A Longitudinal Study of Differences between Predicted, Actual, and Remembered Personal Change

Sarah Molouki (smolouki@uchicago.edu)
Daniel M. Bartels (bartels@uchicago.edu)
Oleg Urminsky (oleg.urminsky@chicagobooth.edu)
University of Chicago
5807 S. Woodlawn Ave., Chicago, IL 60637

Abstract

We investigated people's assessments of their own personal change over time, comparing predicted, actual, and recalled change in personality, values, and performance. On average, participants underestimated the absolute magnitude of their personal change in both prediction and recall. However, people specifically neglected negative future change, resulting in overly optimistic predictions of improvement. In contrast, recall of positive and negative change was relatively more balanced, such that assessments of past improvement were better calibrated on average. Our findings provide insight into how people think about their own identity over time and address disparate theories in the literature regarding predictions of personal stability versus improvement.

Keywords: self-perception; social cognition; future self; past self; identity; time; personal change

Introduction

Imagine yourself ten years in the future. Will you be nearly the same person you are today, just with grayer hair? Or will you be a significantly changed person with different abilities, values, and personality characteristics? If you will have changed, will you have improved, becoming wiser and kinder, or will you have taken a turn for the worse, ending up lazy and irresponsible?

A large literature on beliefs about personal change suggests that people tend to perceive a trajectory of improvement in their own lives. People claim to possess more desirable characteristics in the present than they did in the past (Wilson & Ross, 2001), and think they will continue to get even better in the future (Haslam, Bastian, Fox, & Whelan, 2007; Kanten & Teigen, 2008). They even expect basic personality traits to improve over most of their lifespan (Krueger & Heckhausen, 1993), despite some evidence indicating that these traits are mostly unchanging (e.g., Costa & McCrae, 1989).

Expectations of improvement over time have been associated with people's normative theories about personal identity. For example, Newman, Bloom, & Knobe (2014) find that when evaluating change in others, people associate improvements, but not declines, with a person's core identity, or "true self." In this view, positive change is a natural part of human development. Other work highlights the finding that people consistently predict greater personal improvement for themselves than for others (e.g., Haslam et al., 2007, Kanten & Teigen, 2008), suggesting possible self-enhancement motives.

However, separate lines of research suggest that people view their own identity as stable over time. Loewenstein, O'Donoghue, & Rabin (2003) describe a systematic tendency to overestimate the degree to which one's own preferences will persist into the future. More recently, Quoidbach, Gilbert, & Wilson (2013) described an "End of History" illusion. In this framework, people reported more change in the past than they anticipated for the future in various domains, possibly due to the difficulty of envisioning new changes in prospect.

It is unclear how to reconcile findings related to belief in self-improvement with research suggesting people underestimate personal change more generally. Do people in fact think that they have stopped changing, or do they believe the biggest improvements are yet to come? Because many studies highlighting people's difficulty in projecting future change have used changes with no obvious direction (e.g., preference change), these have not been directly connected to ideas about improvement or decline. Are these two effects (expectations of improvement and perceptions of stability) in fact conflicting, or do they co-exist? Furthermore, many studies of personal change over time examine either perceptions or actual change, but not both. Are people's predictions and recall of change well-calibrated with their actual change, or do they diverge?

We address these questions by examining both absolute and directional personal change using a repeated measures longitudinal design. Although Quoidbach et al. (2013) found that one sample of people tended to predict less future personal change than the other sample remembered experiencing in the past, the study did not assess actual change in individuals over time. In the current studies, we measure and directly compare predicted, actual, and recalled change within each of our samples of young adults. We use actual change as a baseline to determine whether any observed differences between predicted and remembered change are due to biases in estimating future change, distorted memories of past change, or both. Furthermore, we use measures of personality, values, and ability that allow us to examine change both in magnitude and direction.

Our findings reconcile potentially conflicting viewpoints in the literature by suggesting that although people do underestimate the magnitude of their own change, this finding is moderated by the valence of

change (i.e., whether the change is positive or negative). Averaging across our measures, we find that people are fairly well-calibrated in recall, but specifically underappreciate the potential for future decline. Because people's predictions tend to omit undesirable changes while acknowledging positive change, they simultaneously underestimate absolute change and overestimate (future) improvement on average.

Methods

We compared predicted, actual, and recalled personal change over time in two panel surveys of young adults, who completed all measures online. Study 1 assessed 155 participants (60% female, mean age=22.1) in December 2013 (Time 1) and December 2014 (Time 2), and Study 2 assessed 203 participants (73% female, mean age=22.6) in May 2016 (Time 1) and September 2016 (Time 2). Study 2 was a conceptual replication that addressed several additional questions raised by the results of Study 1. (Key differences between the two studies are indicated in the "Measures" section). For Study 1, college students (in any year of college) were recruited from across the United States using an online panel. In Study 2, participants were graduating college seniors recruited by the experimenters. Although the time period measured in Study 2 (4 months) was shorter than that in Study 1 (1 year), all participants in Study 2 would be undergoing a major life change (i.e., college graduation) during the study period, making it plausible that significant changes in personality and values could occur between the two assessments.

In both studies, we measured change in personality traits and values, and in Study 2 we also measured change in performance on an objective (knowledge) task. Personality and values are viewed as important psychological determinants of personal identity (Bartels & Rips, 2010; Chen, Urminsky, & Bartels, 2016) and have been used in previous research on perceptions of personal change (Quoidbach et al., 2013). We chose these constructs rather than other personal attributes (such as preferences) because change in personality, values, and performance can be measured both directionally (increase vs. decrease) as well as in terms of absolute difference. The performance measure is included to verify that our findings are replicable in a domain where actual change is measured objectively rather than by taking a difference in self-report measures.

Participants provided *current* measures of personality and values (and performance, in Study 2) at both Time 1 and Time 2. At Time 1, they also *predicted* what their responses would be at Time 2. At Time 2, they provided their *recollection* of their responses at Time 1. Reports of current values were always made before reports of predicted or recalled values.

Measures

Personality In Study 1, participants completed a 5-item personality assessment that involved reading a short description of each Big Five dimension (i.e., extraversion, agreeableness, conscientiousness, emotional stability, and openness) and judging how much they thought this trait applied to them. Ratings of current, predicted and remembered personality were reported using a 0-100 slider scale for each trait. In Study 2, participants again completed this 5-item personality measure, and also completed a previously validated 10-item measure with a 7-point response scale (TIPI; Gosling, Rentfrow, & Swann, 2003; also used in Quoidbach et al., 2013).[1]

Values Values were assessed using a 10-item version of the Schwartz Value Inventory (Lindeman & Verkasalo, 2005; also used in Quoidbach et al., 2013), measuring the personal importance of self-direction, stimulation, hedonism, achievement, power, security, conformity, tradition, benevolence, and universalism. Current, predicted, and remembered value importance ratings were measured on a 9-point scale.

Performance In Study 2, participants also answered ten factual multiple-choice questions at each time point (e.g., "How many of the world's tallest buildings are located in the United States?"). Both sets of 10 questions were pre-tested to ensure that they were of similar difficulty and that there were no floor or ceiling effects. At Time 1, participants reported perceptions of their current and future performance, and at Time 2 they reported their perceived current and past performance.

Pre-Test to Determine Valence of Change

We used a separate online sample (N=100; 41% female, mean age=34.3) to assess how people generally view increases and decreases in the characteristics of interest. For each personality dimension and value, participants used a 0-100 scale to separately report how they would feel (*0=extremely displeased, 50=neither pleased nor displeased, 100=extremely pleased*) if the given characteristic were to increase and decrease. For each of the five personality dimensions as well as 9 out of 10 values, the average response was significantly greater than 50 for increases (suggesting people consider increases to be desirable) and significantly less than 50 for decreases (suggesting people consider decreases to be undesirable).[2] Accordingly, for our basic directional analyses, we treat personality and value increases as improvements, and decreases as declines.

In Study 2 (after all other measures were completed), we also asked individual participants to report whether they viewed each personality or value change as an improvement or decline, in order to better account for individual variation in these beliefs. Coding each individual's changes as improvements and declines based on their own assessments

[1]Two week test-retest reliabilities (from separate sample, N = 215): r = 0.795 (5-item measure) and r = 0.923 (10-item measure).

[2]Conformity, for which ratings of both increases and decreases did not significantly differ from the scale midpoint of 50, was excluded, though overall results do not change if it is included.

rather than the mean assessment from the pretest did not change the overall pattern of our results. However, future research can further explore the effect of individual differences in perceptions of valence of these characteristics, as well as perceived differences in the magnitude of their importance.

Change Calculation

We quantify change in two different ways, looking at both absolute change and directional change. ***Absolute change*** (i.e., the absolute difference between an item at Time 2 and Time 1) represents deviation from the present state, ignoring direction. Averaging absolute change across items captures the distinction between variability (high values indicating large changes in any direction) and stability (low values indicating little change). This approach was taken in some prior work, including Quoidbach et al. (2013).

However, looking only at absolute change neglects the fact (confirmed in our valence pre-test) that increases and decreases generally differ in desirability. For example, an increase in creativity might be considered an improvement, but a decrease of equivalent magnitude might be a decline. Measuring only absolute change obscures this distinction.

We therefore also computed measures of ***directional change*** (i.e., directional difference in Time 2 minus Time 1 ratings). Averaging across individual items thereby captures the distinction between overall improvement (high positive values indicating net positive change), overall stasis (near-zero values indicating no net change), and overall decline (high negative values indicating net negative change).

In our analyses of personal change, we compare the following: (i) predicted change (difference between future prediction provided at Time 1 and current rating provided at Time 1), (ii) actual change (difference between current rating provided at Time 2 and current rating provided at Time 1), and (iii) remembered change (difference between current rating provided at Time 2 and past recollection provided at Time 2). Using both absolute and directional measures allows us to examine a) whether participants perceive a smaller absolute magnitude of personal change than they actually undergo over time and b) whether participants overestimate their net improvement over time, for both prediction and recall.

Results

Across our two studies, we have 6 distinct measures for which we examine change over time. For each of these measures, we conducted both an absolute and a directional comparison of the three types of change (predicted, actual, and recalled). Overall, we found that people predicted future improvement, but systematically neglected the possibility of future decline. This resulted in *both* an overall underestimation of mean absolute future change *and* an overestimation of mean future improvement. In contrast, people were more balanced in recall, remembering both positive and negative past change. Thus, although people underestimated the magnitude of past change, they did not express a directional bias in recall.

Although the overall pattern of our results supports this finding, results across measures and studies were highly variable. We report weighted mean effect sizes (Cohen's *d*) across all studies in the text of the paper to summarize our overall findings, and present figures depicting the findings of each individual measure to capture the variability across them.

Absolute Change Across our six domains of measurement, we found significant differences in absolute magnitude between predicted, actual, and recalled change. Overall, participants predicted that they would undergo less personal change in the future than they recalled undergoing in the past (mean d=-0.18, p<.001), which replicates previous findings (Quoidbach et al., 2013). However, this effect was small in comparison to their larger tendency to underestimate the magnitude of *both* past (mean d=-0.51, p<.001) and future (mean d=-0.72, p<.001) change relative to actual change. This general pattern was found in all absolute measures except for the 10-item personality measure used in Study 2 (see left hand side of Figures 1-4).

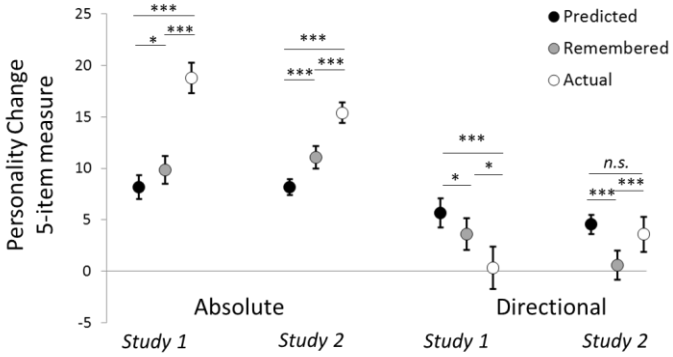

Figure 1. Absolute and directional change for 5-item personality measure. Error bars represent 95% CI.
n.s. nonsignificant, * p < .05, ** p < .01, *** p< .001

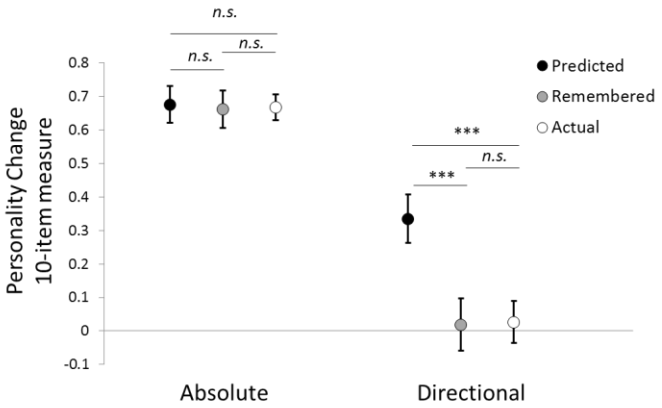

Figure 2. Absolute and directional change for 10-item personality measure (Study 2). Error bars represent 95% CI.
n.s. nonsignificant, * p < .05, ** p < .01, *** p< .001

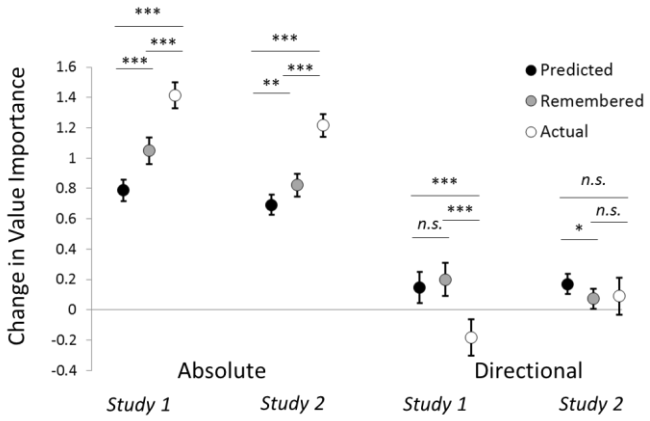

Figure 3. Absolute and directional change for measure of value importance. Error bars represent 95% CI.
n.s. nonsignificant, * $p < .05$, ** $p < .01$, *** $p < .001$

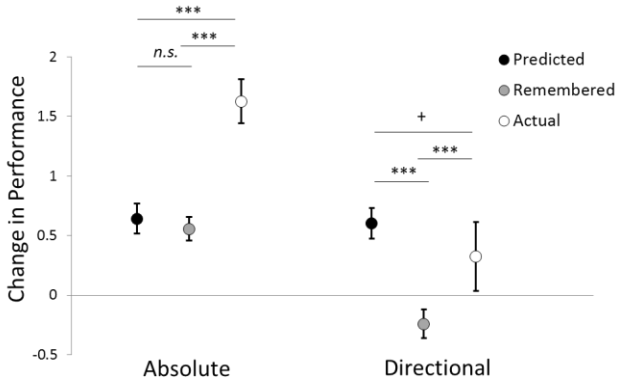

Figure 4. Absolute and directional change in performance, measured as number of questions answered correctly. (Study 2). Error bars represent 95% CI.
n.s. nonsignificant, + $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Net Directional Change We conducted a directional analysis that accounts for valence, treating net increases in all measures as improvements and net decreases as declines (based on the results of our pre-test). On average across our measures people predicted more positive future change than they subsequently remembered (mean d=0.30, p<.001). Our analysis also revealed a tendency to predict more positive net future improvement than actually occurred (mean d=0.22, p<.001). In contrast, people's recall of past improvement was more variable. Although in Study 1, participants recalled greater improvement in personality and values than they had experienced, recalled improvement was either equal to or less than actual improvement for all measures in Study 2 (right hand side of Figures 1-4). Across all measures in Studies 1 and 2, average recall of past directional change was not significantly different from actual change (mean d=-0.03, p=.377).

Individual-level "Improvers" and "Decliners" How do we explain the fact that on average, participants simultaneously predicted *less* absolute change and *greater* improvement than they actually experienced? To better understand the observed mean-level effects, we separated individuals based on whether they exhibited an overall increase versus decrease in their predicted, remembered, and actual change. For most of our measures across both studies 1 and 2, *actual* directional change across the sample was near zero. However, this was not because people had remained stable (as evidenced by the large absolute change findings); rather, the sample was evenly split into those who had experienced net improvement and those who had experienced net decline of equal magnitude.[3] In contrast, *predicted* change was significantly positive for each measure because fewer individuals predicted that they would decline over the study period, and those that did so reported declines of significantly smaller magnitude than the average decline experienced. Figure 5 illustrates this pattern using the personality and value measures from Study 1.

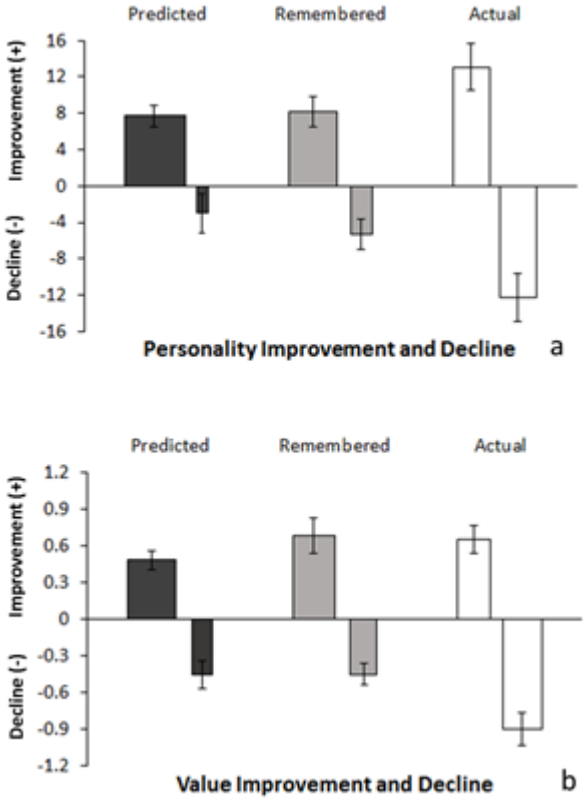

Figure 5. Decomposing directional change in Study 1 into decline and improvement for a) 5-item personality measure, b) values measure. Column width indicates proportion of participants indicating net improvement or decline and height denotes magnitude of improvement or decline. Error bars represent 95% CI.

[3]Only the 5-item personality measure in Study 2, where participants on average experienced greater positive net change over the study period, substantially deviated from this pattern.

We then performed separate analyses on those who had actually improved versus those who declined. This revealed that the underestimation of absolute magnitude of change at the sample level in fact comes disproportionately from those participants who are underpredicted their actual decline (rather than from those who underpredicted their actual improvement). Although similar patterns are observed for each of our measures, we describe the 5-item personality measure from Study 1 in detail to illustrate the form of this effect. Participants who experienced an actual net *decline* in the measured traits over the year (M=-12.25, SD=11.65) had instead predicted a mean personality *improvement* of +3.62 (SD=6.67). The difference between these two numbers reflects a significant *directional* overprediction of improvement by 15.87 scale points, $t(77)=10.87$, 95% CI=[12.96,18.78], $d=1.23$, $p<.001$. Nevertheless, the *absolute magnitude* of their predicted change was still smaller than the absolute magnitude of their actual change (i.e., 3.62 vs. 12.25; $t(77)=5.47$, 95% CI=[5.48, 11.77], $d=0.62$, $p<.001$). This yields an underprediction of change when future change is defined only in terms of absolute deviation from zero. In contrast, those who experienced an actual net personality *improvement* (M=+13.07, SD=11.44) had predicted an improvement of +7.73 (SD=7.76). This reflects an underestimation of *both* their directional improvement *and* their absolute change by 5.34 scale points, $t(76)=4.05$, 95% CI=[2.72, 7.97], $d=0.55$, $p<.001$.

Comparing the size of these prediction errors reveals that actual decliners made significantly larger errors on average than actual improvers (i.e., 15.87 vs. 5.34); $t(152)=5.35$, 95% CI=[6.64, 14.42], $d=0.86$, $p<.001$. As a result, we observe an overall improvement bias in the sample, given that the errors made by decliners were biased in the direction of positive change. Figure 6 provides a graphical depiction of this phenomenon.

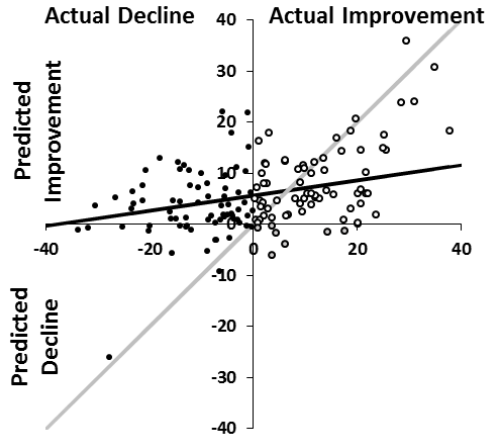

Figure 6: Comparison of actual (x-axis) versus predicted (y-axis) personality change (Study 1). Each point on this graph represents an individual participant from Study 1, with black dots representing those who actually declined over the period and white circles representing those who improved. The light gray line represents the line y=x (actual improvement or decline=predicted improvement or decline), which is where each point would fall if predictions were completely accurate. The black line is the regression line relating predicted and actual improvement as fitted from the data. The discrepancy between the black and gray lines to the left of the y-axis illustrates the overprediction of improvement in those who actually declined, and the discrepancy on the right side of the graph illustrates the (smaller) underprediction of improvement in those who actually improved.

The finding that those who actually declined underpredicted their decline to a greater extent than improvers underpredicted their improvement was observed across all measures: personality ($t(152)=5.35$, 95% CI=[6.64, 14.42], $d=0.86$, $p<.001$) and values ($t(142)=4.53$, 95% CI=[0.31, 0.80], $d=0.73$, $p<.001$) in Study 1, and both 5-item ($t(111)=4.02$, 95% CI=[3.02, 8.88], $d=.65$; $p<.001$) and 10-item ($t(169)=7.82$, 95% CI=[0.51, 0.86], $d=1.17$; $p<.001$) personality measures, values ($t(182)=2.95$, 95% CI=[.09, .47], $d=.43$; $p=.004$), and performance ($t(152)=2.56$, 95% CI=[.14, 1.09], $d=.40$, $p=.011$) in Study 2. However, there was no consistent finding in errors related to recall across studies. In Study 1, those who actually declined made larger errors than those who actually improved for measures of both personality and values. In contrast, across measures in Study 2, actual improvers made errors of equivalent or greater size as actual decliners did in recall.

Discussion

Overall, the results of our two longitudinal studies reveal that people predict smaller absolute change in personality, values, and performance than they actually experience. However, a directional analysis of the data reveals that this discrepancy is specifically driven by a ***neglect of negative change***. Although on average people experience both improvements and declines over time, they incorrectly predict that their future will consist mainly of improvements. Rather than being the end of their personal trajectory, the present moment represents a watershed of a different sort: the moment when people think a somewhat rocky past resolves into a consistent upward climb. Our findings suggest that looking only at the absolute magnitude of change may obscure important aspects of people's beliefs about their own personal change.

Although people do underestimate the magnitude of their future change, our directional measures reveal that this is *not* generally caused by expectations of stability in personal characteristics. Rather, at the sample level, those who worsened over our study period were disproportionately likely to have neglected the possibility of decline and instead predicted some smaller level of improvement. Thus, the apparent magnitude effect seems to be driven by a general tendency to overestimate improvement, which is consistent with prior research suggesting that people expect the continued development and emergence of positive

personal characteristics (Haslam et al., 2007; Newman et al., 2014). Previous work also suggests that although people are able to distinguish their future expectations from conceptions of their ideal self, predictions are nonetheless likely to be influenced by aspirations (Molouki & Bartels, 2017). This may be one mechanism underlying the observed overpredictions of improvement.

Although we found that people overpredicted future improvement, on the whole, we did not find this effect in recall of past change. This may be because past recall is more constrained by reality and episodic facts than future prospection (Kane, McGraw, & Van Boven, 2009), making people more likely to acknowledge that past decline has occurred even if this was counter to their expectations. However, other research suggests that people do revise their perceptions of the past towards a trajectory of improvement (e.g., Wilson & Ross, 2001). Although we did find that people overestimated past improvement in Study 1, this pattern did not emerge in Study 2. Further research is needed to explore the source of this heterogeneity (and the large heterogeneity across our measures more broadly), by examining effects of contextual factors such as length of time span, intervening life events, dimension of change, and timing of measurement. In particular, a more careful investigation of our personality measures is needed, as some discrepancies were noted between the 5-item and 10-item personality scales used.

In addition to providing a reconciliation of previous findings about perceptions of stability versus improvement, the current work makes an important contribution more broadly to a growing body of literature on people's theories of the nature and persistence of personal identity. Existing research in this area has suggested that people endorse normative theories about a fundamentally good essence that forms the core of one's identity and will be revealed over time (Molouki & Bartels, 2017; Newman et al., 2014; Newman, De Frietas, & Knobe, 2015; Strohminger, Knobe, & Newman, in press; Tobia, 2015). The current research explicitly demonstrates that predictions of personal improvement are more pronounced than actual improvement over time. This finding lends empirical support to the idea that predictions may be influenced by normative beliefs that diverge from a purely descriptive account of personal development. Furthermore, we noted new findings about different patterns of prediction error for those who in fact improved versus declined over the study period. Future research can further explore the interactions between specific developmental trajectories and beliefs about personal identity.

Acknowledgments

This research was supported by funding from the John Templeton Foundation and the James M. Kilts Center for Marketing at the University of Chicago Booth School of Business. We thank Halley Bayer, Stephanie Chen, Ed O'Brien, Jordi Quoidbach, Anne Wilson, and several anonymous reviewers for helpful comments/suggestions.

References

Bartels, D.M, & Rips, L.J. (2010). Psychological connectedness and intertemporal choice. *Journal of Experimental Psychology: General, 139*, 49-69.

Costa, P. T., & McCrae, R. R. (1989). Personality continuity and the changes of adult life. In M. Storant & G. R. Vanderbos (Eds.), *The Adult Years: Continuity and Change* (pp. 45-77). Washington, DC: APA.

Chen, S., Urminsky, O. & Bartels, D. M. (2016). Beliefs about the causal structure of the self-concept determine which changes disrupt personal identity. *Psychological Science*, *27*(10), 1398–1406.

Gosling, S. D., Rentfrow, P. J., & Swann, W. B. (2003). A very brief measure of the Big-Five personality domains. *Journal of Research in Personality, 37*(6), 504-528.

Haslam, N., Bastian, B., Fox, C., & Whelan, J. (2007). Beliefs about personality change and continuity. *Personality and Individual Differences, 42*(8), 1621-1631.

Kane, J., McGraw, A. P., & Van Boven, L. (2009). Temporally asymmetric constraints on mental simulation: Retrospection is more constrained than prospection. *The Handbook of Imagination and Mental Simulation,* (pp. 131-149). New York: Psychology Press.

Kanten, A. B., & Teigen, K. H. (2008). Better than average and better with time: Relative evaluations of self and others in the past, present, and future. *European Journal of Social Psychology*, *38*(2), 34 -353.

Krueger, J., & Heckhausen, J. (1993). Personality development across the adult life span. *Journal of Gerontology, 48*(3), 100-108.

Lindeman, M. & Verkasalo, M. (2005). Measuring values with the Short Schwartz's Value Survey. *Journal of Personality Assessment, 85*(2), 170-178.

Loewenstein, G., O'Donoghue, T., & Rabin, M. (2003). Projection bias in predicting future utility. *The Quarterly Journal of Economics, 118*(4), 1209-1248.

Molouki, S., & Bartels, D. M. (2017). Personal change and the continuity of the self. *Cognitive Psychology, 93*, 1-17.

Newman, G. E., Bloom, P., & Knobe, J. (2014). Value judgments and the true self. *Personality and Social Psychology Bulletin*, *40*(2), 203-216.

Newman, G. E., De Frietas, J., & Knobe, J. (2015). Beliefs about the true self explain asymmetries based on moral judgment. *Cognitive Science, 39*(1), 96-125.

Quoidbach, J., Gilbert, D. T., & Wilson, T. D. (2013). The end of history illusion. *Science, 339*(6115), 96-98.

Strohminger, N., Newman, G., & Knobe, J. (in press). The true self: A psychological concept distinct from the self. *Perspectives in Psychological Science.*

Tobia, K. P. (2015). Personal identity and the Phineas Gage effect. *Analysis, 75*(3), 396-405.

Wilson, A. E., & Ross, M. (2001). From chump to champ: people's appraisals of their earlier and present selves. *Journal of Personality and Social Psychology, 80*(4), 572-584.