

When Does the Future Begin? Time Metrics Matter, Connecting Present and Future Selves

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Abstract

People assume they should attend to the present; their future self can handle the future. This seemingly plausible rule of thumb can lead people astray, in part because some future events require current action. To get going, the future must feel imminent, which we manipulate using time metric -- the units (e.g., days, years), in which time is considered. People (mis)interpret accessible time metric in two ways: If preparation is underway (Studies 1-2), people (mis)interpret metric as implying when a future event will occur. If preparation is not underway (Studies 3-5), they (mis)interpret metric as implying when it should start (e.g., planning to start saving four times sooner for a retirement in 10,950 days instead of 30 years). In these latter studies, metric matters not by changing how distal or important future events feel (Study 6), but by changing how connected and congruent current and future selves feel (Study 7).

Keywords: Motivation, Future, Judgment, Time, Situated Cognition

When Does the Future Begin? Time Metrics Matter, Connecting Present and Future Selves

People often delay taking action towards future events, finding the present more pressing and assuming that their future self can always take action later, only to find that time has run out. Failure to act soon enough has enormous real-world consequences: people fail to save enough for retirement (e.g., Munnell, Webb, & Golub-Sass, 2007, 2009), fail to sufficiently engage in preventive health behaviors (Sirois, 2004), and fail to invest enough time studying for school (e.g., Oyserman, 2015). Instead of delaying current gratification, they act as if they prefer their current self's needs and desires to those of their future self. This pattern of discounting future relative to current costs and rewards is termed temporal discounting (Ballard & Knutson, 2009; Chapman & Elstein, 1995). Explanations for individual and group-level differences in temporal discounting range from structural (e.g. poverty, Bertrand, Mullainathan, & Shafir, 2004, structure of defaults, Thaler & Sunstein, 2008) to psychological (e.g., lack of self-control, Ariely & Wertenbroch, 2002, lack of connection between current and future self, Oyserman, 2007) and linguistic (e.g., how the future is marked, Chen, 2012).

Temporal discounting rate thus seems multiply determined, implying that a number of solutions are possible to the problem of insufficient future investment. We focus on one possibility in particular, which is to increase the psychological relevance of the future self for the current self. Studies to date have focused on manipulating images of the self directly (e.g., Hershfield et al., 2011). For example, Nurra and Oyserman (2014) asked children to imagine the adult they would be in the future and how old they would be then, varying the connection implied between current and adult self. For some children the adult future was tagged as connected to the current self, for others as separate. Children in connected conditions outperformed their peers both immediately and over time, obtaining better grade point averages.

Tags did not influence the content of children's adult self (occupations) or the age they would be when they attained it (early 20's), implying that effects were due to felt rather than chronological nearness.

To better understand these effects and because the studied connection tags may not be present in real world settings, in the current studies we consider tags that are omnipresent, time metrics -- the units (e.g., days, months, or years), in which time is considered. We predict that changing the metric used to frame when the future begins should make the future feel psychologically relevant to the current situation by making it connected and congruent with the current self. Our prediction was constructed in three steps. First, people have a lay theory about time as distance (e.g., Casasanto & Boroditsky, 2008). This implies an experience of temporal granularity. That is, the farther away a future event is, the fewer details can be seen; the closer a future event is, the more details can be seen. Hence, compared to closer events, farther events are typically considered using a more gross-grained time metric (e.g., years rather than days). Second, following Grice's logic of conversation (Schwarz, 1996), people assume that the time metric used relates to how much time is being discussed, and following Higgin's (1998) 'aboutness principle', once a particular time metric is on people's mind, they will assume it is relevant to the task at hand. Yet, having a metric brought to mind doesn't necessarily cause people to act. Knowing when people will act requires step three; identity-based motivation theory (Oyserman, 2007), which predicts that if the future self is experienced as connected to the current self, people should be more willing to act in support of that self, discounting future rewards less. Taken together, people should infer from use of a fine-tuned time metric that the future is near, this should influence their willingness to start saving for the future and indeed

reduce the extent that they discount the future in part because they will experience their future self as more connected to and congruent with their current self.

Synthesizing these three steps yields three predictions about people induced to consider the future with a fine-grained vs. a gross-grained time metric: First, if when a future event will occur is unknown, people should interpret current action as implying that the event will occur sooner. Second, if when a future event will occur is known, they should plan to act sooner to prepare for it. Third, one reason they will act sooner to prepare in these later situations is that accessible time metric changes perceived connection and congruence with one's future self. This effect should be robust to other factors relevant to self-control (e.g., income, education, age, interpretation of experienced difficulty, determined character or 'grit') (Duckworth & Seligman, 2005; Smith & Oyserman, 2014).

Once a future event is experienced as relevant to the present, people should be more willing to take action. Indeed, temporal construal theory predicts that in the far future people focus on *whether* one would like to act whereas in the near future they focus on *how* to act (e.g., Trope & Liberman, 2010). That shift, from state (should I?) to action (how will I?), is well documented (e.g., Gollwitzer & Sheeran, 2006), and temporal construal theory (Trope & Liberman, 2010) predicts that near events produce action tendencies. The question we raise is different. We ask whether people can be induced to act in support of objectively distal events without necessarily making the event itself feel closer by making the future feel psychologically relevant. In the current studies we test the three core predictions about (mis)interpretation of time metric derived from our model. (1) When events occur: Effects of time metric on estimates of when an event will occur given that preparations are underway, (2) When preparations start: Effects of time metric on estimates of when to start preparation given that when the event will

occur is known. (3) Meditational process: The mediating effect of identity in starting to act for distal future events with known start times.

When Events Will Occur: Studies 1 and 2

Sample and Procedure

To test Prediction 1, we manipulated time metric between-subjects and asked participants when an event (a wedding, birthday, work presentation or midterm exam) that the protagonist was already preparing for would occur. Our goal was to obtain about 40 participants per cell. In Study 1 ($n=82$, 40.2% female, 80% Caucasian, 82.9% had at least some college, age range 19-61, $M= 31.27$, $SD = 10.72$), we recruited adults with U.S. IP addresses from Amazon's Mechanical Turk to read vignettes about gender-matched people. In Study 2 ($n = 80$, 50% Female, 41% Caucasian, 78.8% were Juniors and Seniors), undergraduate research assistants approached undergraduates in public areas around the University of Michigan campus and asked them if they were willing to fill out a brief (paper and pencil) survey about everyday decisions. Tables 1 and 2 present the six scenarios participants read: Three had time metrics and three were fillers without metrics. Scenarios were the same in both studies except that adults received a work scenario (Study 1) and students received a studying scenario (Study 2). In both studies, the time metric was fine-grained for half of respondents and gross-grained for the other half of respondents. The fine-grained metric was days in the first two scenarios and months in the third scenario. The gross-grained metric was months in the first two scenarios and years in the third scenario. Tables 1 and 2 list the full text of each scenario. Questionnaires were randomized (on-line or by pre-sorting questionnaires) and all responses were open-ended.

Preliminary Analyses

To create a common metric for analysis, responses were transformed to the finer-grained unit so that months were transformed to the same number of days and years were transformed to the same number of months and then responses were standardized. Later studies focus on savings and are difficult to interpret without demographic controls. Therefore demographic controls are included in all analyses presented¹. Results without controls yield the same patterns and are presented in the Supplemental Materials. Sample size for analysis was reduced due to nonresponse (Study 1 $n = 69$ answered all three scenarios, $n = 75$ to 78 answered any one; with Study 2 $n = 63$ answered all three scenarios, $n = 68$ to 71 answered any one).

Results

Repeated measures analyses of covariance showed that Time Metric mattered in the three critical Scenarios (main effect of Time Metric Study 1, $F(1,65)=334.875$ $p < .001$ $d=4.54$, Study 2, $F(1,59)=64.805$ $p < .001$ $d=2.10$). Randomization to condition did not affect response to any of the fillers (Study 1 p 's > 0.489 , Study 2 p 's > 0.711), allowing us to focus on the critical scenarios in which time metric of answer units was manipulated as detailed in Tables 1-2. For adults, events seemed 29.7 days sooner when considered in days rather than months and 8.7 months sooner when considered in months rather than years (average $d = 3.52$). For students, events seemed 16.3 days sooner when considered in days rather than months and 11.4 months sooner when considered in months rather than years (average $d=1.51$).

Scenario itself did not influence how far in the future the event seemed (Study 1 $p = 0.856$, Study 2 $p = 0.997$). As can be seen, in Study 1, gross-grained estimates did not always cover the full range from 0 (right now), whereas gross-grained estimates did cover this full range

¹ Demographic controls: Study 1: Age ($p = .417$), Education ($p = .277$); Study 2: Age ($p = .401$), Years of college ($p = .789$).

in Study 2. Indeed, Time Metric mattered more in some scenarios than others for adults (Time Metric x Scenario Hotelling's Trace $F(2, 64) = 3.022$ $p = .056$) but was equally powerful across scenarios for students (Time Metric x Scenario Hotelling's Trace $p = .264$). Studies 1 and 2 support the prediction that when current action is combined with a fine-grained time metric, people understand that action is being taken for a more proximal event. But what if action is not yet occurring? Does time metric influence one's plan to act (Prediction 2) and does it do so by making the future event more psychologically relevant (connected to and congruent with the present self) as predicted (Prediction 3)? We test these predictions in studies 3-7.

Table 1**Study 1: When will future events occur? Effect of fine-grained vs. gross-grained time metric**

Scenarios	When will event occur			t-test ^b	Effect size (<i>d</i>)
	Mean (<i>SD</i> , <i>range</i>) Converted to Days				
	Fine-Grained Time Metric	Gross-Grained Time Metric	Difference ^a		
"John/Jane is shopping for a present for his/her friend's birthday party. When do you think the party is?" In ___ day(s)/month(s)	5.3514 (3.5136) (0 to 14)	31.5789 (6.7888) (0 to 60)	26.2276 (10.7787)	-23.47	-5.82
"Dan/Elizabeth is preparing his/her presentation for work. When do you think the presentation is?" In ___ day(s)/month(s)	5.6410 (4.3498) (0 to 15)	38.8462 (16.0370) (15 to 90)	33.20513 (23.3475)	-12.66	-3.14
	Mean (<i>SD</i> , <i>range</i>) Converted to Months				
"Mark/Sarah is saving money for his/her wedding. When do you think the wedding is?" In ___month(s)/year(s)	9.1579 (3.7238) (3 to 18)	17.8378 (7.2783) (12 to 36)	8.6799 (11.4395)	-6.48	-1.61
OVERALL EFFECT SIZE					-3.52

Note: ^a Difference is calculated in the fine-grained metric (days for the birthday and work presentation scenarios and months for the wedding scenario). ^b All t-tests are significant at $p < .001$ *dfs* are 73, 76, and 73 by scenario respectively.

In the filler scenarios time metric of answer was not manipulated. The filler scenarios were: Class level of a student who meets with an advisor to check on graduation requirements - Freshmen, Sophomore, Junior, Senior; Age in years of a person meeting with an attorney to establish a last will and testament; A 22 year old is saving for retirement, when does this person plan to retire.

Table 2**Study 2: When will future events occur? Effect of fine-grained vs. gross-grained time metric**

Study 2 Scenarios	When will event occur			t-test ^b	Effect size (<i>d</i>)
	Mean (<i>SD</i> , <i>range</i>) Converted to Days				
	Fine-Grained Time Metric	Gross-Grained Time Metric	Difference ^a		
"John/Jane is shopping for a present for his/her friend's birthday party. When do you think the party is?" In ____ day(s) /month(s)	3.8056 (2.2274) (1 to 7)	23.5227 (14.4409) (0 to 60)	19.7172 (20.0901)	-7.11	-1.85
"Dan/Elizabeth is preparing for his/her midterm. When do you think the midterm is?" In ____ day(s) /month(s)	5.4000 (3.5990) (1 to 14)	18.2391 (10.1752) (0 to 30)	12.8391 (14.9743)	-6.25	-1.63
	Mean (<i>SD</i> , <i>range</i>) Converted to Months				
"Mark/Sarah is saving money for his/her wedding. When do you think the wedding is?" In ____ month(s) /year(s)	10.4571 (4.1256) (2 to 24)	21.8700 (13.7250) (0 to 60)	11.4129 (20.2080)	-4.05	-1.05
OVERALL EFFECT SIZE					-1.51

Note: ^a Difference is calculated in fine-grained unit is days for the birthday and midterm scenarios and months for the wedding scenario. ^bAll t-tests are significant at $p < .0001$ *dfs* are 69, 68, and 71 by scenario respectively. The filler scenarios were: Class level of a student who meets with an advisor to check on graduation requirements - Freshmen, Sophomore, Junior, Senior; Age in years of a person meeting with an attorney to establish a last will and testament; A 22 year old is saving for retirement, when does this person plan to retire.. Questionnaire data were double entered (Kappa= 1.00) prior to analysis (Landis & Koch, 1977).

When preparation should start: Studies 3- 7

Sample

Adults with U.S. IP addresses were recruited from Amazon's Mechanical Turk.

Demographics for each study are presented in Table 3, the only demographic that differed significantly by study was age. Participants in Study 7 were significantly older than those in the other Studies. Age, education, and income are included as covariates (controls) in analysis since all are relevant to saving.

Table 3

Studies 3-7: Demographics

Study ^a	N	Final <i>n</i>	Percentage of Participants			Age		
			White	Some college	Earn < \$50,000	Range	<i>M</i>	<i>SD</i>
3	140	138	74.3%	87.1%	68.6%	18-62	30.91	10.03
4	127	126	78.0%	92.9%	78.7%	18-61	31.48	10.04
5	124	122	71.8%	88.7%	74.2%	18-67	31.72	11.44
6	402	400	81.8%	88.1%	74.9%	18-72	31.27	9.96
7	324	316	80.2%	81.8%	75.0%	18-73	35.55	11.25

Note: ^aStudy 3: There were two conditions (college in 18 years or in 6,570 days). Study 4: There were two conditions (retirement in 30 years or 10,950 days). Study 5: There were two conditions (retirement in 40 years or 14,600 days). Study 6: There were six conditions (college in 18 years or 6570 days, retirement in 30 years or 10,950 days, retirement in 40 years or 14,600 days). In Study 7 there were four conditions, college in 18 year or 6570 days and retirement in 30 years or 10,950 days.

Procedure

To test Predictions 2 and 3 we manipulated time metric between subjects such that half saw a fine-grained metric (days) and half saw a gross-grained metric (years). In each Study when the future event would occur was fixed and the dependent variable varied as described next.

To test Prediction 2, in Studies 3 to 5 participants were asked when they planned to start taking action (saving) with an open-ended question containing the same time metric as the prime. We labeled this factor Time Metric (days, years). In Study 3, participants received a College in 18 years (6,570 days) Scenario, in Study 4 a Retirement in 30 years (10,950 days) Scenario, and in Study 5 a Retirement in 40 years (14,600 days) Scenario. In each study the question asked matched the scenario in content and metric. For example, participants in the College Scenario year Time Metric condition read: “Imagine you have a newborn child. You realize your child will be ready for college in only 18 years, when should you begin saving for their college education? In ___ years”. In the same way, participants in the College Scenario day Time Metric condition read; “Imagine you have a newborn child. You realize your child will be ready for college in only 6,570 days, when should you begin saving for their college education? In ___ days”.

Since starting sooner might involve doing more, we explored whether participants planned to do more by manipulating Chance for Action (incremental, overall) as a second factor. To do so, we asked a second question: “How much would you save?” as detailed next. In the incremental Chance for Action condition, participants were offered a chance for action using the Time Metric condition to which they were randomized. In the overall Chance for Action condition, they were not offered a chance for action. For example, in the College day Time Metric, incremental Chance for Action condition participants were asked, “How much should

you save (in US Dollars) per day for their college education?” In the College day Time Metric, overall Chance for Action condition participants were asked, “How much should you save (in US Dollars) overall for their college education?” Then we obtained demographic covariates.

In Study 6 participants were randomized to one of the three Scenarios used Studies 3, 4 and 5: College in 18 years (6,570 days), Retirement in 30 years (10,950 days), Retirement in 40 years (14,600 days) and to one of the two Time Metric (days, years) conditions and asked (in order) (1) “How important is saving for college/retirement” (1=*Not at all important* to 10=*Very important*), and (2) “How close does college/retirement feel” (1=*Very near*, to 10=*Very far*) prior to obtaining the demographic covariates.

In Study 7 participants were randomized to the College in 18 years (6,570 days) Scenario or the Retirement in 30 years (10, 950 days) Scenario and then were asked about their sense of connection and congruence between their present and future selves. These posited mediators were followed by a standard set of questions to calculate temporal discounting generally (not related to saving for their child’s college or to their own retirement). Then we obtained demographic, and self-control covariate controls. Mediation was tested via Identity Connection (4 items $\alpha = .81$)² and Identity Congruence (4 items $\alpha = .71$)³ (1=*Strongly Disagree* 7=*Strongly*

² Factor analysis showed that these four items loaded on the first factor without cross loading: “The person I am now and the person I will be in (18 years or 6,570 days/ 30 years or 10,950 days) are pretty much the same person”; “When I try to imagine the person I will be in (18 years or 6,570 days/ 30 years or 10,950 days) it is as if I am imagining a person other than myself” (Reverse Coded); “The person I will be in (18 years or 6,570 days/ 30 years or 10,950 days) does not look like me at all” (Reverse Coded); “The person I will be in (18 years or 6,570 days/ 30 years or 10,950 days) is a stranger to myself” (Reverse Coded). Other items did not include the time metric and formed smaller factors so were not included.

³ The items were: “I cannot imagine being (the parent of a college student/ being a retiree)” (Reverse Coded); “The identity of a (‘retiree’/ ‘college mom or dad’) is just something I cannot imagine as me at all” (Reverse Coded) “My identity as (a parent/ an adult) includes saving for

Agree) and Temporal Discounting (using Kirby Monetary Choice Questionnaire, Kirby, Petry, & Bickell, 1999). Kirby's temporal discount rate (k) was calculated with the aid of the macros used by Duckworth and Seligman (2005) and by Carter, McCullough, Kim-Spoon, and colleagues (2012) (personal communications, June 2014).

Results

Time metric influences when people plan to start. As predicted, granularity of time metric matters. As can be seen in Figure 1, participants planned to start saving four times sooner in the days condition compared to the years condition, controlling for their age, income, and education, $F(1,371)=17.969$ $p < .001$, $d= 0.44^4$. Imagining distal future events with a fine-grained metric (their newborn's college in 6,570 days, their retirement in 10,950 or 14,600 days) rather than a gross-grained metric (their newborn's college in 18 years, retirement in 30 or 40 years) jumpstarted planned start time.

Starting to save sooner might also resulted in planning to save more, particularly if participants were given a chance for incremental action. We did not find evidence for this; an analysis of covariance showed no effect of incremental saving or time metric on amount to-be-saved (Scenario $p = .894$, Time Metric $p = .458$, Chance for Action $p = .207$, Chance for Action x Time Metric $p = .378$).⁵ Estimates varied widely as might be expected given that saving

(college/retirement)"; "My identity as a person conflicts with some of the trappings of adulthood like saving for (college/retirement)" (Reverse Coded).

⁴ Results for each study show the same effect and are presented in the Supplemental Material. An anonymous reviewer asked that the presented analysis be a synthesis across the three studies. To do so, we transformed open-ended planned start time responses to a percentage of the total time available. There was no significant effect of participant education ($p = .123$) or income ($p = .176$), but age mattered ($p = .008$). Older participants planned to start saving sooner. Scenario did not have a main or moderating effect in the synthesized analysis.

⁵ We looked for this possibility by transforming how much people said they would save daily or yearly into the amount this would be in 18, 30 or 40 years then logging and standardizing results

toward these goals is dependent not only on psychological relevance of the future event but also on current circumstance (e.g., income, age) and goal (e.g., saving for public or private university, saving for a plush or sparse retirement) and people may or may not actually know how much they need.

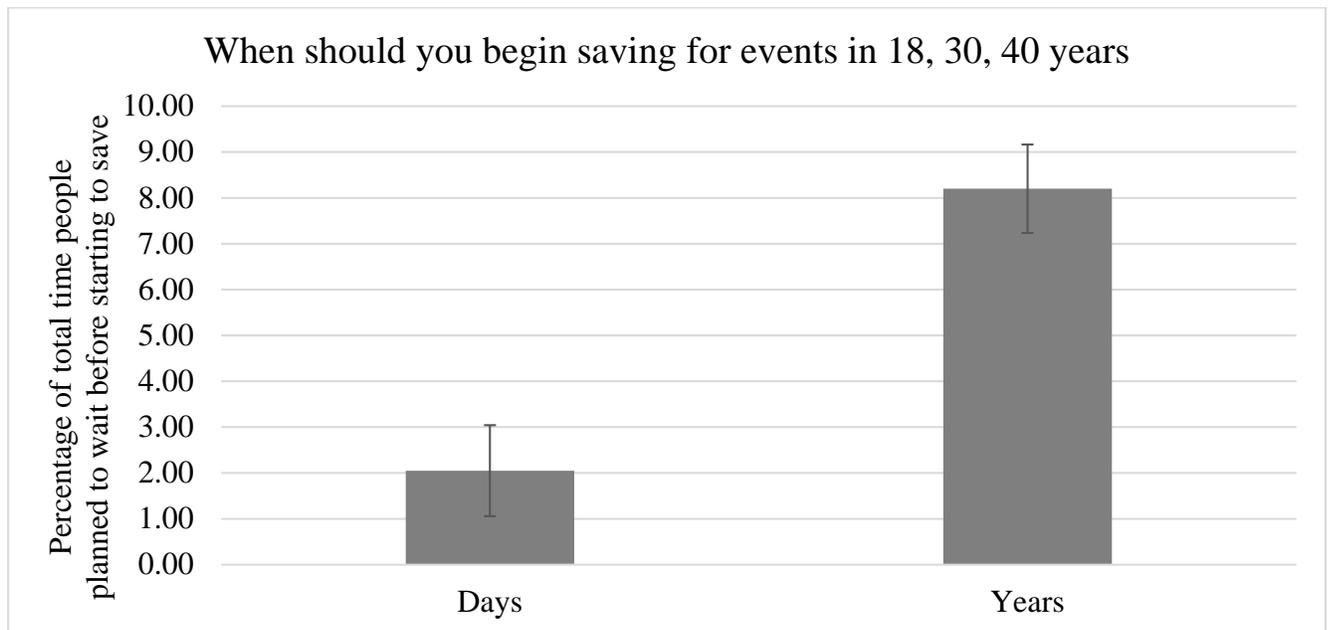


Figure 1: Studies 3, 4, 5 - When should you begin saving for future events?

Note: There were three scenarios (college in 18 years, retirement in 30 years, retirement in 40 years) and two time metric conditions (days, years). People were told in how many days (6,570, 10,950, or 14,600) or years (18, 30, or 40) an event would occur and asked when they would start saving (open-ended response). This response was transformed into a percentage of the total time available to them (18, 30, or 40 years) making responses comparable across time frames.

Time metric influences psychological relevance of the future self, not how far away or how important saving for college or retirement seems. Prediction 3 was tested in two parts.

First, in Study 6 we showed that time metric does not influence goal importance or distance (if

within study. We logged because responses were in dollars and standardized because the amount needed to save for college in 18 years, retirement in 30 years and retirement in 40 years differs and there is no correct response (meaning that simple metrics such as percentage of total were not available. Results are the same in each Study, as presented in the Supplemental materials.

when an event will occur is distal but fixed) using analysis of covariance (controlling for participant age, education and income). Participants rated saving as important ($M=8.623$, $SD=1.805$) and far away ($M=7.965$, $SD=2.423$) no matter which Scenario (college, retirement) (importance $F(2, 394)=1.971$, $p=0.177$, $d=0.15$, far away $F(2, 394)=1.940$, $p=0.148$, $d=0.15$) or which time metric (days, years) (importance $F(1, 394)=0.000$, $p=0.937$, $d=0.02$, far away $F(1, 394)=1.253$, $p=0.255$, $d=0.10$) they saw. These null effects are important as the scenarios actually presented differentially distal events, 18 years (6,570 days), 30 years (10,950 days), 40 years (14,600 days) in the future. Moreover, the actual amount of money needed should differ if one is saving for college or for retirement in 30 years or retirement in 40 years. Hence effects of time metric on starting to act in response to future events that will occur in a known but distal future are unlikely to be due to granularity of the metric making a future event feel closer or more important.

In Study 7 we tested the prediction that time metric influences temporal discounting via its effect on experienced connectedness between the present and future selves and hence congruence of present and future self. We tested this prediction, controlling for demographic variables and self-control measures, using PROCESS for SPSS v2.12, Model 6 with a bootstrap sample of 10,000 (Hayes, 2013). We found the predicted mediation, which is displayed in Figure 3, and shows a significant indirect effect of time metric on temporal discounting (the 95% bias corrected confidence interval excludes zero [-0.0163, -0.0005]) via its effects on connectedness and the effects of connectedness on congruence between present and future self. Table 4 presents the raw correlation matrix.

Table 4: Study 7 Raw correlations

Independent Variable	1	2	3	4	5	6	7	8
1. Time Metric (1=year, -1=day)	--							
Mediators								
2. Connectedness to Future Self	.087	--						
3. Congruence with Future Self	.070	.267**	--					
Dependent Variable								
4. Temporal Discounting	-.035	-.054	-.180**	--				
Demographic Covariates								
5. Age	-.067	.149**	.236**	-.178**	--			
6. Income	-.040	.043	.089	-.004	.188**	--		
7. Education	.074	.029	.011	-.221**	.175**	.349**	--	
Self-control Covariates								
8. Interpretation of Difficulty	-.075	.035	-.031	.116*	-.121*	.145**	.094	--

9. Grit	-.059	.329**	.303**	-.009	.210**	.145**	.105	.388**
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Note: Further analyses control for effects of demographics and trait self-control therefore these are labeled as covariates. * $p < .05$ ** $p < .01$

Thinking about the future in days makes people's future selves feel more connected to their current self. The more connected the current self is to the future self, the more congruent the present and future selves feel. The more congruent the present and future selves feel, the less people are willing to discount future rewards in favor of current ones. As noted by Zhao, Lynch, & Chen (2010) the sole criteria of mediation is documentation of an indirect effect. Hence connection and congruence between current and future self mediates the effect of temporal granularity on temporal discounting.

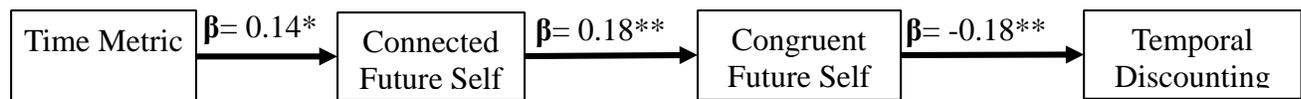


Figure 3. Time metric indirectly influences temporal discounting via its effects on connection and congruence of the current and future self.

Note: All path coefficients are standardized regression weights. The model includes the following controls: participant level of education ($p < 0.001$), income ($p = 0.092$), age ($p = 0.058$), interpretation of difficulty as importance ($p = 0.078$), and grit ($p = 0.712$). 95% Bias Corrected Confidence Interval [-0.0163, -0.0005]. Total adjusted R^2 for the model = 11%. $F(8, 307) = 4.932$, $p < .001$. * $p < 0.05$. ** $p < 0.01$.

General Discussion

Time, resources, and attention are limited. People allocate them to events that are pressing, the ones happening to them now, in a matter of days, rather than the ones that (may) happen to them later, in a matter of months or years. This seemingly useful and common sense approach has some unintended consequences; in particular, an ever pressing present relegates insufficient attention to the future (e.g., Bertrand, Mullainathan, & Shafir, 2004). What can be done? The possibility we focused on is that the future will loom large and be a focus of attention

if it is considered in a fine-grained time metric because this creates a sense that the future and present selves are connected, hence congruent rather than conflicting.

There is evidence that people are ready to act in service of a future self if it is presented as connected to the current self (Oyserman, 2007, 2009). For example, students work harder and get better grades when present and future selves are connected with a picture of a physical path (Landau, Oyserman, Keefer, & Smith, 2014). In the current studies we tested the novel prediction that another way to increase experienced connection and hence willingness to act is to use a fine-grained time metric to describe the future. We developed our prediction in three steps using people's lay theories about time as distance (Casasanto & Boroditsky, 2008), Grician conversational logic (Schwarz, 1996), the 'aboutness principle' (Higgins, 1998), and identity-based motivation (Oyserman, 2007).

First, we demonstrated that if when a future event will occur is unknown, people are sensitive to time metric in estimating when it will occur if preparatory action is underway. We showed this effect for midterms, work presentations, weddings and birthdays. When asked how many days away the event is, people say it is between 13 and 33 days sooner than if asked in months. When asked in months, they say it is 9 to 11 months sooner than if asked in years. This time metric effect is context sensitive, occurring only if time metric appears in the scenario.

Second, we demonstrated that if when a future event will occur known but distal, time metric influences plans to start action. When asked when they will begin saving, people say they will start four times sooner if told how many days rather than how many years they have until their child goes to college or they want to retire. Third, we demonstrated that this latter effect is mediated by psychological relevance of the future self. Considering one's retirement or one's child's college education in days rather than years leads people to experience more connection

between their present and future selves, which makes the identities linked to these future selves (e.g., 'retiree') feel more congruent with their current self. This reduces the extent that people discount future over current rewards. Less discounting means that saving for the future may feel less painful. In situations in which the timing of the future event is known but distal, time metric does not influence how soon or how important a distal future event feels. This distinction is important both practically and theoretically. Practically it reinforces prior findings that people fail to save not because they do not think it is important to save but because they do not start early enough (Thaler & Benartzi, 2004). Theoretically it highlights that the effect of time metric on willingness to act is not solely due to Grician conversational logic, which would not predict change in temporal discounting mediated by change in experienced connection and congruence between current and future selves. This effect of time metric is predicted by identity-based motivation theory (Oyserman, 2015).

Indeed the effects of time metric depend on whether action is currently occurring and on whether the timing of the future event is known. If action is occurring now but the timing of the future event is unknown, then the future feels nearer when a fine-grained time metric is used as shown in Studies 1 and 2. The reverse is also true. If when a future event will occur is known then people will plan to start working toward it sooner if a fine-grained time metric is used as shown in Studies 3-5. These results complement related research showing that priming people with *how* to act increases the likelihood that they will act (Gollwitzer & Sheeran, 2006), because it makes the future seem near (Trope & Liberman, 2010).

Across studies people responded to the implication that days are sooner than years and so require sooner action rather than to the implication they might have drawn from number magnitude: 6,570 (days) is a bigger number than 18 (years). Future research should consider

when the number rather than the unit associated with the metric matters for action (e.g., on learning that one needs a million pennies, would participants plan to start saving sooner than if they learned that they needed \$10,000, see Furlong & Opfer, 2009)?).

We focused on time as our metric and chose savings targets that were both distal and important, saving for one's children's college education and one's own retirement. Too little saving is both a problem in itself and also may reduce motivation to engage in other activities relevant to the future self such as schoolwork. Getting to college requires both savings and investing effort. Learning that money for college is available increases middle school student's investment in homework (Destin & Oyserman, 2010). Low-income children with a bank account they self-marked as 'for college' are more likely to attend college even though their savings are under \$500 (Elliott, 2009). It is not the money; savings seems to make the future and present selves feel more connected, improving investment in schoolwork (Oyserman, 2013). Our results suggest another way to make the future seem connected -- count days rather than years until the future arrives.

Author Contributions

The paper is a joint product. Daphna Oyserman developed the study concept. Both authors contributed to the study designs. Neil Lewis Jr managed data collection, and performed the data analysis and interpretation under the supervision of Daphna Oyserman. The authors discussed how to draft the manuscript and Neil Lewis Jr wrote a first draft that Daphna Oyserman revised. Both authors approved the final version of the paper for submission.

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