking people to estimate when a focal event will occur (e.g., one’s next trip to the dentist; Hu & Maglio, 2018; Liberman & Förster, 2009) or how subjectively close a focal event feels (e.g., graduation; Peetz, Wilson, & Strahan, 2009), as we target instead a *recurring*

event (the transition from the present to the future). For that same reason, we depart from research to date that has approximated a punctuation between the present and the future by introducing event markers in which some *single-shot* thing occurs to mark the separation between the two (e.g., the start of a new month or a holiday; Dai, Milkman, & Riis, 2014, 2015; Peetz & Wilson, 2013; Tu & Soman, 2014).

Fourth, choices made for the present moment often differ from those made in the present but anticipated to be realized, say, years later, and a common presumption is that the latter entails a future-oriented choice (e.g., whether cash in hand should be spent now or saved for the future; Frederick, Loewenstein, & O'Donoghue, 2002; Trope & Liberman, 2010). But would, say, a choice for tomorrow look more like a choice for today (i.e., in the present) or a choice planned for years later (i.e., in the future)? At some point in the progression from now to later, the time traveler in everyone moves from the current present moment to the next, passing a boundary and moving into what used to be the future, and we examine exactly this boundary. While event markers or consideration of prospects decades away might *suffice* to partition the present from the future, we suggest that they are not *necessary*; instead, we posit the existence of an omnipresent division between the present and the future. We are thus interested in understanding perceptions of when the present ends *in general* (e.g., as an individual difference, albeit one that is modifiable). Such a treatment is similar to the way that self-control has been viewed in the literature: It is a stable trait but nonetheless susceptible to situational influences such as sleep deprivation (Christian & Ellis, 2011). Taken together, in attempting to answer our first question of when people believe that the present ends and the future begins, we draw on several theoretical assumptions but adopt a largely exploratory empirical approach.

Motivation Across Time

Our second objective asks whether variation in how people answer the question of when the present ends and the future begins maps onto behavior. Here, we adopt a motivational lens, as the pursuit of goals often involves tradeoffs between the exact two constructs at the heart of our investigation: the present and the future. From this perspective, a number of lines of research provide tangential insight into answering this question. One crucial investigation to date has linked time perception (in the form of duration judgments for the past) and motivation evidenced in the present. Namely, the very act of engaging in self-regulation (“operations by the self to alter its own habitual or unwanted responses to achieve a conscious or nonconscious goal”; Vohs and Schmeichel 2003, p. 217) causes people to look back on the time that they spent engrossed in a regulatory task as lasting longer. When Vohs and Schmeichel (2003) had research participants downplay their emotions (versus act naturally) while watching an emotional movie (with downplaying known to recruit self-regulatory resources), they retrospectively estimated the duration of that movie – a previous present moment – as having lasted longer than their counterparts who sat through the same movie while free to express their naturally-occurring emotions. Furthermore, these exaggerated time estimates accounted for the tendency among emotion downplayers to make an impulsive choice (i.e., to act in a manner favoring the self in the present moment) in a subsequent task. Thus, not only can time come to feel longer or shorter (as evidenced for the past and the future but, as yet, not for the present), but these duration estimates also impact self-regulatory behavior.

Evidence of a motivation-behavior link plays out on a larger (albeit correlational) scale in work by Chen (2013), which suggested that the way a language encodes time can dictate how strongly its speakers perceive a divide between the present and the future. Some languages have a strong future tense, clearly demarcating the present from the future, whereas others have a

weak future tense, in which speakers speak of the present and future in similar ways. In a language with a weak future tense, one does not need to change the wording of an action to indicate that something will occur in the future. A German speaker, for example, can use the present tense to make a prediction about a future event; to indicate that it will rain tomorrow, this speaker would use the phrase *Morgenregnetes*, which translates to “It rains tomorrow,” and still contains the present tense of “rain.” An English speaker, by contrast, must use language that denotes the future, such as “will” or “going to,” and say “It will rain tomorrow.” Chen (2013) coded 130 world languages according to whether they have a strong future tense or a weak future tense and found that speakers of weak future tense languages are more likely to act in self-regulated, future-oriented ways: They have higher saving rates and more retirement wealth, are less obese, smoke less, and practice safer sex. A recent investigation (Pérez & Tavits, 2017) extended this work, recruiting bilingual respondents who were fluent in both Russian (a language with a strong future tense) and Estonian (a language with a weak future tense). When reading and responding to a survey written in Estonian (versus Russian), participants discounted the future less and supported future-oriented policies more. Though provocative and consistent with the conceptualization that we propose, these papers solely concern whether a weak or a strong linguistic marker divides the present from the future and not where in time that division exists.

Motivational accounts of self-regulatory behavior often present the self as a thread connecting the person that one is in the present and the person that one will become in the future. This thread remains susceptible to several factors that either bolster or weaken it (Bartels & Urminsky, 2015; Hershfield & Bartels, 2018; Parfit, 1971), and the degree to which people feel connected, in the present, to their future self dictates whether they ensure the well-being of that future self. Perhaps the superior self-regulation among those with a weak linguistic division

between the present and the future documented by Chen (2013) derives from a seamless, strong continuity from the present to the future self (see Hershfield et al., 2011). Temporal landmarks like birthdays and major holidays punctuate travel through time on a larger scale than the omnipresent, recurring transition from the present to the future at the heart of the present investigation. Though an imminent temporal landmark might allow the procrastinator to wait until after its passage to initiate goal-directed action (Dai, Milkman, & Riis, 2014, 2015; Tu & Soman 2014), separate research suggests that a highly salient boundary in time reduces the extent to which one feels connected to his/her future self, but with positive ramifications for far-sighted behavior. Using a constant span of time, Peetz and Wilson (2013) either did or did not introduce a temporal landmark separating participants in the present from their future selves (e.g., a birthday or a major holiday) to investigate whether such punctuation would create a rift in the connection people felt to their future selves. As predicted, the introduction of the landmark caused people to feel more disconnected from their future selves. This disconnect, in turn, increased rather than decreased their intention to initiate goal-directed activity by highlighting a salient, strong contrast between their current selves and their more idealized future selves. Collectively, previous research has thus found mixed results for the relationship between the division of time and self-regulation. Notably, each of these investigations targeted the presence of a division and not the location of that division. As a result, we undertake the present research open to the possibility that either a shorter present or a longer present might better support far-sighted self-regulatory behavior.

Overview of Current Research

The current investigation thus pursues four objectives: (1) to test whether individuals differ in their perceptions of where the division between the present and future occurs, (2) to

provide evidence that this division (and, accordingly, the duration of the present moment) is not fixed but is, instead, malleable, (3) to examine the motivational consequences of expanding or contracting the present moment, and (4) to identify the psychological process connecting the duration of the present moment to its motivational consequences. Thus, the current investigation probes a fundamental question about time itself (how the present gives way to the future in the mind's eye) through the lens of self-regulation (as fostering far-sighted behavior).

We investigate our research questions in 6 studies. In Study 1, we first set out to examine whether there is, in fact, variability in perceptions of when the present ends and the future begins using both open-ended and forced-choice questions. Then, using an analogic scale in addition to a forced-choice question, we assess the reliability of these perceptions (Study 2). Next, we examine whether such perceptions impact future-oriented choices and consider how distinct they are from potentially related constructs (Study 3). Finally, we examine the extent to which these perceptions are malleable and, if so, whether reconfiguring them shifts future-oriented decision-making – assessed via interest in learning about how to save money for the future (Study 4) as well as enrollment in a real financial wellness seminar (Study 5) – and the mechanism underlying the relationship (Study 6). Across studies, we sought to maximize power by having samples that were as large as our budget would allow at the time a study was run and by having at least 150 participants per cell (if not considerably more; Simmons, 2014).

Study 1

The aim of Study 1 was to understand the distribution of perceptions regarding when the present, generally speaking, ends. This study offers an initial exploration into a question that drives our investigation: Across people, is there variability in perceptions of when the present ends? We asked an online sample of participants to report, using an open-ended format, when

they felt that the present ends and then to provide a series of ratings regarding the answer they had just given. Although both variability and uniformity would offer novel insights into lay perceptions of time, the former would better suggest a construct that could be related to other outcomes and also (possibly) conducive to experimental interventions.

Method

Two hundred and three participants ($M_{\text{age}} = 33.41$ years, $SD = 10.41$ years; 44.3% women) from Amazon's Mechanical Turk subject pool participated for \$.30. In this and all subsequent studies that used Mechanical Turk samples, participants could only complete the survey if they had an approval rating of 95% or higher. Participants were given an Instructional Manipulation Check (IMC; Oppenheimer, Meyvis, & Davidenko, 2009) that ostensibly asked them to report the athletic activities in which they participate, but in reality, asked them to click the box labeled "other" and write a string of syllables. Three participants failed this IMC¹ and one participant failed to complete the survey, leaving a final sample of 199 participants. This study and all subsequent studies were approved by the university Institutional Review Board (IRB # 14-001229).

After completing a consent form, participants were given the following instructions: "Without giving it too much thought, off the top of your head, indicate when you think the present ends. You could obviously answer this question in objective terms, but we are more interested in what you *feel*. In other words, please answer the question: when do you feel like the present ends?" Participants were given a short text box in which to write their response. In an effort to distill these responses to a quantitative variable, we also asked participants to code the responses that they wrote. On the following page, participants were shown the answer that they

¹ We note that this is a low failure rate for the IMC, which may be a reflection of the relatively common IMC that we used in Study 1 as well as the high approval rate that we set for these participants.

had just written and were asked to choose a code that best described the answer that they wrote. These codes had been constructed prior to the study using pilot testing on a separate population recruited for a different study ($N = 217$, $M_{\text{age}} = 28.75$, $SD_{\text{age}} = 8.56$ years), which asked for open-ended responses regarding the end of the present. Coding and discussion between the two authors found that these responses fell across a range of categories: right now, between a second and a minute from now, more than a minute but less than an hour, more than an hour but less than a day, more than a day but less than a week, more than a week but less than a month, more than a month but less than a year, longer than a year, and at some future event. Accordingly, participants in the main study used a scale that reflected these identified categories: “Right now,” “1 second to 1 minute from now,” “Greater than one minute, but less than one hour,” “Greater than an hour, but less than a full day,” “After today but less than a week,” “Between a week and a month,” “Between a week and a month,” “Between a month and a year,” “Longer than a year,” and “At some future event.” Finally, participants completed demographic questions (gender, age, income) and then the IMC.

Results & Discussion

As noted earlier, we were primarily interested in understanding how perceptions of when the present ends might differ across people. As detailed in Table 1, although there was a skew toward perceptions that the present ended immediately, there was nonetheless substantial variability across participants in that the categories were not chosen with equal probability across participants, $\chi^2(8) = 61.37$, $p < .001$. Specifically, 20% of respondents reported that the present ends “right now,” and an additional 18% reported that the present ends some time between 1 second from the present moment and one minute from the present moment. In fact, half of the respondents felt that the present ended some time within one hour from the present moment.

However, 15% of the respondents reported that the present moment ended at some future event; a post-hoc inspection of the data revealed that the most common response in this category was “at my own death.”

Using the forced-choice measure, we find no gender differences, $\chi^2(8) = 7.14, p = .52$, or income differences, Spearman's $\rho(197) = .08, p = .24$, in perceptions of when the present ends. There was, however, a significant negative relationship between age and perceptions of when the present ends, Spearman's $\rho(197) = -.18, p = .01$.

Taken together, this initial foray into our broader research question reveals that although many people think that the present ends essentially immediately, there remains considerable variability in where that division lies in their minds. Notably, this study also indicates that an open-ended measure (and then a forced-choice question) used to gauge perceptions of when the present ends results in an inherently noisy pattern of results (suggesting that perhaps these measures are noisy or that they are not exclusively measuring what they intend to measure). As a result, in Study 2, we sought to examine whether such perceptions are reliable within individuals, and we do so in a way that hewed closer to our intended construct.

Study 2

People evidently vary in their perceptions of when the present ends, but would they vary within themselves in these perceptions over time? In order to assess the test-retest reliability of these perceptions, we administered a question regarding when the present ends to a panel of participants three times over a period of four months. Importantly, rather than giving participants an open-ended response task (as we did in Study 1), we instead used a simple question that graphically represented perceptions of when the present ends as well as when the future starts.

Separately, we incorporated the results of Study 1 to make a methodological update in

Study 2. Given the variability of responses to the question of when the present ends (in Study 1), together with our conceptualization of the present and the future as prototype categories with fuzzy boundaries, it appears plausible that people may envision some sort of gradual transition between the two. Intuitive semantics echoes this possibility, as the next five seconds may well be included in one's definition of the present, a scheduled meeting in two weeks' time may clearly belong to the future, but putting on pajamas at the end of the day may feel inappropriate to categorize as occurring in either. Accordingly, the materials given to participants in Study 2 explicitly allow for the possibility of what we term going forward a "gray area" between the present and the future to ascertain whether participants, when given the chance, espouse a belief in such an area in their conceptualization of time.

Method

Five hundred and eight people ($M_{\text{age}} = 22.89$ years, $SD = 3.90$ years; 77.7% women) from a large public university's laboratory pool participated for \$3. Participants first completed a consent form. Then, to ascertain perceptions of when the present ends, participants were shown a horizontal row of thirty clickable dots, and were given the following instructions:

"Please think about the line of dots below as time, with the present at the far left. You will be clicking on two dots: one that represents when the present ends (in your opinion), and one that represents when the future starts (in your opinion, meaning that there is no right or wrong answer). Some people think that when the present ends, the future starts immediately afterward, and if this is how you feel, then you'd put the two dots next to each other. But, you could also think that there's a gray area in between - neither comprising the present nor the future - if this is the case, then it's OK to have some dots in between when you think the present ends and when you think the future starts."

Participants clicked on the dot that represented when the present ends and then the dot that represents when the future begins. After responding to this question, participants were asked to choose a code that best described their perception of when the present ended with the same choices from Study 1 (“Right now,” “1 second to 1 minute from now,” “Greater than one minute, but less than one hour,” “Greater than an hour, but less than a full day,” “After today but less than a week,” “Between a week and a month,” “Between a week and a month,” “Between a month and a year,” “Longer than a year,” and “At some future event”). Using an open-ended prompt, participants were then asked to indicate how they made their decision regarding when the present ended on this dots task. Table 2 displays the correlations among these central variables for all waves of data collection. Finally, participants completed demographic questions. Details about each wave of data collection can be found in the Supplement.

Results & Discussion

As in Study 1, there was a skew toward perceptions that the present ended immediately on the forced-choice task (the mean score was a 3.70 in this sample, which was again most closely related to “greater than an hour, but less than a full day”). Similarly, slightly more than half of the participants (51.6%) felt that the present ended some time within one hour. Additionally, perceptions of when the present ended skewed more toward the “sooner” than the “later” on the dots task, with a mean score regarding when the present ends of 7.01 ($SD = 6.94$; 1 = the dot on the extreme left or “soonest” and 30 = the dot on the extreme right). The mean score regarding when the future starts was 12.31 ($SD = 9.14$), suggesting that participants did in fact perceive a buffer between when the present ends and the future begins ($M = 5.29$ units, $SD = 6.41$ units). Finally, 54.3% of participants indicated the presence of a ‘gray area’ (in that they had

a gap of 1 dot or more between when the present ends and when the future starts). The median of this gray area was 2 dots ($M = 5.29$, $SD = 6.41$ dots).

The main aim of Study 2 was to examine the test-retest reliability of perceptions of when the present ends and the future begins. If, as we contend, these perceptions represent individual differences, then we should expect reasonable test-retest reliability from one point in time to another. But if these perceptions are not reflective of individual differences *per se* and are instead more context-dependent, then test-retest reliability should be low. The reliability of the composite measure from Wave 1 to Wave 2 (separated in time by two weeks) was quite strong, $r(305) = .69$, $p < .001$. Similarly, the reliability from Wave 1 to Wave 3 was strong, $r(185) = .58$, $p < .001$, as it was from Wave 2 to Wave 3, $r(185) = .58$, $p < .001$. Similar reliabilities were found for the individual measures that comprise the composite measure (see Supplement).

Together, these findings point to a great deal of stability in how people conceptualize of the passage of time: Whether they tend to see the present as generally more short or generally more long, the operant word is ‘generally.’ In identifying this tendency as a reliable individual difference, we identify not an isolated consideration regarding a particular present moment, but a pattern of appraising time and progression through it. To foreshadow our later studies, this does not preclude the possibility that the sense of how long the present lasts might also prove susceptible to situational factors.

Post-tests. After conducting Study 2, we wanted to assess what exactly our research participants were considering when they chose dots to represent when the present ends and the future starts. Our *a priori* assumption was that the dots task was a face valid task (i.e., that choosing a dot for when the present ends was representative of a general, omnipresent sense for when the present gives way to the future). However, the possibility remained that participants

were instead interpreting the question in some other way (e.g., on a more idiosyncratic level, such as when a period of time like “finals week” would conclude, or on a more macro-level, such as when one decade of life like their 20s would conclude).

As a result of this uncertainty, we asked 200 participants from Mechanical Turk ($M_{\text{age}} = 35.68$, $SD = 10.43$ years; 42% women) to complete the dots task from Study 2. After registering their responses, participants were asked to list the thoughts that came to mind as they made their decision regarding when the present ends, and then to do the same for their decision regarding when the future begins. Both researchers read the responses and extracted from them four broad categories that encompassed nearly all responses: 1) continuous time (e.g., “the present ends within the next month, and the future starts after”), 2) intuition (e.g., “I just thought about when I thought that the present moment would end”), 3) event-based (e.g., “I think about when I will get married; that's when the present stops and the future will begin”), and 4) lifetime-based (e.g., “I think the present ends when you start getting old and can't do for yourself anymore”). To the extent that we were intending to measure a general, omnipresent perception of when the present ends and the future begins, we treated responses from the first two categories (i.e., continuous time and intuition-based) as evidence for our proposed construct. A trained research assistant then read each response and assigned it to one of these four categories. Of the 188 participants who responded to the question regarding when the present ends, 160 (85%) gave an answer based on a sense of continuous time, 8 (4%) gave an intuition-based answer, 6 (3%) gave an event-based answer, and 14 (7%) gave a lifetime-based answer. Put differently, 89% of the respondents were coded as having interpreted and answered our question of when the present ends in the manner that we had intended based on our conceptualization. Of the 181 participants who responded to the question regarding when the future begins, 149 (82%) gave an answer

based on a sense of continuous time, 4 (2%) gave an intuition-based answer, 7 (4%) gave an event-based answer, and 21 (12%) gave a lifetime-based answer. Here, 84% of respondents were coded as having interpreted and answered our question of when the future begins in the manner that we had intended.

A second post-test, in which participants self-coded their responses, largely mirrored the findings from the first post-test (see Supplement).

Our intention in using the analogic dots task in Study 2 was to measure a general sense of continuous time; based on the results of these two post-tests, we were satisfied that this was in fact how participants interpreted and used the task (given that a large majority of them responded in this way). Nonetheless, across the two post-tests, a portion of respondents did not perceive the dots task in the way that we had intended, which likely contributed to their scoring generally higher on the task itself (i.e., by reporting a later end to the present). In our subsequent studies, we treat the responses of this small minority of participants as noise (e.g., impervious to experimental manipulation on account of rigidly believing that the present only ends at a lifetime milestone like graduation, marriage, or promotion) that may simply dampen the strength of any observed relationships.

Study 3

Having established stability within (Study 2) and variability across (Studies 1 and 2) individuals in how long they tend to see the present as lasting, we next ask what other constructs are related to these perceptions, and what downstream behaviors such perceptions might predict. We examined whether perceptions of when the present ends (in general) are related to self-regulation across time by asking participants to report when they felt that the present ends and then to complete a monetary allocation task. We sought to determine whether any such

relationship would hold when controlling for other conceptually-similar constructs in the interest of establishing discriminant validity for a sense of when the present ends as a unique construct. Although there are a host of constructs that may be relevant to perceptions of when the present ends and the future begins, here we narrowed the possibilities down to those that seemed *most* relevant from an *a priori*, theory-driven perspective.

Namely, we investigated constructs that fell into three related buckets. First, given that perceptions of when the present ends fundamentally concern perceptions about time, we examined other constructs that also involve time perception. Within this bucket, we measured how long participants' time horizons were (Future Time Perspective (FTP); Carstensen & Lang, 1996), how long people consider the duration between one future period of time and another future period of time (Temporal Duration Estimate; Zauberman et al., 2009), and whether they tend to think about certain periods of time in positive or negative terms using Zimbardo and Boyd's (1999) five dimensions of past positive, past negative, present hedonism, present fatalism, and future orientations (Short Zimbardo Time Perspective Inventory (SZTPI); Zhang, Howell, & Bowerman, 2013). Second, given that time perceptions often include inferences about how the self may change over time, we employed measures that examine conceptualizations of the self over time. Namely, we examined how emotionally connected people believed their current selves were to their future selves (Future Self-Continuity (FSC); Ersner-Hershfield, Garton, Ballard, Samanez-Larkin, & Knutson, 2009) and how emotionally reactive they thought their future selves would be to rewards (Future Anhedonia; Kassam, Gilbert, Boston, & Wilson, 2008). Third, in an effort to ensure that perceptions of when the present ends were not just a smaller instantiation of a larger, more established personality difference, we also measured the general tendency to think in more concrete or abstract terms (Behavioral Identification Form

(BIF); Vallacher & Wegner, 1989) as well as the Big 5 personality traits of openness, extraversion, conscientiousness, agreeableness, and emotional stability (Ten-Item Personality Inventory (TIPI); Gosling, Rentfrow, & Swann, 2003).

Method

Five hundred and twenty-four participants ($M_{\text{age}} = 47.53$, $SD = 15.99$ years, range 18-79 years; 50.0% women) from the Qualtrics Panels subject pool participated for \$3.50. To be eligible to participate, respondents needed to be between 18 and 80 years of age, and we aimed to have an equal distribution of men and women. As screening criteria, all respondents first reported their age and gender, then an instructional manipulation check (similar to the ones used in the earlier studies). See Supplement for additional details about the Qualtrics Panels sample.

All respondents then completed the dots task as well as a monetary allocation task, in which they were asked to imagine that, after paying their bills and necessary expenses for the month, they realized that they had \$1000 remaining in their bank account. They were asked how they would like to divide the full \$1000 between two different options: (1) Use the money to purchase something fun or special to use immediately and (2) Put it into a long-term savings account to be used later. They were free to report any amount (from \$0 to \$1000) for each, provided that the sum across the two options totaled \$1000. Next, participants completed the Ten-Item Personality Inventory (Gosling et al., 2003), the Behavior Identification Form (Vallacher & Wegner, 1989) to assess the tendency toward more abstract or concrete thinking, the Future Self-Continuity scale (Ersner-Hershfield et al., 2009) to assess the felt relationship with one's future self, the Future Time Perspective scale (Carstensen & Lang, 1996) to assess the length of one's time perspective, the Temporal Duration Estimate (Zauberman et al., 2009) to assess estimates of temporal duration, the Future Anhedonia scale (Kassam et al., 2008) to assess

attitudes toward future emotions, and the Short Zimbardo Time Perspective Inventory (Zhang et al., 2013) to assess different temporal orientations, presented in a random order.

After completing these scales, participants indicated when they felt the present ends, using the objective 9-point scale used in the earlier studies. Finally, participants completed demographic questions (gender, age, income) and then the IMC.

Results & Discussion

As noted earlier, Study 3 had two important aims. Our first aim was to examine the extent to which other constructs were related to perceptions of when the present ends (and future-oriented decision-making). Results indicated that, overall, the longer the present seemed to last, the more they felt anhedonic (i.e., lessened emotions) about the future, the longer they felt a year lasted, and the higher they scored on extraversion, the Future Time Perspective scale², and the past positive, present fatalism, and present hedonism subscales of the SZTPI. When the present ended was not related to the tendency to think abstractly, nor to conscientiousness, agreeableness, emotional stability, openness, future self-continuity, or the past negative and future subscales of the SZTPI.

Second, we wished to assess the relationship between perceptions of when the present ends and a monetary allocation task. Here, we briefly highlight the main findings using a composite measure of when the present ends, which represents a standardized composite of when the present ends, when the future starts, and the objective measure of when the present ends. See the Supplement for full results; patterns are similar across all measures. Notably, as shown in Table S5, the composite measure of when the present ends is a significant predictor of monetary

² It was somewhat surprising that the later the present ended, the higher participants scored on the Future Time Perspective scale. We note, however, that the Future Time Perspective scale not only measures length of future time but also optimism about the possibilities that exist in the future. This was an unanticipated result, so we hesitate to speculate further.

allocation when including age, education, sex (Model 21) and abstract thinking (Model 22):

When the present is seen as short, people intend to put more money into the long-term savings account. That is, a shorter present was associated with more future-oriented self-regulatory behavior. The Supplement also reports an additional study (labeled Study 3a) that replicates this relationship and provides additional robustness checks. The composite measure significance was trend-level when including other future-oriented variables (Model 23; $p = .06$) and personality variables (Model 24; $p = .05$), but dropped to non-significant when including the SZTPI (Model 25; $p = .11$).

The drop in significance when including the SZTPI was not anticipated in advance; when choosing constructs to include in Study 3, we targeted constructs that could be identified as conceptually related to the independent variable (i.e., perceptions of when the present ends) by way of time perception, the self over time, and broad personality traits. It is possible, though, that scores on the SZTPI are instead highly related to the dependent variable (monetary allocation), as the location and nature of how people think about time (e.g., hedonism in the present) might bear directly (e.g., negatively) upon far-sighted decision-making (e.g., investment and savings). By such reasoning, this unanticipated result may have arisen because including the SZTPI accounted for more variance in the analysis than we had anticipated. We also cautiously note that recent work has questioned the construct validity of the Zimbardo Time Perspective Inventory (in both short form and regular length; Temple et al., 2017).

Study 3 also allowed us to investigate a phenomenological question regarding the construct under investigation. We had aimed to measure a general sense of continuous time (which the post-tests from Study 2 suggested were the case). However, it is possible that people's estimates of the duration of the present depend on how long they think it would take

them to complete the tasks they have already undertaken (in this instance, an online survey). That is, if the estimate of when the present ends is simply a measure of the anticipated amount of time to be spent on one task, then people who take longer on a given task should estimate the present as lasting longer. To examine this alternative account, we calculated the total amount of time that participants spent on the survey and then correlated this time with the key present/future measures. (We acknowledge that time spent doing something represents just an approximation of perceptions of how long a given task will take). We first removed two extreme outliers, and then participants who were three standard deviations above the mean. Surprisingly, we found that there were significant negative relationships between all present/future measures and the amount of time the survey took (all ρ s $< -.11$, all p s $< .01$), suggesting that, if anything, the participants who perceived the present as ending shorter were also the ones who took the longest amount of time on the survey.

Accordingly, Study 3 finds support for the notion that perceptions of when the present end are related to long-term decision-making in a hypothetical context. The nature of this relationship is consistent with the notion that when seeing a shorter present and a sooner future, people make more far-sighted choices.

Study 4

Study 3 documented that when the present seems longer, participants intended to save less in a financial allocation task. Because this study was correlational in nature, we cannot yet speak to the causal relationship between these variables. Accordingly, in Study 4, we manipulate perceptions of when the present ends and then measure a real choice. At a very basic level, this empirical approach will offer initial insight into whether perceptions of how long the present lasts are firmly fixed or, instead, malleable insofar as they respond to external prompts. At a

behavioral level, because we uncovered a negative relationship in Study 3 (i.e., a sooner end to the present was related to more far-sighted decision-making), we hypothesized that people who were led to see the present as ending sooner would be more inclined to choose a far-sighted option reflecting better self-regulation. Finally, because controlling for the Short Zimbardo Time Perspective Inventory in Study 3 seemed to reduce the strength of the relationship between perceptions of when the present ends and monetary allocation, Study 4 also measured the SZTPI after completion of the task.

Method

Nine hundred and five participants from the Mechanical Turk pool ($M_{\text{age}} = 38.94$, $SD = 11.60$ years; 55.6% women) completed the experiment for \$.30. Participants were given an Instructional Manipulation Check (IMC) that ostensibly asked them to report which U.S. state they were from, but in reality, asked them to click the box labeled “I do not live in the continental U.S.” One hundred and seventy-one participants failed this IMC, leaving a final sample of 734 participants.

Participants first completed an online consent form, and then read the following statement:

“Time is a difficult concept to define. One way to think about it is that there is a present and a future, and some people think that there is a gray area in between (neither comprising the present nor the future). Please think about the bar below as time, with the present at the left. While there are many ways to think about when the present ends and the future starts, the average – across a wide variety of people – is to consider it as shown below.”

Participants were then randomly assigned to one of two conditions. In the short present condition, participants were shown a bar that faded from blue to red approximately a third of the way along the bar, and was labeled “Present ends” where the blue part faded out and “Future starts” where the red part faded in (see Figure 1). In the long present condition, participants saw the exact same bar, except that it faded from blue to red approximately two-thirds of the way along the bar. The screen containing this manipulation remained visible for 30 seconds, at which point participants had the ability to advance to the next screen (at the bottom of the screen, participants saw a message indicating that “The >> button will appear shortly.”).

On the next screen, participants were asked if they would like to “quickly read an article that lists some creative ways to save for the future.” Their choice to do so represented our primary outcome variable: By clicking “yes”, participants were engaging in successful self-regulation by sacrificing time in the interest of bettering their long-term, far-sighted financial prospects. If participants indicated that they did want to read saving tips, they were then shown a screen with 20 tips to help them save money.

Participants were next given the Short Zimbardo Time Perspective Inventory (SZTPI), and then – as a manipulation check – the dots task (used to measure naturally-occurring population variation in the same construct in our earlier studies). Participants then indicated when they felt the present ends using the 9-point objective scale from the earlier studies. Finally, participants completed demographic questions (gender, age, income) and then the IMC.

Results & Discussion

Manipulation check. As a manipulation check, we examined whether there were differences in perceptions of when the present ends on the dots task, perceptions of when the future starts on the dots task, and the objective response to when the present ends. As in the

earlier studies, we examine these variables individually, as well as in aggregate using a composite variable of the standardized scores ($\alpha = .72$). The manipulation was successful in that participants in the short present condition reported a sooner end to the present on the dots task ($M_{\text{PresentEnds}} = 8.56$, $SD_{\text{PresentEnds}} = 6.05$), than participants in the long present condition ($M_{\text{PresentEnds}} = 12.82$, $SD_{\text{PresentEnds}} = 7.17$), $t(732) = 8.70$, $p < .001$, $d = .64$, and a sooner start to the future ($M_{\text{FutureStarts}} = 12.42$, $SD_{\text{FutureStarts}} = 7.33$) than participants in the long present condition ($M_{\text{FutureStarts}} = 16.86$, $SD_{\text{FutureStarts}} = 7.41$), $t(732) = 8.16$, $p < .001$, $d = .55$. There were no differences in scores on the objective scale (short present condition: $M_{\text{ObjectivePresentEnds}} = 3.90$, $SD_{\text{ObjectivePresentEnds}} = 2.35$; long present condition: $M_{\text{ObjectivePresentEnds}} = 4.01$, $SD_{\text{ObjectivePresentEnds}} = 2.34$), $t(729) = .64$, $p = .52$, $d = .05$. Finally, participants in the short present condition had significantly lower scores on the composite measure ($M_{\text{composite}} = -.22$, $SD_{\text{composite}} = .78$) than participants in the long present condition ($M_{\text{composite}} = .19$, $SD_{\text{composite}} = .77$), $t(732) = 7.24$, $p < .001$, $d = .54$.

Primary analysis. The central aim of Study 4 was to examine whether manipulating when the present ends could causally impact far-sighted behavior. In line with our hypothesis, we found that participants in the short present condition were more likely to read the tips about how to save money for the future (65.9%) compared to participants in the long present condition (57.5%), $b = .36$, S.E. = .15, Wald = 5.46 $p = .02$, Exp(B) = 1.43.

Given the findings from Study 3, we also wanted to examine whether these results held when controlling for the Short Zimbardo Time Perspective Inventory (SZTPI). To do so, we conducted a logistic regression in which we regressed choice to read the articles on condition and SZTPI scores. When controlling for the SZTPI, the effect of condition was similar, $b = .39$, S.E. = .16, Wald = 6.27, $p = .01$, Exp(B) = 1.48. Accordingly, our evidence from Study 4 suggests

that perceptions of the when the present ends offer predictive power above and beyond the established time perception constructs measured by the SZTPI. Nonetheless, we note here that this predictive power – the effect size connecting our construct to behavior in Study 4 – is relatively small for a behavior largely confined to a lab session. As a complement, we sought to provide a conceptual replication of this basic phenomenon in the next study to attest not only to its consistency but also to its relevance to more naturalistic, consequential behavior.

Study 5

The aim of Study 5 was to test whether experimentally-manipulated variation in the duration of the present (using the manipulation we employed in Study 4) would generalize to a more consequential outcome in a field setting. We partnered with a financial wellness group to examine whether a message that framed the present as short would encourage more people to enroll in a day-long financial education seminar³ than a message that framed the present as long. As in Study 4, our primary outcome variable was whether participants would successfully self-regulate by undertaking an action (spending a whole day learning about financial education) that could help their long-term financial wellbeing.

Method

We partnered with a Financial Wellness Program at a large public university, a program that helps the university community “navigate their finances in a way that supports their overall well-being.” As part of their annual financial literacy month in April, the Financial Wellness Program hosts a “financial literacy bootcamp,” at which community members can learn about specific financial behaviors relevant to them (e.g., creating a better budget). Community

³ Although a recent meta-analysis found that financial education may have serious limitations (Fernandes, Lynch, & Netemeyer, 2014), those same authors suggest that “just in time” education tied to specific behaviors may prove helpful. Along these lines, the day-long financial education seminar targeted specific financial behaviors relevant to undergraduate students (e.g., how to most effectively create a budget to pay off student loans).

members who were part of the Financial Wellness Program's existing email list ($N = 251$) were randomly assigned to see one of two different flyers (created by a graphic designer) that advertised the financial literacy bootcamp. As in Study 4, one flyer contained a message emphasizing that the present was short ("The present is short and the future starts sooner: Acquire better financial habits today!"; See Figure 2a) while the other flyer contained a message emphasizing that the present was long ("The present is long and the future starts later: Acquire better financial habits today!"; See Figure 2b). As shown in Figures 2a and 2b, a graphic similar to that used in Study 4 was included underneath this message, with the short present condition containing a bar that faded from green to red approximately a third of the way along the bar, and the long present condition containing a bar that faded from green to red approximately two-thirds of the way along the bar. The bars were labeled "Present" in the green portion and "Future" in the red portion. The rest of the flyers were identical across the two conditions, containing descriptive information about the bootcamp. Because sign-ups from emailed advertisements can be low, and because the overall email list only contained 251 people, the experiment added an additional incentive to encourage sign-ups: The first 50 people to enroll would receive \$25 to start a savings account.

To enroll in the financial literacy bootcamp, participants had to visit a sign-up link. In order to distinguish sign-ups that resulted from the short present flyer versus sign-ups that resulted from the long present flyer, the two flyers contained different links. When enrolling, participants provided their name and university ID number, as well as topics that they wanted to learn about at the bootcamp. Because the Financial Wellness Group planned to augment their campaign by posting printed flyers throughout the campus, a question on the sign-up page asked enrollees how they learned about the financial fitness bootcamp ("email, flyer (paper or

electronic), social media, or from a friend”). Finally, the sign-up page also included a question that asked which flyer had been seen, with three possible answers: a small graphic of the short present bar, a small graphic of the long present bar, and an “I don’t remember” option.

The Financial Wellness Group sent the short present email to 126 randomly-selected people from their email list and the long present email out to the other 125 people. Initial emails were sent on Monday, April 3rd, 2017, and, to encourage higher sign-up rates, were re-sent on Wednesday, April 5th, 2017. Because we had no way of monitoring how many total people would see the printed flyers or the social media flyers (running the risk of compromising the validity of our planned statistical analyses of enrollment rates), the Financial Wellness Group agreed to wait one week before posting flyers throughout the campus and on social media. Thus, on Monday, April 10th, 2017, the Financial Wellness Group posted the flyers widely. As such, data collection for the experiment occurred only during the one week following the initial emailing (i.e., Monday, April 3rd through Sunday April 9th). We hypothesized that more people would enroll for the bootcamp in response to the short present email compared to the long present email. The methods, hypotheses, and data analysis plan for Study 5 were pre-registered (<https://aspredicted.org/9pk4q.pdf>).

Results & Discussion

At the end of our specified window for data collection, the Financial Wellness Group compiled an anonymized data file with individual sign-ups resulting from each flyer. By April 10th, a total of 72 people had enrolled in the financial fitness bootcamp, but two sign-ups (both in the long present condition) occurred before the initial email had been sent (from student members of the Financial Wellness Group) and two sign-ups (both in the short present condition) occurred on April 10th (the day the data file was compiled). Because these four sign-ups occurred

outside of the window of data collection, they were excluded from further analysis. Further, from the question regarding how enrollees learned about the bootcamp, we observed that 7 people heard about the event through a friend and 12 people heard about it via social media. Even though the Financial Wellness Group had not posted the flyer to social media yet, a recipient of one of the emails had posted it to their social media page. Notably, of the 7 people who indicated that they had heard about the event from a friend, all 7 were in the short present condition, and of the 12 people who indicated that they had heard about the event via social media, all 12 were also in the short present condition. Because we could not know how many people saw the social media post, we conducted our main analysis on the remaining 49 people who had enrolled. Of these 49, 10 indicated that they heard about the bootcamp via a flyer (paper or electronic). Because the Financial Wellness Group had not yet posted any paper flyers around campus, we assume that these 10 people clicked on “flyer (paper or electronic)” to indicate that they had found out about the event via the emailed flyer from the Financial Wellness Group. Nevertheless, we conduct separate analyses with these 10 people included and excluded.

To examine whether the short present email resulted in more sign-ups than the long present email, we conducted a chi-squared analysis on sign-ups as a function of condition. The Financial Wellness Group did not have access to software capable of tracking whether each email was opened or not (i.e., seen or ignored/deleted). However, even if the email was seen by fewer than the full 251-person group, we have no reason to suspect that a different number of people would have seen it as a function of condition. As a result, for the chi-squared analyses that follow, we use an intent-to-treat analysis (Gupta, 2011) with 125 people as the denominator in the long present condition and 126 as the denominator in the short present condition. We view

this as a conservative test: lowering the total number of people could (potentially artificially) inflate the proportion of people who enrolled from each condition.

Full sample. Of the 49 people who enrolled in the financial fitness bootcamp via the emailed announcement, 13 (10.4% sign-up rate from a base of 125 people) were in the long present condition and 36 (30.9% sign-up rate from a base of 126 people) were in the short present condition. Thus, in line with our hypothesis, the short present flyer prompted significantly more people to enroll in the financial fitness bootcamp compared to the long present flyer, $\chi^2(1, N = 251) = 13.19, p < .001$.

Excluding those who chose “flyer.” When excluding the 10 people who indicated that they had learned about the bootcamp via a flyer (paper or electronic) before any flyers had been posted, the results remain largely the same: of the 39 total people, 12 were in the long present condition and 27 were in the short present condition. Again, significantly more people enrolled in the bootcamp in the short present condition than in the long present condition, $\chi^2(1, N = 251) = 6.97, p < .01$.

Excluding those who remembered the wrong flyer. Finally, in our pre-registration, we indicated that we would also conduct our main analysis on just the participants who remembered seeing the correct flyer. Perhaps because this question was not required, only 18 people completed it. Of them, 13 remembered seeing the correct flyer, 1 remembered seeing the incorrect flyer, and 4 indicated that they could not remember which flyer they saw. Given that this sample was drastically reduced, and that we could not provide an estimate of the denominator in this particular case, we did not conduct an inferential statistical analysis. However, we note that of the 13 people who indicated that they saw the correct flyer, 3 were in the long present condition and 10 were in the short present condition.

Post-test. It is possible that the messages used in Study 5 prompted a difference in sign-ups not because of a change in conceptualization of when the present ends (and the future begins), but rather because one was simply more persuasive or easy to understand than the other. As a result, we conducted a post-test in which we presented the two flyers from Study 5 to a group of 300 students from the same university at which Study 5 was conducted. Participants were told that experimenters were gauging reactions to a flyer to be used at an on-campus event and were then shown either the flyer from the short present condition or the long present condition. Participants were asked to report how persuasive the message was on a 5-point scale (with anchor points of “not at all,” “a little,” “somewhat,” “very,” and “extremely”) and how easy the message was to understand (also on a 5-point scale with the same anchor points).

Results indicated that participants in the short present condition perceived the message as equally persuasive ($M = 3.13$, $SD = .91$) as those in the long present condition ($M = 2.97$, $SD = .95$), $t(298) = 1.43$, $p = .15$. Participants in the short present condition did, however, find the message easier to understand ($M = 3.76$, $SD = .90$) compared to participants in the long present condition ($M = 3.47$, $SD = .99$), $t(298) = 2.70$, $p < .01$. Regarding this latter finding, we make two observations. First, participants in both conditions rated the message significantly above the midpoint of the ‘ease of understanding’ scale (short present: $t(149) = 10.40$, $p < .001$); long present: $t(149) = 5.79$, $p < .001$), suggesting that both messages were easier to understand than they were difficult. Second, although the observed difference in ease of understanding might make fluency seem like a plausible alternative account (with greater fluency associated with greater ease of understanding), findings from the fluency literature in fact seem to suggest the opposite. Namely, ease of understanding was lower (and disfluency was greater) in the long present condition. Prior research indicates that disfluent messages prompt abstract thinking

(Alter & Oppenheimer, 2008), and abstract thinking has been tied to greater future-oriented behavior (Fujita, Trope, Liberman, & Levin-Sagi, 2006), yet it was the short present condition that prompted more sign-ups, providing evidence (albeit indirectly) that the ease of understanding of the messages is not a likely candidate in explaining our primary effect.

Study 6

As detailed in the Introduction, though we had no *a priori* prediction regarding whether perceiving the present as short or as long would better facilitate self-regulation, the correlational evidence from Study 3 and the causal evidence from Studies 4 and 5 collectively suggest that it is a short rather than a long present that proves more effective for far-sighted behavior. We formalized no predictions because the existing literature offered little insight by way of conceptualizing the location of the division between the present and the future. Indeed, we see our Studies 1 and 2 as providing vital initial evidence that people can think about and articulate the location of this division. Having documented a reliable construct (Studies 1 and 2) that consistently predicts a meaningful outcome (Studies 3-5), our final set of studies seeks to understand the mechanism upon which this relationship relies. Here again, our Introduction offered little guidance in formulating an *a priori* prediction, but it at least provided a literature to be reviewed, albeit one that culminated in conflicting predictions: The sharpness or blurriness, rather than the location, of the division between the present and the future should prove relevant for far-sighted behavior. One perspective seems to suggest that a blurry division between the two would heighten motivation and self-regulation because the present would be seen as bleeding relatively seamlessly into the future, given that a linguistic seamlessness between the present and the future predicts far-sighted behavior at the country level (e.g., Chen, 2013). Yet, another perspective suggests that that a sharp division could enhance the desire to act in the service of the

future self (e.g., Peetz & Wilson, 2013): By highlighting a sharp division between the present and the future, people are made aware of the stark contrast that exists between their present state and a future state, and awareness of this gap thus spurs future-oriented action.

Given the diverse, though discrepant, interest in the construct of the strength (i.e., sharpness/blurriness) of the division, Study 6 considers the possibility that variation in the location of the division (corresponding to a short or long present) corresponds with its sharpness or blurriness and accounts for its impact on behavior. To test this possibility, Study 6a first frames the present as either short or long and then asks participants whether they see the division between the two as sharp or blurry. Again, given the prior literature, we were agnostic as to which relationship would bear out. From there, Studies 6b and 6c separately manipulate both the location and the sharpness/blurriness of the division in moderation-of-process designs, assessing how these factors (and their interaction) impact far-sighted behavior both in terms of behavioral intentions (Study 6b) and incentive-compatible choice (Study 6c).

Study 6a

In Study 6a, our central question was whether the placement of the division between the present and the future (either sooner or later, corresponding to a shorter or a longer present) would affect the sense that this division was blurrier or sharper.

Method

Three hundred and four participants on Mechanical Turk ($M_{\text{age}} = 38.30$, $SD = 11.68$ years, range 20-81 years; 46.7% women) participated for \$.25.

We employed a between-subjects design with two conditions. All participants read that, “Time is a difficult concept to define. One way to think about it is that there is a present and a future with some sort of division between the two.” To manipulate division location, participants

in the short (long) present conditions read, “While there are many ways to think about when the present ends and the future starts, the average – across a wide variety of people – is to consider the present as rather short (long) and the future as starting sooner (later).” Participants then read, “However, people are mixed on how they think about the division between this short (long) present and sooner (later) future, with some representing the division as more blurry, and others representing the division as more sharp, as depicted in the two images below.” Participants were then shown two images in which the sharpness/blurriness of this division was varied and were asked to pick which one best represented how they thought about the division between present and future (See Figure 3).

Participants then completed demographic questions and were debriefed.

Results & Discussion

To determine whether the placement of the division between the present and future affected participants’ perceptions of the sharpness/blurriness of that division, we conducted a chi-squared analysis. Results indicated that although participants overall endorsed a blurrier division between present and future (72% across conditions), participants in the short present condition were more likely to endorse a sharp division (34.0%) compared to participants in the long present condition (22.9%), $\chi^2(1, N = 304) = 4.60, p < .05$. This provides initial evidence that when people see the present as particularly short, they also see the division between the present and future as particularly sharp.

Integrating this finding with our earlier studies, could the increased tendency to see a sharp division between the present and the future underlie the finding that a shorter present is linked to (Study 3) and leads to (Studies 4-5) more self-regulatory behavior? Again, some prior work has found that when a salient contrast is made between the present self and the future self,

people are more motivated to act in the service of the future self because they are more aware of what is different between their current state and their desired future state (Peetz & Wilson, 2013). Along similar lines, if a short present is associated with a sharper division between the present and the future, it may be the case that coupling a sharp division with a sense of a relatively short present then leads to more future-oriented self-regulatory behavior. We explore this possibility in Study 6b.

Study 6b

The aim of Study 6b was to assess whether the relationship uncovered in Study 6a could play a role in decision-making. As noted above, if part of the process underlying the effectiveness of a short present is that the division between the present and future comes to be seen as sharper as the present ends sooner, then framing the present as ending sooner *with* a sharp division from the future should induce self-regulated decision-making more than framing the present as ending later *or* ending sooner with a blurrier division. In Study 6b, we used a between-subjects factorial design and showed participants either a short present with a sharp division from the future, a short present with a blurry division from the future, a long present with a blurry division from the future, or a long present with a sharp division from the future and then asked them how motivated they were to take future-oriented financial action.

Method

Based on the small effect size from Study 6a, we recruited a sample sufficiently large to detect a small effect with a 2x2 factorial between-subjects design. One thousand seven hundred and forty Mechanical Turk participants ($M_{\text{age}} = 36.55$, $SD = 11.65$ years, range 18-82 years; 50.3% women, 49.3% men, 0.4% other) participated in exchange for \$.25.

We employed a 2(Division Location: short, long) x 2(Division Appearance: sharp, blurry) between-subjects design. As in Study 6a, participants read, “Time is a difficult concept to define. One way to think about it is that there is a present and a future with some sort of division between the two.” Participants were then shown an image and language that corresponded to their condition. For example, those in the short present, sharp division condition, read “While there are many ways to think about when the present ends and the future starts, the average – across a wide variety of people – is to consider the present as rather short and the future as starting sooner, with a sharp division between the present and future, as shown below,” and were then shown a representation of time with a short present and a sharp division between the present and the future (See Figure 3, top left panel). On the next screen, participants saw the image again, as well as language that corresponded to their condition (e.g., “With a short present, and a sharp division between the present and the future...”) and were asked how likely they would be to 1) contribute to a savings account, 2) set up a way to have automatic deposits taken out of their checking account and into their savings account, and 3) speak to a financial advisor about saving for the future. All three questions used a 6-point Likert scale ranging from “very unlikely” to “very likely.”

Participants were then given demographic questions and then two questions that served as attention checks (“when the present and future were described earlier, how did most people describe the division between the two?” with sharp and blurry as the two answer choices, and “When the present and future were described earlier, how long did most people say that the present was?” with short and long as the two answer choices). This study was pre-registered at <http://aspredicted.org/blind.php?x=ei6kz4>.

Results & Discussion

Nine participants failed to answer the three dependent variable questions and were excluded from further analysis. A total of 346 participants (19% of sample) failed to answer both attention check questions correctly. Unexpectedly, more participants in the short present conditions (84.8%) answered the attention check questions correctly compared to the participants in the long present conditions (75.5%), $\chi^2(1, N = 1740) = 23.33, p < .001$. As a result, we present the results with the full sample, and then in a footnote, present the results when excluding those who failed the attention checks.

The three financial outcome variables showed acceptable reliability ($\alpha = .74$) and were averaged to create one item. A 2x2 factorial ANOVA revealed a main effect of division location, with participants in the short present condition being more motivated to act in future-oriented ways compared to participants in the long present condition $F(1, 1727) = 15.21, p < .001, d = .19$. There was no main effect of division appearance ($p = .49$), but there was, however, a significant division location by division appearance interaction, $F(1, 1727) = 4.29, p < .05, d = .10$. Follow-up tests indicated that, among participants in the short present conditions, those considering a sharp division were more motivated to take future financial action ($M = 4.51, SD = 1.09$) than those considering a blurry division ($M = 4.36, SD = 1.12$), $t(855) = 2.00, p < .05, d = .14$, but that, among participants in the long present conditions, there was no difference between those in the sharp division ($M = 4.18, SD = 1.21$) and blurry division conditions ($M = 4.26, SD = 1.12; p = .34$). Further tests indicated that participants in the short present, sharp division condition were also more motivated than those in the long present, sharp division ($t(863) = 4.16, p < .001, d = .28$) and long present, blurry division conditions ($t(863) = 3.34, p < .001, d = .23^4$).

⁴ When excluding participants who failed the two attention checks, we observe a main effect of division location, $F(1, 1390) = 11.86, p < .001, d = .18$, and a Division Location x Division Appearance interaction, $F(1, 1390) = 6.03, p < .05, d = .13$. Follow-up tests indicated that, among participants in the short present conditions, those considering

This finding builds a bridge from Study 6a, showing that not only does a short present cause the division to appear somewhat sharper, but that this sharpening accounts, at least in part, for the observed boost in self-regulation. Of note, these results also highlight that a sharp division between the present and the future might be necessary but not sufficient in order to increase far-sighted behavior, as participants considering a long present with a sharp division did not witness the same boost in intentions to save for the future. Instead, it appears that perception of a sharp division works best in enhancing self-regulation for a relatively short present. To conceptually replicate this finding, we turn next to our final experiment.

Study 6c

Study 6c had a single aim. Although Study 5 employed an incentive-compatible design, that study measured sign-ups for the financial wellness educational event (rather than attendance), an arguably loose proxy for real behavior. Thus, with Study 6c, we wanted to see whether framing the present as ending sooner rather than later would have an effect on a fully incentive-compatible outcome. Further, drawing on the findings of Studies 6a and 6b, we aimed to assess whether framing the present as ending sooner with a sharp division from the future would have the strongest effect on this real outcome. To do so, we used a design identical to Study 6b, but instead of asking participants about hypothetical financial decision-making, we presented them a choice between a \$25 gift certificate that they could use to spend now or a \$25 gift certificate that they could use to save for the future.

Method

a sharp division were more motivated to take future financial action than those considering a blurry division, $t(728) = 2.49, p < .05, d = .18$, but that, among participants in the long present conditions, there was no difference between those in the sharp division and blurry division conditions ($p = .29$). Further tests indicated that participants in the short present, sharp division condition were also more motivated than those in the long present, sharp division ($t(691) = 4.10, p < .001, d = .31$) and showed a trend-level difference compared to those in the long present, blurry division conditions ($t(689) = 1.74, p = .08, d = .13$).

To reduce responses from bots, participants first had to correctly answer three analogy questions before they could continue on to the rest of the survey. One thousand seven hundred and sixty-four Mechanical Turk participants ($M_{\text{age}} = 37.19$, $SD = 11.88$ years, range 18-83 years; 52.2% women, 47.1% men, 0.7% other) participated in exchange for \$.25. Participants were randomly assigned to one of the four conditions from Study 6b. After seeing the description and visual representation of the present / future division, participants read:

You have a choice of two gift certificates: one that lets you spend right now, and one that helps you save for the future. All survey participants will be entered into a lottery. If you are one of the two winners of the lottery, you will receive the gift certificate that you selected (worth \$25). (We will help you activate the gift if you need help doing so). Therefore, keep in mind that this choice has real consequence as you may receive your selection.

Participants then indicated their choice between the two gift certificates, with a gift certificate for Best Buy presented as the offering to be spent right now and a gift certificate for Wealthfront (a robo-advisor investment service) presented as the offering to save for the future. All participants then answered demographic questions as well as the two attention check questions from Study 6b. This study was pre-registered at <http://aspredicted.org/blind.php?x=kt6t2p>.

Results & Discussion

A total of 618 participants (35% of the sample) failed to answer the attention checks correctly. Again, more participants in the short present conditions (71.4%) answered the attention check questions correctly compared to the participants in the long present conditions (58.4%), $\chi^2(1, N = 1764) = 32.83, p < .001$. As a result, we present the results with the full sample, and then in a footnote, present the results when excluding those who failed the attention checks.

Because this study used a non-linear dichotomous outcome (i.e., choice of gift card), and due to the inherent difficulties in interpreting predicted values from interaction terms in binary

logistic regression models, we employed a binary logistic regression model with a single four-category predictor that represented condition with four levels (i.e., short present, sharp division; short present, blurry division; long present, sharp division; long present, blurry division)⁵. Doing so allows for a straightforward interpretation of both the overall effect of condition and the key contrasts, all using a single model. (In the interest of completeness, we report the factorial model in the Supplement.) Descriptively, 54.8% of participants in the short present, sharp division condition chose the Wealthfront gift card compared to 47.9% in the short present, blurry division condition, 44.7% in the long present, sharp division condition, and 45.5% in the long present, blurry division condition.

The test of the full logistic regression model was statistically significant, Wald $\chi^2(3) = 11.03, p < .05$. Each of the comparisons of the other three conditions to the short present, sharp division were significant. Namely, the coefficients comparing gift card choice when comparing the short present, blurry division to the short present, sharp division condition, $B = -.28$, Wald $\chi^2(1) = 4.25, p < .05, e^B = .76$, the long present, sharp division to the short present, sharp division condition, $B = -.40$, Wald $\chi^2(1) = 8.93, p < .01, e^B = .67$, and the long present, blurry division to the short present, sharp division condition, $B = -.38$, Wald $\chi^2(1) = 7.54, p < .01, e^B = .69$, were all statistically significant⁶. Thus, when the present was framed as short and with a sharp boundary, participants were more likely to choose an incentive-compatible gift card that

⁵Study 6b had a linear outcome variable, and thus employed a standard factorial ANOVA. We note, however, that using a single four-category predictor in Study 6b also yields the same results that were obtained with the factorial ANOVA.

⁶ When excluding the participants who failed the two attention checks, results indicated that the logistic regression model reached trend-level significance, Wald $\chi^2(3) = 7.39, p = .06$. The coefficients comparing the short present, sharp division to other conditions indicated that there were differences in gift card choice when comparing the short present, blurry division to the short present, sharp division condition, $B = -.29$, Wald $\chi^2(1) = 3.36, p = .06, e^B = .75$, the long present, sharp division to the short present, sharp division condition, $B = -.36$, Wald $\chi^2(1) = 4.41, p < .05, e^B = .70$, and the long present, blurry division to the short present, sharp division condition, $B = -.43$, Wald $\chi^2(1) = 6.22, p = .01, e^B = .65$.

reflected successful self-regulation (i.e., helped them to save for the future rather than spend in the present).

General Discussion

The question posed in our title appears to be worth asking. Our first set of experiments established its validity in both ecological terms (people are capable of answering it) and discriminant terms (answers to it are made independent of answers to other questions). Afterward, a separate set of experiments established its importance, owing to the fact that answers to it predict far-sighted intentions, behaviors, and incentive-compatible choices (i.e., successful self-regulation). Thus, what started as an irksome methodological question to two researchers generally interested in how choices for the future differ from choices for the present evolved into a broader investigation, identifying a novel individual difference that remains susceptible to variation as prompted by contextual cues. Said differently, we contend that people can experience the passage of time as the self jumping through a never-ending succession of temporal bubbles, each of which consists of a new present moment. With the present investigation, we have targeted not the subjective expansion or contraction of any one particular period of time but, instead, the size of these bubbles — the successive presents — in general (which tend to be about the same size over time, per Study 2). We are careful to note that this research represents a first step toward what we hope is a more complete understanding of how people partition the present and the future, how such partitions affect choice, and the mechanisms accounting for these relationships.

Process

Owing to the growing and tangentially-related body of work investigating the strength of the division between the present and the future, Study 6 considered and found evidence that it

underlies the relationship between a short present and more far-sighted decisions. To be sure, the process by which a short present sharpens the division between the present and the future may operate in tandem, in parallel, or in addition to yet other mechanisms awaiting future consideration. One intuitively-appealing explanation might present an entirely rational account for greater long-term saving resulting from a shorter present: Given a lifetime for which total duration is fixed, a shorter present necessitates a longer future. Resource expenditures take place in time, meaning that a longer future will, in turn, need more resources (money for food, rent, and vacations), deriving the straightforward prediction that people should be expected to set aside more money for this span of time. Relatedly, because the present seems particularly truncated with the future encroaching on that brief present, seeing the present as short might give rise to a greater sense of urgency, compelling people to take action quickly for fear that the window of opportunity in which to do so may soon close. A separate explanation, returning to our metaphor describing the present as a series of temporal bubbles through which people traverse time, might suggest that a shorter present translates to a greater experienced frequency of the transition between bubbles. It remains possible that a shorter perceived present makes it seem as if time is passing more quickly (with known consequences for motivation and affect that might affect long-term decision making; Sackett, Meyvis, Nelson, Converse, & Sackett, 2010) and/or making the future seem more in a state of perpetual arrival and re-arrival (enhancing its familiarity, vividness, and, as a result, importance or positivity; Alter & Balci, 2011; Hershfield et al., 2011).

Future Directions and Implications

In lieu of emphasizing why, for example, this *particular* present moment (the one in which our participants found themselves working through our experimental materials) was short

or long, we underscored a general sense of the duration of the present, hoping to frame *all* of those many conjoined temporal bubbles as relatively big (long) or small (short), situated within the broader framework of lay perceptions of time (e.g., Boroditsky, 2011). This operational choice begs, to us, two questions. First, how might variation in the *current* present moment interact with how people conceptualize of the duration of present moments *in general*? Filling a given time interval with more variation makes that period of time feel longer (Block & Zakay, 1997), an effect that generalizes to larger-scale time intervals as well (Zauberman, Levav, Diehl, & Bhargava, 2010). While the authors of these and similar investigations never framed their findings in terms of the present, they did nonetheless change perceptions of time. Insofar as their participants, exposed to manipulations creating variation in *one* present moment (i.e., the one of interest to the researchers) saw it as relatively short or long, might those participants extrapolate to seeing the present, in general, the same way? Such a possibility would broaden the scope of factors capable of influencing this general, subjective duration of the present (and, perhaps, the tractable consequences of it). Indeed, this would raise the related question of whether, for instance, abbreviating the current present is necessary or sufficient to make the present, in general, feel short. Let us note here that we suspected that it may well be at least sufficient: We made the deliberate decision to conduct all of our studies well in advance of major temporal landmarks (e.g., holidays; see Dai, et al., 2014) out of a concern that such an external prompt to see the present as short would interfere with our goal of manipulating the duration of the present in general.

Second, though our experimental materials purported to shift lay theories regarding the passage of time (i.e., the duration of the present), how long did any such shifts occur? Did our participants come to see the present moment in new terms, creating a lasting change, or did their

individual-level tendency to see the present as short or long (see Study 2) re-emerge as the dominant force as soon as they left the lab (in a manner similar to established individual-level resilience in things like happiness and weight; Lucas, 2007; Mrosovsky & Powley, 1977)? Adopting a longitudinal design similar to that of Study 2, would manipulations designed to frame the present as short at one point in time have an impact, at a later point in time, on those same perceptions? When our participants made judgments during the experimental session regarding life outside the lab (how they perceive, in general, the passage of time), would those reports create self-fulfilling prophecies, helping them to find reasons consistent with their reporting? Perhaps a decay function would emerge instead, with presents in the short-term (e.g., that same day) resembling what they had seen and said (e.g., feeling very long) but witnessing a gradual diminishment back to their original baseline. Answers to these questions will inform not only the definition of our construct but also how best to manipulate the sense of how long the present lasts in order to prompt far-sighted behavior.

Additionally, in defining our research question in terms of the division between the present and the future, we deliberately chose to ask research participants when the present gives way to the future. Doing so may have imposed an artificially discontinuous partitioning of time into the present and the future. Future research may wish to use a more implicit methodology (e.g., natural language processing) to ascertain where individuals place a division between the present and future, even in the face of not being directly *asked* to do so.

As a related point, the methodology that we employed necessarily left out the third major component of time – the past – from our investigation. Given that previous research has uncovered asymmetries between the past and the future (e.g., Caruso, Gilbert, & Wilson, 2008), it is possible that there are asymmetries between when the present is thought of as giving way to

the future and when the past is thought of as giving way to the present, which could lead to interesting research questions. Namely, if perception of the past/present divide is not symmetrical with the present/future divide, could that asymmetry, in itself, be a predictor of future-oriented behavior? And could the sense of a recurring division between the past and present be predictive of cognitions (such as regret and rumination) that are related to the way the past is perceived?

Conclusion

Perhaps owing to its ubiquity in daily life, there has been no shortage of research on time and the way that people relate to it. Researchers have made great progress in understanding how thinking and behaving at one fuzzy point in time (the present) can differ from the thoughts and actions planned for another fuzzy point (the future) in the absence of explicit consideration of how people perceive and go about defining the division between these two. We view the current research as a first step toward doing making the implicit assumption of a division between the present and the future explicit. Across six studies, we found that there seem to be stable individual differences regarding perceptions of when the present gives way to the future and that these perceptions predict behavioral intentions and incentive-compatible actions and choices. Thus, people are capable of thinking about the division between the present and the future, and where they draw it provides a compelling glimpse into how they navigate and decide through time.

Context

Both authors of this work have research programs that focus on the perception of time and how such perceptions affect judgments and decisions. A core aim of both authors' previous research is to better understand how people conceive of and make decisions that have consequences at different points in time, and how understanding these basic processes can inform policy and interventions meant to improve long-term decision-making. The current research was thus borne out of conversations surrounding decisions that are made over time, and the realization that although there is no shortage of work that has focused on these topics, the basic question of when the present gives rise to the future had not yet been explored. In undertaking this research, it was our hope that investigating this general construct might first make a theoretical contribution to cognitive, social, and personality psychological theories that consider time perception, and second, make a practical contribution to the social psychological, policy, and behavioral economic literatures that try to understand interventions that can help people maximize well-being over time.

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Table 1.*Self-Coded Responses for "When Does the Present End?" (Study 1)*

Response	Frequency	Proportion of Sample
Right now	39	19.5%
1 second to 1 minute from now	35	17.5%
Greater than one minute, but less than one hour	22	11.0%
Greater than an hour, but less than a full day	28	14.0%
After today, but less than a week	27	13.5%
Between a week and a month	4	2.0%
Between a month and a year	7	3.5%
Longer than a year	7	3.5%
At some future event	30	15.0%

Table 2.

Correlations Among Perceptions of When the Present Ends, When the Future Starts, and the Forced Choice Question Regarding When the Present Ends, Study 2

Variables	1	2	3	4	5	6	7
1. When Present Ends, Wave 1	--						
2. When Future Starts, Wave 1	.71***	--					
3. Forced Choice, Wave 1	.33***	.42***	--				
4. When Present Ends, Wave 2	.57***	.42***	.24***	--			
5. When Future Starts, Wave 2	.42***	.63***	.35***	.64***	--		
6. Forced Choice, Wave 2	.32***	.38***	.72***	.37***	.45***	--	
7. When Present Ends, Wave 3	.38***	.29***	.21***	.36***	.28***	.22**	--
8. When Future Starts, Wave 3	.39***	.51***	.33***	.40***	.55***	.36***	.65***
9. Forced Choice, Wave 3	.17*	.27***	.68**	.20**	.30***	.68***	.27***

* $p < .05$. ** $p < .001$. *** $p < .001$

Figure 1. Materials used in Study 4

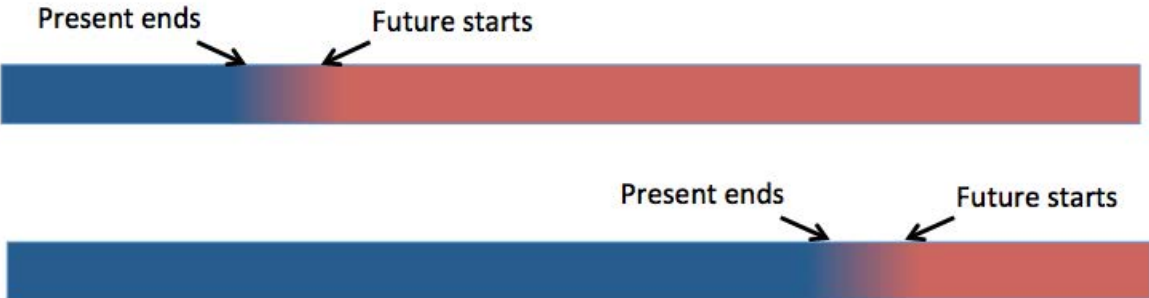
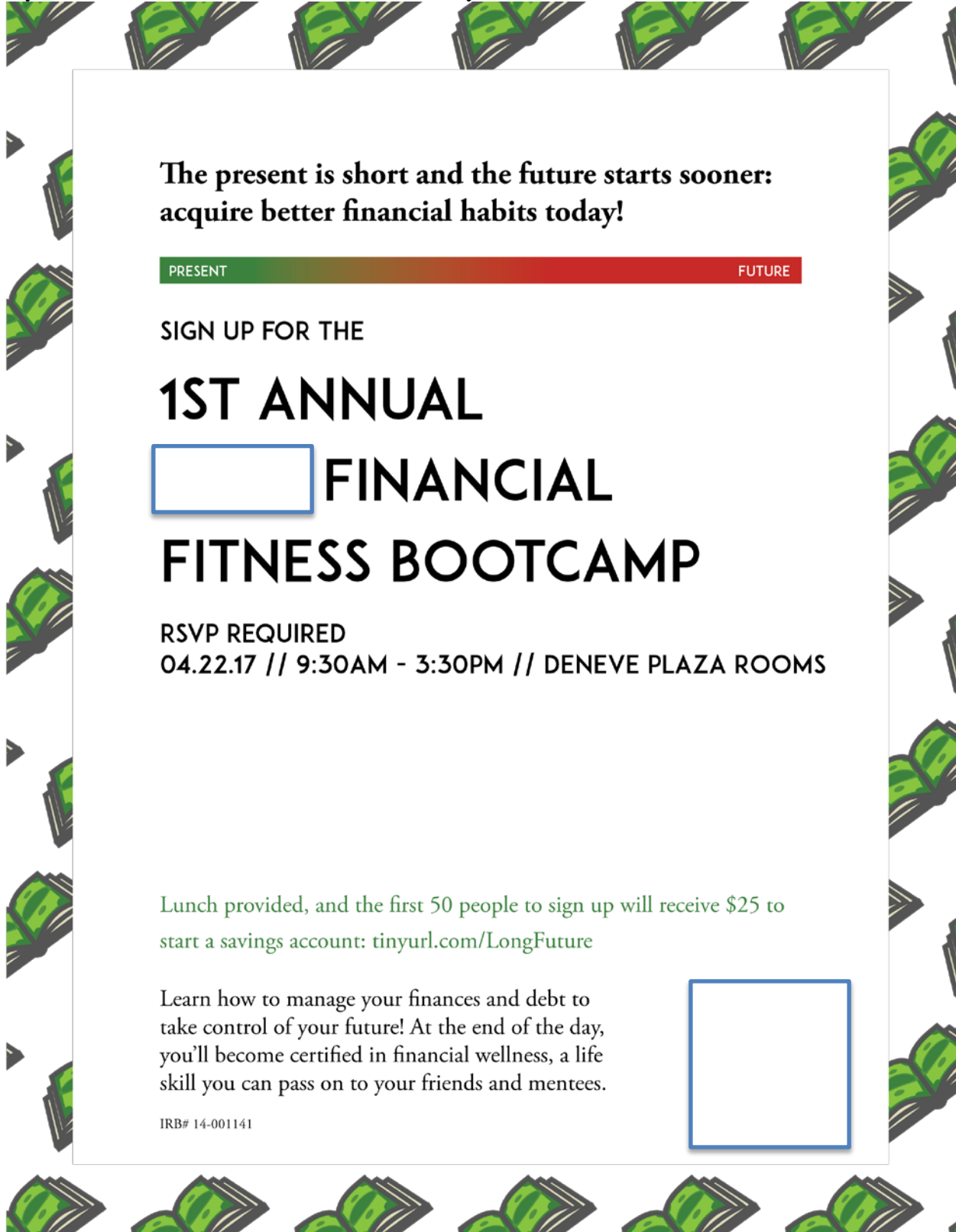
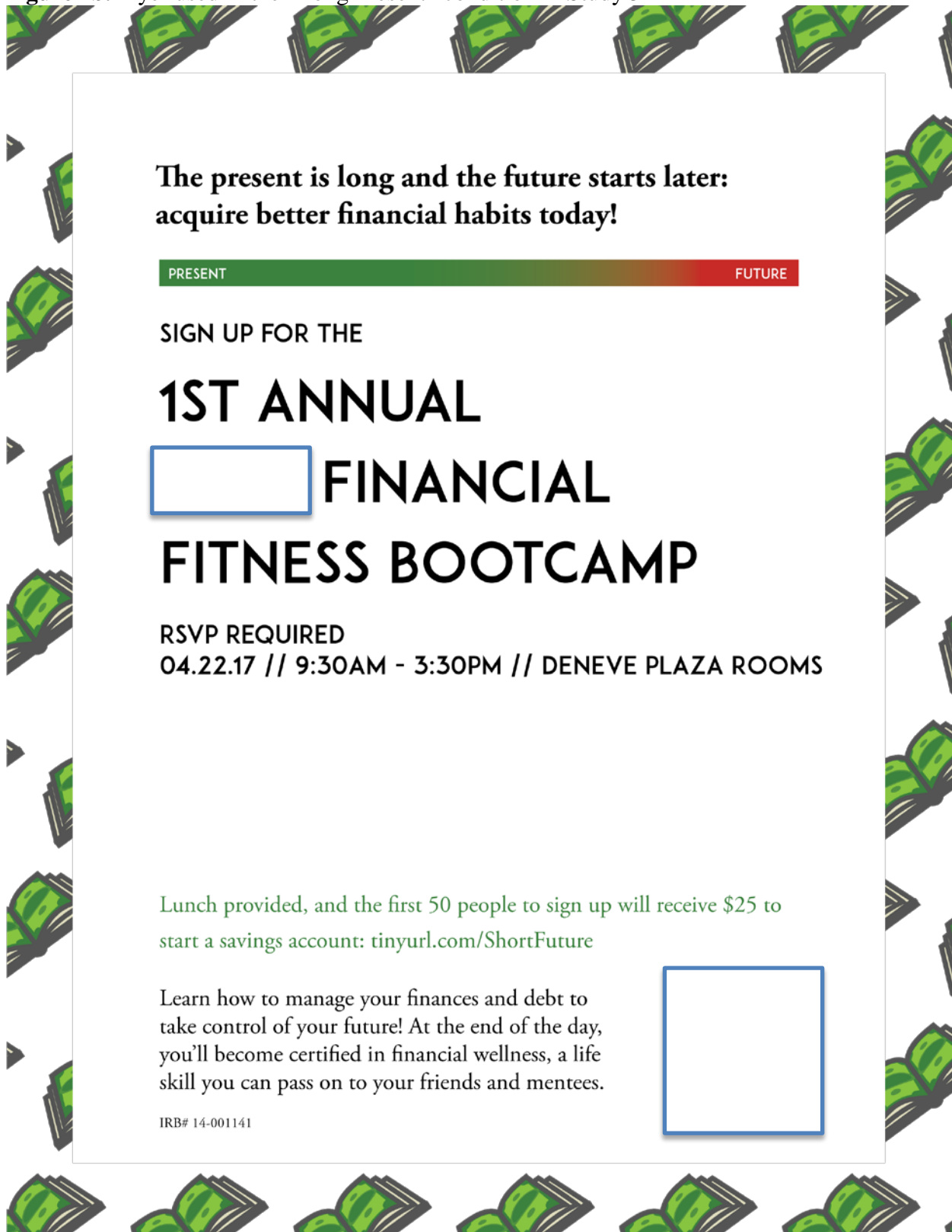


Figure 2a.
Flyer used in “Short Present” condition in Study 5

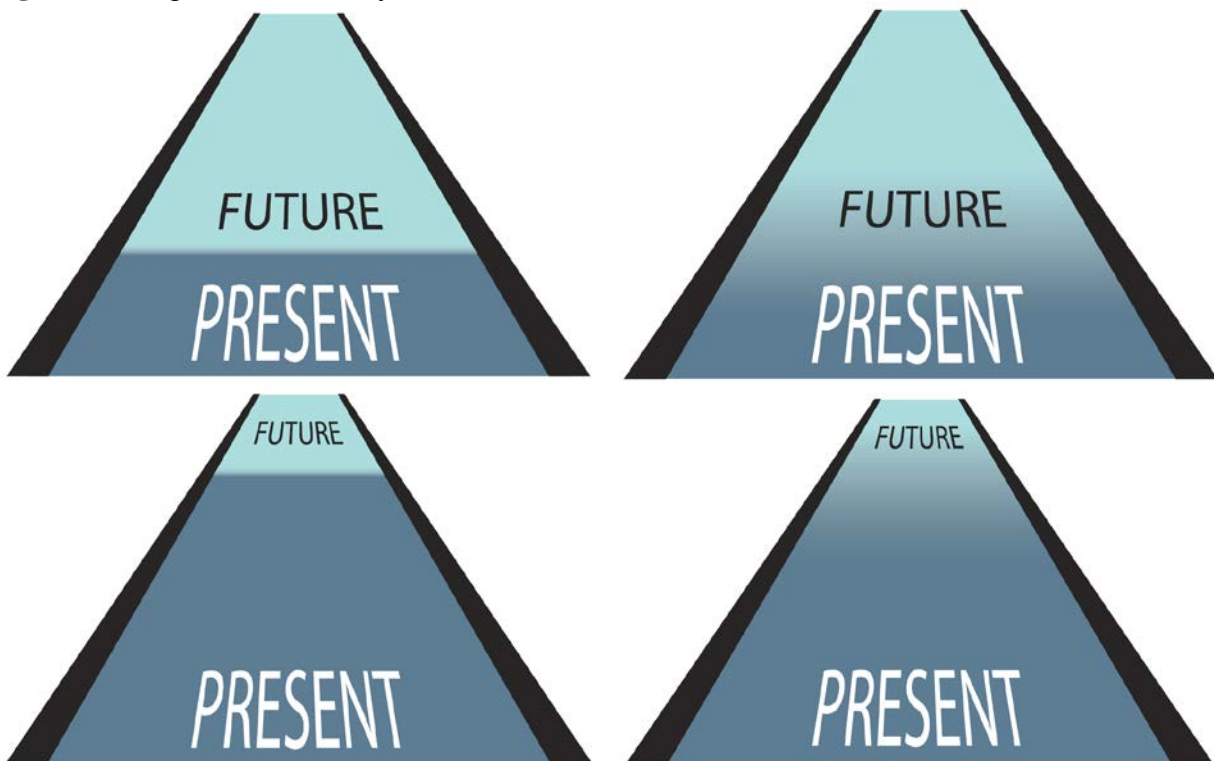


Note. White boxes added to anonymize the university at which this study took place.

Figure 2b. Flyer used in the “Long Present” condition in Study 5



Note. White boxes added to anonymize the university at which this study took place.

Figure 3. Images used in Study 6.

Note. Top two images are for the short-present conditions (with the sharp division on the left, and the blurry division on the right); bottom images are for the long-present conditions (with the sharp division on the left, and the blurry division on the right).