

PSYCHOLOGY

Valuing time over money predicts happiness after a major life transition: A preregistered longitudinal study of graduating students

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How does prioritizing time or money shape major life decisions and subsequent well-being? In a preregistered longitudinal study of approximately 1000 graduating university students, respondents who valued time over money chose more intrinsically rewarding activities and were happier 1 year after graduation. These results remained significant controlling for baseline happiness and potential confounds, such as materialism and socioeconomic status, and when using alternative model specifications. These findings extend previous research by showing that the tendency to value time over money is predictive not only of daily consumer choices but also of major life decisions. In addition, this research uncovers a previously unidentified mechanism—the pursuit of intrinsically motivated activities—that underlies the previously observed association between valuing time and happiness. This work sheds new light on whether, when, and how valuing time shapes happiness.

INTRODUCTION

Many North Americans feel increasingly pressed for time (1) and report worrying about not having enough money (2). In representative surveys, a large proportion of Americans (41%) report that they do not have enough time to do all the things that they want to do. A large proportion of respondents also report that unexpected expenses are a primary source of worry (43%) (2). Although people desire to have more time and money, there are few opportunities to gain both. Instead, people are often forced to make trade-offs between these valuable resources. For example, people frequently confront difficult decisions such as whether to work more hours and make more money (versus spending more time with their children), to live in a more expensive apartment closer to work (versus spending more time stuck in traffic each day), or to pay someone else to complete disliked tasks on their behalf (versus completing disliked tasks on their own). Each day and across many years, the decisions people make about having more free time at the expense of having less money may hold critical implications for subjective well-being (SWB).

Although wealth offers the potential for people to spend their time in happier ways, such as by living in a more expensive apartment closer to the office, survey data suggest that wealthier individuals often spend more of their time engaging in activities that are less enjoyable, such as commuting and shopping (3). Relatedly, research suggests that rising incomes are linked to an increased sense of time scarcity. Across diverse cross-cultural contexts such as Europe, Asia, and America, people who earn more money report feeling more pressed for time (4). In a large-scale survey of more than 30,000 working adults living in the United States, respondents were asked to report their income as well as their feelings of time stress over the course of three consecutive years. Specifically, respondents reported how often they felt rushed and how often they felt pressed for time (5). Controlling for individual and job-related characteristics, such as the number of hours worked each year, when respondents' income increased so too did their feelings of time stress.

This research suggests that giving up discretionary income to have more free time might promote happiness. Consistent with this idea, spending money on time-saving purchases—such as spending money to outsource cooking, shopping, and house cleaning—is linked to higher levels of life satisfaction (6). In an experimental study, working adults reported greater end-of-day happiness after being assigned to spend a \$40 payment on a time-saving (versus material) purchase (6). This research provides initial evidence that giving up money to have free time promotes well-being, at least for individuals with additional income at their disposal. While people who lack discretionary income or are struggling to make ends meet are unlikely to confront the question of whether to give up money to have more time, a large proportion of people living in developing countries have a nontrivial amount of discretionary income that they could spend in these ways (7). This research fits with a growing literature showing that how people spend their money may be at least as important for happiness as how much money they make (8, 9). While past research has focused almost exclusively on how people spend money, other trade-offs that do not involve spending (such as working fewer hours for less money) might also shape SWB.

Researchers have started to explore this possibility by examining whether broadly prioritizing time over money in the context of everyday life is associated with greater SWB (10–13). To this end, researchers have developed the Resource Orientation Measure (ROM) (13). The ROM is a single-item measure that asks individuals whether they value time more than money or money more than time. The simple, single-item format of this measure minimizes participant burden while simultaneously allowing researchers to understand people's broad preferences to prioritize time over money (versus focusing on specific spending decisions).

Previous research has found evidence that this single-item measure demonstrates strong psychometric properties (13). Demonstrating discriminant validity, participants' responses to the ROM are distinct from materialism, material striving, socioeconomic status (SES), social desirability, conscientiousness, and current feelings of time and material affluence (13). Demonstrating test-retest reliability, participants' responses to the ROM are consistent over a 3-month period (13), during which time stable constructs should show no true change (14). These findings provide initial evidence that participants' responses

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Table 1. Demographic characteristics of respondents who completed T1 and T2.

Variables	
Percent female T2	71.9%
Mean, age T2	20.63 (SD = 4.15)
Family SES	4.03 (SD = 1.88); corresponds with "completed a master's degree"
Primary activity T2	<ul style="list-style-type: none"> •Full-time employment (24.3%) •Part-time employment (23.0%) •Graduate or Professional School (12.8%) •No activities (5.2%) •Service trip (3.9%) •Travel or gap year (2.6%) •Unpaid internship (1.7%) •Other—Self-defined by participant (26.6%)
Motivation for primary activity T2	67.51 (SD = 23.30)

to the ROM represent a chronic orientation that is relatively stable across time. Demonstrating construct validity, participants' responses to the ROM predict hypothetical consumer decisions, such as whether respondents choose a more expensive direct flight versus a cheaper indirect flight. Responses to the ROM also predict in-the-moment decision-making, such as whether individuals choose a housecleaning voucher versus a cash prize in a lottery (13).

Most critically for the current investigation, participants' responses to the ROM are reliably linked to SWB. Across six studies ($n = 4690$), individuals who broadly prioritized time (versus money) on the ROM felt more satisfied with their lives and reported more frequent positive emotions and less frequent negative emotions (13). These results held without controls and when controlling for materialism and material striving and other potentially related variables, such as age, number of children living at home, household income, number of hours worked, and conscientiousness. The effects of prioritizing time over money also held controlling for how pressed for time and money respondents felt in the moment.

Moreover, these findings are robust across samples: Valuing time has been associated with higher well-being in studies of college students, working adults recruited from Canada, and nationally representative samples of working Americans (13). Attesting to the reliability of these results, these findings have also been conceptually replicated in an independent investigation. Across six studies of Americans ($n = 4413$), respondents were asked whether they would rather have more time or more money (10). In these studies, individuals who reported that they would prefer to have more time (versus more money) reported greater life satisfaction, greater positive affect, and lower negative affect. Once again, these effects held without controls and when controlling for demographic characteristics, as well as for the amount of discretionary time and money that individuals had available.

Previous research suggests that the tendency to prioritize time over money is a generalizable, replicable, and previously unrecognized correlate of SWB. However, almost nothing is known about why this association exists. Scholars have argued that this association may occur because people who value time over money make better decisions about how to spend their time (e.g., by spending more time socializing) (12). It is also possible that there is a third variable that explains these

Table 2. Correlation table of response delay between T1 and T2 surveys and key outcomes. Age correlation is based on smaller subsample of $n = 823$. [†] $P \leq 0.10$, * $P < 0.05$, ** $P < 0.01$, and *** $P < 0.001$.

Correlation of response delay and each of the following variables	
1. T2 ROM (1 = time-oriented)	-0.05
2. T2 SWB	0.01
3. Activity motivation	-0.03
4. Age	-0.09*
5. Gender (1 = female)	-0.17**
6. Parents' education	0.03
7. Materialism	-0.04

associations. Going beyond cross-sectional data, which have not yet explored possible underlying mechanisms, we tracked individuals before and after a major life transition: graduation from college. We expected that respondents who valued time would emerge from this major life transition happier than respondents who valued money.

We further theorized that individuals who valued time (versus money) would be more likely to pursue intrinsically motivated activities in the year following graduation. Money is a quintessential source of extrinsic motivation (15), whereas valuing time is linked to greater interest in activities that are associated with intrinsic motivation, such as social and prosocial activities (11, 12). Pursuing intrinsically motivated goals, in turn, puts people on a long-term trajectory of increased well-being (16). In one study, for example, students who successfully strove toward more intrinsically motivated goals during their freshman year were more likely to experience sustained changes in well-being over the course of college compared to students who strove toward more extrinsically motivated goals (16). This research suggests that intrinsic motivation could partially explain why people's chronic time orientations are associated with higher levels of well-being.

As stated above, to detect the long-term effect of individuals' time and money orientations on major life decisions and well-being, it is important to study people who are facing critical junctures in their lives. To this end, we recruited over a thousand graduating college students and examined how students' initial proclivity to value time over money predicted their SWB and career choices a year after graduation. We deliberately focused on career selection because it is one of the most critical decisions that people face in their lifetime (17) and is a powerful predictor of SWB (18). SWB refers to a person's evaluation of how happy they are and includes both global cognitive assessments of the quality of one's life, as well as measures of emotional experiences (19). SWB is typically defined as high life satisfaction, high feelings of positive affect, and low feelings of negative affect (20).

RESULTS

Resource Orientation Measure

At time 1 (T1), 61.7% of respondents valued time more than money, whereas 38.3% of respondents valued money more than time. We observed nearly the identical split at T2, with 61.5% of respondents valuing time more than money and 38.5% of respondents valuing money more than time. Respondents' general orientation to value

Table 3. Correlation table of all variables examined at T1 and T2. [†] $P \leq 0.10$, * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

	1	2	3	4	5	6	7	8	9
1. T1 time-oriented (1 = yes)									
2. T2 SWB	0.12**								
3. T2 SWL (satisfaction with life)	0.10**	0.77***							
4. T2 positive affect	0.06*	0.79***	0.59***						
5. T2 negative affect	-0.06*	-0.75***	-0.47**	-0.56***					
6. Activity motivation	0.10**	0.41***	0.41***	0.33***	-0.28***				
7. Age	0.05	0.04	0.04	0.05	-0.04	0.02			
8. Gender (1 = female)	-0.04	-0.05	-0.006	-0.003	0.11***	-0.04	-0.06 [†]		
9. Parents' education	0.05	0.003	0.01	-0.02	-0.02	0.06*	0.02	-0.02	
10. Materialism	-0.06*	0.01	0.04	0.01	0.02	0.04	-0.13***	-0.04	0.04

time versus money was moderately stable during the study [$r = 0.44$, $\kappa = 0.44$ (0.03), approximate $T = 14.33$, $P < 0.001$], with 14% of respondents shifting from a money orientation to a time orientation and 13% of respondents shifting from a time orientation to a money orientation. These results confirm past studies by showing that participants' responses to the ROM represent a relatively stable orientation that is somewhat sensitive to change depending on personal and situational circumstances (13).

Hypothesis 1: SWB Preregistered analyses

As per our preregistered analytic plan, we first examined whether students who prioritized time over money at T1 reported greater SWB at T2. As predicted, students who valued time over money at T1 reported significantly higher SWB at T2 ($M = 0.29$, $SD = 2.43$), compared to students who valued money over time ($M = -0.32$, $SD = 2.55$) [$t_{1231} = 4.19$; $P < 0.001$; $d = 0.24$; 95% confidence interval (CI), 0.32 to 0.89]. Reported in regression, students who valued time more than money reported significantly greater SWB at T2 ($\beta = 0.12$, $P < 0.001$). Following our preregistered analytic plan, we first examined whether these results held controlling for our key demographic variables of interest: gender (1 = female) and family SES. Controlling for these covariates, students who valued time more than money at T1 reported greater SWB at T2 ($\beta = 0.12$, $P < 0.001$). After adding materialism into the model, this result was unchanged: Students who valued time more than money at T1 reported significantly greater SWB at T2 ($\beta = 0.12$, $P < 0.001$). In this model, materialism did not predict SWB ($\beta = 0.02$, $P = 0.489$) (see Table 4A, A to D, for the full regression models with and without covariates).

Additional analyses

When we controlled for T1 SWB, the effect of valuing time over money at T1 on T2 SWB also remained significant ($\beta = 0.07$, $P = 0.009$) (see Table 4D). These results provide evidence that the effects of valuing time over money on T2 SWB could not be explained by T1 SWB. Stated differently, respondents' upward trajectories of well-being at T2 were partially explained by T1 orientations. We also explored whether these effects were moderated by family SES. We found no evidence that family SES moderated the relationship between valuing time over money at T1 and SWB at T2.

Hypothesis 2: Intrinsic activity motivation Preregistered analyses

Next, we examined whether students were more likely to pursue intrinsically motivated activities after graduation if they valued time over money. As predicted, students who valued time over money at T1 were more likely to pursue an intrinsically motivated primary activity at T2 ($M = 69.34$, $SD = 22.29$) compared to students who valued money over time ($M = 64.56$, $SD = 24.59$) ($t_{922.22} = 3.44$; $P = 0.001$; $d = 0.36$; 95% CI, 2.05 to 7.52). Reported in regression, students who valued time reported significantly higher intrinsic motivation ($\beta = 0.10$, $P < 0.001$). Controlling for gender, family SES, and materialism, this effect remained significant ($\beta = 0.10$, $P = 0.001$); in this model, materialism was not significantly associated with activity motivation ($\beta = 0.04$, $P = 0.183$) (see Table 5A, A to D).

Additional analyses

As shown in Table 5D, the effect of valuing time (T1) on intrinsic motivation at T2 remained significant after controlling for T1 SWB ($\beta = 0.07$, $P = 0.046$; $n = 850$). We also explored whether these effects were moderated by family SES. We found no evidence that family SES moderated the relationship between valuing time over money at T1 and intrinsic motivation at T2.

Hypothesis 3: Mediation of SWB by activity motivation Preregistered analyses

Our preregistered mediational analyses showed that the relationship between valuing time over money and well-being was partially explained by intrinsically motivated activity pursuit. Respondents who valued time over money at T1 reported significantly higher SWB at T2 [$B = 0.61$ (0.15); 95% CI, 0.32 to 0.89] and significantly higher intrinsically motivated activity pursuit at T2 [$B = 4.79$ (1.36); 95% CI, 2.12 to 7.45]. After controlling for intrinsically motivated activity pursuit, valuing time over money was less strongly predictive of SWB [$B = 0.15$ (0.07); 95% CI, 0.01 to 0.28]. Upon testing the significance of the indirect effect using bootstrap estimation with 10,000 samples, the indirect coefficient was significant [$B = 0.11$ (0.03); 95% CI, 0.05 to 0.17], indicating partial mediation. This indirect effect held controlling for gender, family SES, and materialism [$B = 0.11$ (0.03); 95% CI, 0.05 to 0.17]. To test the significance of the indirect effect, we used a bias-corrected bootstrap estimation method. Because it is based on resampling with

Table 4A. T1 ROM predicting T2 SWB with preregistered covariates (gender, parents' education, and materialism).

	β	<i>B</i>	SE	<i>P</i> for predictor	<i>F</i> for model	<i>P</i> for model	<i>R</i>
ROM (1 = time-oriented)	0.12	0.61	0.15	<0.001			
Gender (1 = female)	-0.05	-0.26	0.16	0.093			
Parents' education	-0.01	-0.01	0.04	0.783			
Materialism	0.02	0.004	0.006	0.489			
					$F_{4,1230} = 5.29$	<0.001	0.13

Table 4B. T1 ROM predicting T2 SWB with other demographic covariates (gender, parents' education, and age).

	β	<i>B</i>	SE	<i>P</i> for predictor	<i>F</i> for model	<i>P</i> for model	<i>R</i>
ROM (1 = time-oriented)	0.11	0.60	0.18	0.001			
Gender (1 = female)	-0.04	-0.25	0.21	0.230			
Age	0.03	0.02	0.03	0.381			
Parents' education	0.02	0.03	0.05	0.539			
					$F_{4,821} = 3.49$	0.008	0.13

Table 4C. T1 ROM predicting T2 SWB with other demographic covariates (gender, parents' education, and age) and materialism.

	β	<i>B</i>	SE	<i>P</i> for predictor	<i>F</i> for model	<i>P</i> for model	<i>R</i>
ROM (1 = time-oriented)	0.11	0.56	0.19	0.003			
Gender (1 = female)	-0.04	-0.25	0.21	0.232			
Age	0.03	0.02	0.03	0.454			
Parents' education	0.02	0.03	0.05	0.545			
Materialism	-0.03	-0.07	0.07	0.346			
					$F_{5,820} = 2.96$	0.012	0.13

Table 4D. T1 ROM predicting T2 SWB with demographic covariates (gender and parents' education), materialism, and T1 SWB.

	β	<i>B</i>	SE	<i>P</i> for predictor	<i>F</i> for model	<i>P</i> for model	<i>R</i>
ROM (1 = time-oriented)	0.07	0.39	0.15	0.009			
Gender (1 = female)	-0.02	-0.13	0.17	0.454			
Parents' education	0.004	0.006	0.04	0.882			
Materialism	-0.005	-0.001	0.005	0.854			
SWB T1	0.57	0.57	0.03	<0.001			
					$F_{5,850} = 86.93$	<0.001	0.58

replacement, this method leads to a more accurate estimation of the obtained CI by increasing statistical power [see (37) for a discussion].

Additional analyses

This indirect effect also held controlling for T1 SWB [$B = 0.09$ (0.02); 95% CI, 0.06 to 0.20].

Exploratory analyses

ROM predicting T2 activities

On an exploratory basis, we examined whether responses to the ROM at T1 predicted the activities that respondents chose to complete at T2. When using the ROM to predict students' T2 primary activity,

the overall omnibus χ^2 was significant ($\chi^2 = 28.46$, $P < 0.001$). Respondents who valued time over money at T1 were more likely to report attending graduate or professional school after graduation (13.8%) as compared to respondents who valued money over time (8.7%) ($P < 0.001$). Furthermore, respondents who valued time at T1 were significantly less likely to be employed full-time at T2 (18.7% versus 28.4%) ($P < 0.001$) as compared to respondents who valued money. These data provide evidence that people's responses to the ROM at T1 were a significant predictor of what primary activities respondents chose to complete after graduation in addition to why they chose to engage in these activities.

Table 5A. T1 ROM predicting T2 activity motivation with preregistered covariates (gender, parents' education, and materialism).

	β	<i>B</i>	SE	<i>P</i> for predictor	<i>F</i> for model	<i>P</i> for model	<i>R</i>
ROM (1 = time-oriented)	0.10	4.67	1.36	0.001			
Gender (1 = female)	-0.04	-1.84	1.47	0.210			
Parents' education	0.06	0.69	0.35	0.049			
Materialism	0.04	0.07	0.05	0.183			
					$F_{4,1230} = 5.00$	0.001	0.13

Table 5B. T1 ROM predicting T2 activity motivation with demographic covariates (gender, parents' education, and age).

	β	<i>B</i>	SE	<i>P</i> for predictor	<i>F</i> for model	<i>P</i> for model	<i>R</i>
ROM (1 = time-oriented)	0.09	4.37	1.62	0.007			
Gender (1 = female)	-0.03	-1.47	1.85	0.428			
Age	0.009	0.06	0.22	0.799			
Parents' education	0.04	0.42	0.41	0.309			
					$F_{4,821} = 2.36$	0.052	0.11

Table 5C. T1 ROM predicting T2 activity motivation with covariates (gender, parents' education, and age) and materialism.

	β	<i>B</i>	SE	<i>P</i> for predictor	<i>F</i> for model	<i>P</i> for model	<i>R</i>
ROM (1 = time-oriented)	0.08	3.92	1.68	0.020			
Gender (1 = female)	-0.03	-1.50	1.85	0.417			
Age	0.003	0.020	0.219	0.929			
Parents' education	0.04	0.41	0.41	0.322			
Materialism	-0.04	-0.64	0.64	0.315			
					$F_{5,820} = 2.05$	0.070	0.11

Table 5D. T1 ROM predicting T2 activity motivation with covariates (gender, parents' education, and age), materialism, and T1 SWB.

	β	<i>B</i>	SE	<i>P</i> for predictor	<i>F</i> for model	<i>P</i> for model	<i>R</i>
ROM (1 = time-oriented)	0.07	2.69	1.63	0.046			
Gender (1 = female)	-0.02	-1.19	1.79	0.507			
Parents' education	0.03	0.29	0.40	0.468			
Materialism	-0.04	-0.67	0.62	0.275			
SWB T1	0.26	2.22	0.30	<0.001			
					$F_{6,818} = 11.09$	<0.001	0.28

Across analyses, we found little evidence that demographic variables predicted SWB. These findings are consistent with meta-analytic research documenting small, sometimes nonsignificant associations between demographic characteristics and SWB (36). Across analyses, we also found little evidence that materialism predicted SWB. These findings are consistent with recent research documenting small, sometimes nonsignificant associations between materialism and well-being (10, 12, 13).

Alternative SEM approach

Although we preregistered the use of multiple regression, some scholars argue that structural equation models (SEMs) are preferable when making claims about whether a critical variable can predict an outcome above and beyond other conceptually related variables (21). SEMs are often preferable when attempting to establish incremental

validity because they more conservatively control type 1 error (21). Because valuing time over money is theoretically distinct from materialism but shares some conceptual overlap, we used SEM and repeated our primary analyses examining the association between valuing time over money at T1 on SWB and activity motivation at T2 and controlling for materialism. Using SEM, we obtained results

that were consistent with the multiple regression results reported above, providing further evidence for the robustness of our primary findings (see the Supplementary Materials for SEM results).

DISCUSSION

In a well-powered preregistered longitudinal study, students' chronic orientations to prioritize time over money at the end of university predicted their life choices and feelings 1 year following graduation. Students who valued time over money were more likely to pursue intrinsically motivated activities, which, in turn, predicted greater well-being. The salutary effects of valuing time over money before graduation predicted happiness a year later, even after controlling for baseline happiness, although these analyses relied on a subset of participants ($n = 829$), were not preregistered, and should be interpreted with some caution. Although recent research has documented a robust cross-sectional relationship between valuing time over money and happiness, the present work provides the first window into how this relationship unfolds during a critical life transition, namely, students' career decisions following graduation.

By tracking students at a critical juncture and examining how their time and money orientations predict major life decisions and well-being, this research adds important nuance to emerging research. In contrast to past research, which has focused on hypothetical choices (10–13) or daily time-use decisions (12), the current research shows that chronic orientations to prioritize time over money predict major life decisions. These data also provide the first evidence that people who are chronically oriented to value time over money are more likely to choose careers for intrinsically (versus extrinsically) motivated reasons, with implications for SWB.

Given the nonexperimental nature of these data, we cannot prove that valuing time over money at T1 causes people to be happier and more intrinsically motivated at T2. Our longitudinal data, however, do help to constrain theorizing about the relationship between time-money orientations and happiness. In particular, our data cast doubt on the possibility that this relationship exists merely because happier individuals value their time more (i.e., they have better things to do with their time) compared to less happy individuals. This explanation cannot easily account for our finding that graduating students' time-money orientations predict their happiness a year later, even after controlling for their T1 happiness. That said, the present research does not rule out the existence of other mediational pathways that we did not examine. Graduating students who value time over money might use their newfound time after finishing school to pursue a new hobby or invest in social relationships, providing other pathways through which time-money orientations might shape happiness over this period.

Although we intentionally studied participants over the course of a major life transition, most of them reported a consistent orientation to value either time or money across this period, dovetailing previous research that has treated the ROM as a measure that captures a stable individual difference (13). Of course, because this study included only two waves, it was not designed to examine how changes in time-money orientations predict changes in well-being.

Future research should delineate the specific developmental periods where people are most likely to shift their orientations and where it is most adaptive to prioritize time versus money. Because psychological flexibility substantively contributes to well-being (22), future studies should also explore whether flexibly changing

one's time-versus-money orientations to match the situation shapes well-being.

To be clear, our data do not show that actively shifting one's mindset from prioritizing money to time will produce reliable changes in happiness for individuals across time. Instead, the present research simply suggests that the pathways graduating students pursue—and the happiness they subsequently report—can be partially predicted by their orientation to value time versus money at the end of college.

The associations between the ROM and career choices were small, suggesting that people's general orientations do not entirely explain people's decisions. These findings are consistent with research showing that the extent to which people's intentions and orientations predict their behavior depends on situational circumstances (23). The overall association between the ROM and SWB was also small in this study (24). However, the magnitude of this effect is consistent with a great deal of existing research, which typically reveals rather diminutive relationships between individual psychological variables and the broad and multiply determined construct of SWB (25). It is notable that in our sample of graduating students, the association between the brief measure of time-money trade-offs and SWB was nearly double the size of previously established factors, including parental income and materialism. Going beyond these well-studied predictors of happiness, our work suggests that how people navigate trade-offs between time and money may hold important implications for the trajectory of their lives in early adulthood.

MATERIALS AND METHODS

Preregistered hypotheses

Following the reporting standards proposed by Simmons *et al.* (26), we reported all exclusions and every measure given. On the basis of the effect sizes documented in past research (10–13), we set a minimum sample size of 200 graduating students, with the goal of recruiting as many graduating senior students as possible to examine our key hypotheses of interest.

We preregistered our hypotheses through the Open Science Framework (OSF; https://osf.io/xpt2j/?view_only=218faee2ee-c541afb769ac4f00a494ba). Our data and syntax are publicly available through the OSF: https://osf.io/c28xa/?view_only=8dccc7a8397c4d80b432d24556f71a30. We preregistered three main hypotheses through the OSF as follows:

H1: Students who value time over money before graduation (at T1) will report greater SWB 1 year after graduation (at T2).

H2: Students who value time over money before graduation (at T1) will be more likely to pursue intrinsically motivated activities 1 year after graduation (at T2).

H3: Any effect of valuing time over money before graduation (at T1) on the happiness that students report 1 year after graduation (at T2) will be at least partially mediated by intrinsically motivated activity pursuit.

We also preregistered additional analyses to ensure that our results held controlling for gender, age, family SES, and materialism.

As described above, it was our goal to collect as many graduating student participants as possible. Thus, we used multiple methodologies to recruit participants. Sometimes, these methodologies restricted the number of measures that we could include (i.e., short surveys implemented by our university). Given this data collection strategy, we only preregistered analyses for measures that we were able to collect across all data collection opportunities.

Participants and procedure

Data collection overview

This research was approved by the ethics board at the University of British Columbia (H17-02217). To test our hypotheses, we recruited graduating college students from the University of British Columbia in Vancouver, Canada (see Table 1 for the demographic characteristics of the sample). Between August 2014 and June 2016 (T1), more than 1000 senior undergraduate students completed a validated measure of time and money trade-offs—the ROM—described in detail above ($n = 1232$).

Students either completed this measure as part of a larger annual survey of graduating students that was run by the university (21%), or they completed this measure while participating in other ongoing research in our department (79%). In September 2017 (T2), we invited all consenting students to complete a brief follow-up survey in exchange for the chance to win prizes.

Only 172 respondents who completed the ROM measure at T1 did not complete the full measures at T2 (leaving 1060 of 1232 respondents), suggesting that we had relatively low attrition across our measurement points. Students who completed the ROM at T1 but did not complete T2 measures did not significantly differ on any variable that we examined in the study (i.e., demographics, well-being, and materialism; see the Supplementary Materials).

As described above, because we recruited participants using various strategies, there was variability in how much time had elapsed between the T1 and T2 surveys. On average, students completed the two surveys 439.33 days apart ($SD = 83.03$), and 98.5% of the sample completed the survey between 12 and 24 months after graduation. The amount of time between the T1 and T2 surveys was not significantly associated with our key measures of interest ($P \geq 0.130$); therefore, this variable is not discussed further (see Tables 2 and 3 for relevant correlation tables).

T2 survey overview

As part of the T2 survey, respondents completed several well-being measures and reported on “their current primary activity.” Students reported whether they were employed part-time or full-time, attending graduate school, completing an internship, or spending most of their time completing another activity (see below for more details). Students then reported their primary motivation for completing this activity, their gender, the highest educational attainment of their parents, and a short three-item materialism scale (27), and they once again completed the ROM [(13); in this order].

Measures

ROM (T1 and T2)

At T1 and T2, we examined whether students prioritized time or money by implementing the ROM. This measure requires respondents to read a short paragraph describing two individuals and then presents respondents with a binary choice where they are asked to choose which individual is most like themselves (13). The choices are presented as follows:

Tina values her **time** more than her money. She is willing to sacrifice her money to have more time. For example, Tina would rather work fewer hours and make less money, than work more hours and make more money.

Maggie values her **money** more than her time. She is willing to sacrifice her time to have more money. For example, Maggie would rather work more hours and make more money, than work fewer hours and have more time.

The identifiers of the characters and the pronouns that are used in these vignettes are matched to the participants’ gender (Tina/Tom and Maggie/Michael); for people who did not report gender, the names and pronouns used in the vignettes are displayed as gender neutral (Morgan/Taylor). We chose a binary response format based on the precedent set by previous research (13), as well as for pragmatic and theoretical reasons. Conceptually, we chose this response format because we were interested in assessing people’s broad preferences related to prioritizing time over money, as opposed to assessing people’s domain-specific preferences. Practically, there is an increased awareness about the importance of conducting research with large representative samples (28). Thus, it is necessary to design short measures that minimize participant burden while maximizing reliability (29), and implementing a simple measure allowed us to efficiently collect a large number of college students as they were undergoing a major life event.

SWB (T1 and T2)

To capture SWB, respondents reported on their overall life satisfaction by answering the question, “Taking all things together, how happy would you say you are?” on a scale from 0 = not at all to 10 = extremely (30). Next, participants completed the Cantril Ladder (31), reporting where they currently stand in life on a ladder spanning from the worst possible to the best possible life imaginable (from 0 = bottom rung to 10 = top rung). We selected these questions because they are brief measures that are used extensively in large-scale survey research to capture the cognitive component of SWB. To capture the affective component of SWB, we asked participants to rate their positive and negative affect in the past 4 weeks using the Schedule for Positive and Negative Affect [SPANE; (38); positive affect, $\alpha = 0.84$; negative affect, $\alpha = 0.86$].

We preregistered that we would combine the cognitive component (satisfaction with life) and affective components (positive affect and reverse-scored negative affect) into a single SWB composite if we observed a correlation above 0.50 between these measures. The correlations were more than 0.50 ($r > 0.56$); thus, we standardized and combined these measures to create an SWB composite. For most of the participants recruited through ongoing laboratory studies, we were able to collect the same measures of SWB at T1. As described above, we only preregistered analyses for which we expected to collect data from all our data collection opportunities. We therefore reported our results that include T1 SWB in the main text while noting that the full results that include T1 as a covariate were not preregistered.

Activity (T2)

After reporting well-being, participants selected their one current primary activity from a list we provided. We created this list based on research from our university, showing that graduates most commonly engage in full- or part-time employment, graduate or professional school, service or volunteer activities, internship, travel, or gap years (32). We also allowed participants to report engaging in “other” activities.

Activity motivation (T2)

Participants were then asked to report on their primary motivation for engaging in their primary activity. To assess activity motivation, students completed two items adapted from Sheldon *et al.* (33). Students responded to the question of “why are you engaged in these behaviors” on two sliding scales ranging from 0 = “Because someone told me to” to 100 = “Because I really identify with the activity” and 0 = “Because you would feel guilty if you didn’t” to 100 = “Because of the enjoyment this activity gives you.” Consistent with our preregistered analytic plan, we combined participants’ responses

to these two items to form a composite measure indicating intrinsic activity motivation ($\alpha = 0.84$).

Control variables (T2)

Consistent with our preregistered analysis plan and with other recent research on this topic (6), we repeated our main analyses controlling for gender (1 = female), family SES, and materialism. We asked students to report their parents' education based on research showing that parental education is a more reliable predictor of family SES compared to students' reports of their parents' occupation or income (34). We assessed materialism by asking participants to complete the three highest loading items from the Material Values Survey [$\alpha = 0.76$; (35)]. While previous research has shown that the ROM is distinct from materialism (13), we included a short measure of materialism to ensure that this was the case. Because this measure was of subsidiary interest, we originally planned to ask only a subset of our sample to complete it, but given the brevity of our final questionnaire, we were able to ask all participants to complete the materialism items. In our pre-registration, we also indicated that we would include age as a covariate in our analyses. However, because of a programming error, we failed to collect age data from the first 410 respondents who completed the T2 survey. Because the age range in this sample was highly restricted (more than 90% of the sample was between the ages of 21 and 25 at T2), the models we report in text exclude age as a covariate to maximize power. Analyses that include age as a covariate yield statistically equivalent results (see Tables 4C and 5C).

SUPPLEMENTARY MATERIALS

Supplementary material for this article is available at <http://advances.sciencemag.org/cgi/content/full/5/9/eaax2615/DC1>

Section S1. Structural equation modeling

Section S2. Attrition

Fig. S1. Final model depicting the relationship between valuing time over money, materialism, and SWB.

Table S1. *T* test results between people who completed the ROM measure at T1 and at T2 and those who completed the ROM measure only at T2.

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