Personality trait development and social investment in work

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ABSTRACT

A longitudinal study of employed individuals was used to test the relationship between social investment at work—the act of cognitively and emotionally committing to one's job—and longitudinal and cross-sectional personality trait development. Participants provided ratings of personality traits and social investment at work at two time-points, separated by approximately 3 years. Data were analyzed using latent change models. Cross-sectional results showed that extraversion, agreeableness, conscientiousness, and emotional stability were related to social investment at work. Additionally, a positive association was found between longitudinal change in social investment in work and change in personality traits—especially conscientiousness. Finally, the correlated changes in social investment and personality traits were invariant across age groups, suggesting that personality traits remain malleable across the lifespan.

1. Introduction

Personality traits develop according to normative patterns across the lifespan. For example, individuals tend to increase in conscientiousness, agreeableness, and emotional stability well into adulthood (Lucas & Donnellan, 2011; Roberts, Walton, & Viechtbauer, 2006; Srivastava, Oliver, Gosling, & Potter, 2003). In a recent study, these same patterns were found in an internet sample of over one million English speaking participants ranging in age from 10 to 65 from across the globe (Soto, Oliver, Gosling, & Potter, 2011). It appears that this pattern, described as maturity (Roberts & Wood, 2006) is widely evidenced across most industrialized countries.

Why do personality traits continue to grow and develop in adulthood? One initial perspective argued that the near universal nature of these patterns of personality development would mean that genetic factors and only genetic factors could explain personality trait change in adulthood (McCrae et al., 2000). Though personality change is heritable (Bleidorn, Kandler, Riemann, Angleitner, & Spinath, 2009; Hopwood et al., 2011), like most other psychological phenomena, it is only partially heritable, with over half the variance in personality trait change attributable to environmental factors. Moreover, multiple studies have shown that subpopulations of individuals change in the opposite direction of the norm. For example, individuals who continue to smoke marijuana into adulthood also fail to increase on conscientiousness (Littlefield, Sher, & Wood,

2010; Roberts & Bogg, 2004). Thus, the argument that personality trait change is driven entirely by genetics is untenable.

As an alternative to examining genetic factors that might explain personality trait change, some researchers have searched for and theorized about environmental factors that may be responsible for personality trait development. For example, the neo-socioanalytic model of personality trait development suggests that commitment to and investment in adult roles—like shared genetics—is nearly universal, and may be one reason for personality trait change in adulthood (Roberts & Wood, 2006; Roberts, Wood, & Smith, 2005). This transition from the freedom of adolescence to the responsibilities of adulthood has been described as the process of social investment (Lodi-Smith & Roberts, 2007). To date, most evidence for the effect of social investment has been inferred from past research that was not designed to explicitly test the idea (cf., Lehnart, Neyer, & Eccles, 2010). The primary purpose of this study is to test whether changes in work-related social investment predict changes in personality traits. Changes in social investment in romantic relationships have empirically demonstrated associations with personality change (Lehnart et al., 2010). However, very few studies have directly explored the effects of social investment on personality trait development in other areas of life. Given the extremely high proportion of time many individuals allot to their careers each day, the workplace is a logical next life domain within which to explore social investment processes.

1.1. Social investment and its association with personality change

Social investment reflects the commitment most people make to adult social roles as they transition from their provisional status

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as an adolescent and young adult into a full-fledged adult, both in their own eyes and the eyes of their society (Lodi-Smith & Roberts, 2007). The process of social investment is presumed to be universal, and therefore normative (Helson, Kwan, John, & Jones, 2002). That is, most individuals in most societies commit themselves to the adult roles found in the social structures of family, work, and community. Moreover, despite the heterogeneity in the roles found in these social institutions, most are assumed to contain similarities in terms of the mechanisms that would contribute to personality change. Specifically, social roles contain expectations that are widely held by most age groups in society (Wood & Roberts, 2006). Therefore, people anticipate changes in behavior that will be necessitated as they enter new roles, such as taking their first career-related job or becoming a parent for the first time (Roberts & Wood, 2006). Moreover, others will promote and reward these changes because they share the expectations with the role participant. Finally, new roles come with explicit experiences, rewards, and punishments that lead to changes in thoughts, feelings, and behaviors, which translate into personality change over time.

While many of the aforementioned mechanisms could potentially explain why social investment might lead to personality trait change, it is first necessary to demonstrate that social investment processes actually occur—that is, changes in social investment correlate with changes in personality traits. To the best of our knowledge, Lehnart and colleagues (2010) provided one of the first explicit tests of such social investment processes. They found that young adults who became increasingly socially invested in romantic relationships over time experienced simultaneous increases in emotional stability and self-esteem. Complementarily, they also found support for de-investment processes. A de-investment process occurs when individuals who fail to invest in socially normal ways also fail to experience normative personality changes (Roberts, Walton, Bogg, & Caspi, 2006). For example, Lehnart and colleagues found that individuals who remained single for extended periods of time—thereby failing to invest in romantic relationships—did not display normative increases in self-esteem or emotional stability over time.

1.2. Social investment in work

These very same social investment (and conversely, de-investment) processes that occur in romantic relationships are also expected to occur in other life domains. Specifically, Lodi-Smith and Roberts (2007) found, via meta-analysis, that personality traits were correlated with social investment in four key life domains: (i) close relationships, (ii) work, (iii) community involvement, and (iv) religion. To date, the social investment process has only been explicitly tested in the context of close relationships. The primary purpose of this study is to examine social investment in a second domain—the workplace—as a potential process by which personality traits change.

What does social investment at work look like? Social investment involves committing deeply to adult roles. As such, social investment in work involves assuming an identity as an employee and forming deeply committed, meaningful bonds with various aspects of one's workplace. As such, individuals who are socially invested in their careers should be more likely to follow workplace norms, be good citizens, and embrace their career-oriented identity. Many existing measures used in the literature tap into these constructs. For example, Kanungo's (1982) job involvement scale directly assesses the career-centrality of individuals' lives. Other measures, such as organizational citizenship behaviors (Smith, Organ, & Near, 1983) assess prosocial behavior at work, which represents a deep commitment to one's career role. Conversely, counterproductive behaviors at work (Bennett & Robinson, 2000) characterize individuals who are de-invested and not committed

to their careers. Strictly speaking in terms of existing measures, someone who is deeply social invested in work would be characterized by high job involvement and organizational citizenship behaviors, and low levels of counterproductive behaviors. Specifically, we expect that these scales are indicators of social investment at work. As such, their common variance should be a good indicator of individuals' levels of social investment at work.

We would expect that as individuals become increasingly invested in and committed to their careers that they should experience changes in their personality traits that accommodate the demands of their workplace. Of all of the Big Five personality traits, conscientiousness is empirically and theoretically most linked to a variety of outcomes in the workplace (Bowling, 2010; Judge, Higgins, Thoresen, & Barrick, 1999). As such we would expect that increasing social investment at work would lead to increases in conscientiousness over time. For example, when an individual deeply commits to a work role that requires conscientious behaviors, the self and others provide a structure of rewards and expectations that reinforce conscientious behaviors. This may lead to real, lasting increases in conscientiousness over time. Although the link between social investment and changes in the remaining Big Five traits is less clear, based on cross-sectional research we might expect similar findings for agreeableness and emotional stability (Lodi-Smith & Roberts, 2007).

Past cross-sectional and longitudinal research on work variables that are analogous to social investment provide evidence that work social investment could be linked to changes in agreeableness, emotional stability, and especially conscientiousness. For example, emotional stability and conscientiousness are strong predictors of career success (Judge, Heller, & Mount, 2002; Judge et al., 1999). Moreover, agreeableness, conscientiousness, and emotional stability have replicable relationships with many important work outcomes, including occupational attainment and job involvement (Judge et al., 1999; Lodi-Smith & Roberts, 2007; Roberts, Caspi, & Moffitt, 2003). Second, longitudinal studies have linked workplace experiences to actual changes in personality traits over time. For example, Roberts (1997) found that working women become more norm-adhering over time compared with their non-working peers. Other studies have shown that occupational attainment and work satisfaction are related to long-term changes in traits from the domains of conscientiousness and emotional stability (Roberts et al., 2003). Finally, Roberts and colleagues (2006a, 2006b) found that repeated patterns of antisocial or counterproductive behaviors at work predict subsequent decreases in conscientiousness and emotional stability over time. This effect is notable in its similarity to the de-investment processes observed by Lehnart et al. (2010).

1.3. Social investment across the lifespan

For theoretical and practical reasons the direct empirical tests of the social investment process have focused on young adulthood. The fact that most individuals make the transition to adult roles in young adulthood combined with the fact that it is during this time that we find the most normative changes in personality traits has made this an obvious age period on which to focus. Furthermore, most longitudinal studies track single cohorts over several years, which has prevented an examination of the relation between social investment experiences in other periods of the life course. As a consequence of the focus on young adulthood, very few studies have examined whether changes in social investment continue to occur throughout the lifespan, or whether they attenuate quickly after young adulthood.

The current study permits an examination of the relation between social investment at work and personality change across several age periods in adulthood. What should we expect to find in terms of differential patterns across age? Predictions differ

depending on the underlying model of life-span development. In one perspective, younger people are more susceptible to the influence of the social environment and thus more likely to change in response to it (Elder, 1979; Steward & Healy, 1989). For example, Elder (1979) showed that younger children were more likely to be adversely affected by the great depression than their older siblings. Similarly, it is thought that social attitudes, such as political ideology, are more likely to be shaped by the social environment in young adulthood (Cornelis, Van Heil, Roets, & Kossowska, 2009; Duncan & Agronick, 1995). Based on this model of life-span development, we would expect social investment in work to have its effect predominantly in young adulthood which would be reflected in the relation between social investment and change in personality traits being stronger in young adults than older cohorts. Alternatively, according to Baltes's (1987) perspective on life-span development, personality remains an open system throughout adulthood. If this is the case, then it is possible that social investment experiences at work may be equally important for personality change in middle age than in young adulthood. As several studies have found that work experiences continue to be associated with personality trait change in middle age (Branje, Van Lieshout, & Gerris, 2007; Roberts, 1997; van Aken, Denissen, Branje, Dubas, & Goossens, 2006), the prevailing empirical foundation is unclear. Given the lack of data and the mixed findings to date, we examine whether age moderates the relation between social investment patterns in work and personality trait change.

1.4. The present study

The present study utilizes a longitudinal design with an age-stratified sample in order to examine the relationships between work-related social investment and personality traits. The longitudinal design allows us to examine both cross-sectional relationships between the variables, as well as change in the variables over time. To examine social investment at work, we used a combination of several variables that indicate investment at work (job involvement, organizational citizenship behavior) and, conversely, de-investment at work (counterproductive behaviors at work). Job involvement and organizational citizenship behaviors reflect thoughts, feelings, and behaviors representative of individuals who are deeply committed to their career roles. Conversely, counterproductive behaviors are indicative of individuals who are detached, or uninvested in their careers. Based on prior research, we expect these experiences to be most strongly related to changes in conscientiousness, and possibly linked to changes in agreeableness, and emotional stability also. These personality dimensions represent the personal characteristics that are required and rewarded as individuals become more deeply invested in their careers (Lodi-Smith & Roberts, 2007). Given the lack of research linking social investment to either extraversion or openness we made no a priori hypotheses concerning these trait domains. The age-stratified sample provides the opportunity to test whether age moderates the relationship between changes in social investment and changes in personality traits.

2. Method

2.1. Participants

Participants were drawn from a larger study of 613 (43% male) randomly selected individuals from the State of Illinois who provided two waves of longitudinal data over the course of 3 years (The Health and Aging Study of Central Illinois: HASCI; for an overview of the HASCI project, see Jackson et al., 2009). Participants were sampled using multistage, age-stratified random selection

techniques. In the first sampling stage, nine Illinois counties were selected using probabilities proportionate to size (PPS). PPS weights the probability of a county being selected for inclusion in the study by its total adult population. This procedure provides a higher probability of sampling more populous counties, while allowing all counties some chance of being selected. In the second stage, five census tracts were selected from each sampled county using PPS. In stage three, four city blocks were sampled using PPS from each selected census tract. Finally, within each city block, five houses were randomly selected to be included in the study.

To ensure an age-stratified sample, three target age groups were identified: 20- to 39-year olds, 40- to 59-year olds, and persons over 60 years of age. To obtain an equal number of participants within each age strata, selection of households within blocks was adjusted to oversample the smallest represented strata in the area. Researchers visited each selected household up to ten times to contact the residents, after which the household was recorded as a noncontact.

Twice, separated by an average of 2.48 years (min = 1.75; max = 3.85; $SD = 0.27$), selected participants completed an online battery of personality measures and were given face-to-face interviews in their homes by the Survey Research Lab of the University of Illinois, Chicago. Participants were given a $15 gift card as reimbursement for their time. Total response rate, calculated as completed interviews divided by the sum of total interviews, refusals, noncontacts, and households within the block with unknown eligibility, was 18.5%. Total refusal rate was 21.5%.

We focused on a subsample of the HASCI Statewide sample that was younger than 65 and working at both time points.[1] Since we were interested in individual differences in longitudinal change in social investment at work, we only analyzed data from participants who were employed at least at time 1. At time 1, 391 (64%) participants were 65 years old or younger and had jobs. Of these participants, 182 (47%) also provided data at time 2. With respect to all variables that we examined, t-tests revealed that participants who provided data at both time points did not significantly differ from participants who dropped out of the study, all $ps > .05$.

Of the 182 participants who were working at the first assessment and then provided data at the second assessment, 36 had retired or were temporarily out of work at time 2, and therefore did not complete measures of social investment at work. A total of 146 (47% male) participants were employed at both time points. Our growth models used full information maximum likelihood (FIML) estimation, which was able to use all 391 data points (employed at least at time 1). In the first wave of the sample, included participants' ages ranged from 19 to 65 years ($M = 39.53$, $SD = 11.95$). The racial distribution of the final sample approximated the racial distribution of the state of Illinois. Seventy-four percent of the participants were Caucasian, 13.7% were African American, and 6.5% were Asian American.

2.2. Measures

2.2.1. Personality traits

Participants provided self-report ratings of their personality traits using an abbreviated version of the AB5C (Goldberg, 1999). Participants rated statements about themselves on a scale of 1 (Very Inaccurate) to 5 (Very Accurate). Conscientiousness was measured as a composite of nine facet scales (conscientiousness, efficiency, dutifulness, purposefulness, organization, cautiousness, rationality, orderliness, perfectionism), each containing 9–13 items. Extraversion, agreeableness, emotional stability, and openness were each measured with a 10 or 11 item indicator facet:

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gregariousness, understanding, stability, and intellect, respectively.[2] Reliabilities were satisfactory for each scale at both time points, ranging from .77 to .84.

2.2.2. Job involvement

Participants completed the ten-item Job and Work Involvement Scale (Kanungo, 1982). Each item was rated on a scale of 1 (Strongly Disagree) to 5 (Strongly Agree). Prototypical job involvement items were, "I am very much involved personally in my job," and "Most of my interests are centered around my job." Reliability for this scale was .82 at time 1 and .85 at time 2.

2.2.3. Organizational citizenship behaviors

Thirteen items assessed participants' organizational citizenship behaviors (Smith et al., 1983). For each item, participants rated how frequently they performed certain behaviors on a scale from 1 (Never) to 4 (Once a month) to 7 (Several times per day). Organizational citizenship behaviors are prosocial, pro-organizational behaviors; the scale included items such as, "was respectful of others' needs while at work", "displayed loyalty to the company", and "went out of my way to do the things a 'good' employee would do". Reliability for this scale was good (α = .86 at time 1; α = .84 at time 2).

2.2.4. Work investment

Six items assessed participants' work investment on a scale from 1 (Strongly Disagree) to 5 (Strongly Agree). Sample items included, "I feel a strong sense of obligation toward my work", and "I consult my coworkers before making important changes in my life". Alphas were adequate, ranging from .60 (time 1) to .67 (time 2). To avoid confusion, we refer to this six-item scale as *work investment*, and use the terms *social investment at work* or *work social investment* to refer to all four social-investment variables (job involvement, organizational citizenship behaviors, work investment, and counterproductive behaviors) collectively.

2.2.5. Counterproductive behaviors at work

Counterproductive behaviors at work were measured using Bennett and Robinson's (2000) scale. For each item, participants rated how frequently they performed certain behaviors on a scale from 1 (Never) to 4 (Once a month) to 7 (Several times per day). Counterproductive behaviors included antisocial behaviors such as, "talked badly about people behind their backs", as well as behaviors that impede the fluid operation of the company, including "used office supplies without permission" and "ignored a supervisor's instructions". Reliability for the scale ranged from α = .80 (time 1) to α = .81 (time 2).

2.3. Analyses

2.3.1. Latent change models

We used latent change models to examine the associations between personality traits and work-related social investment, as well as the concurrent longitudinal change between personality
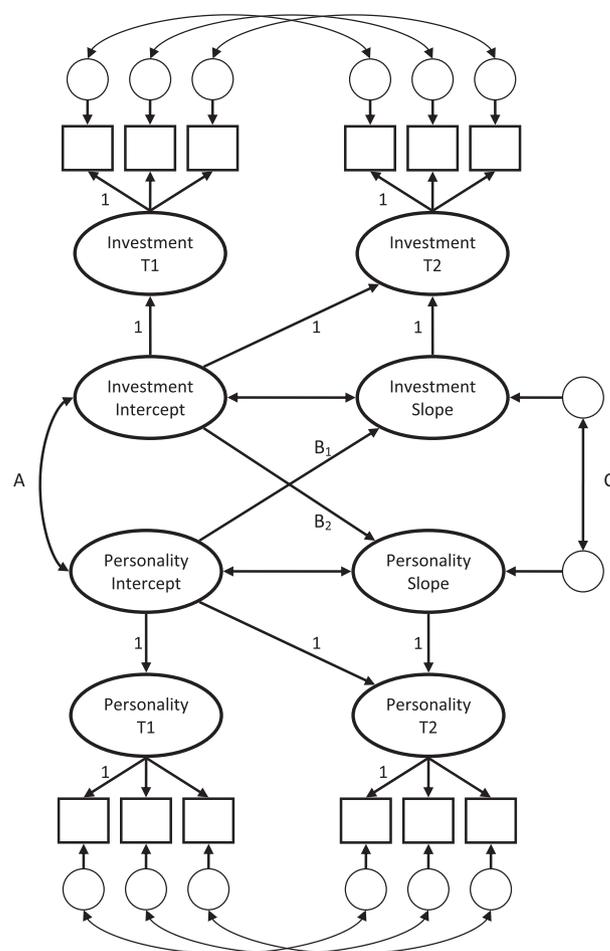

Fig. 1. Latent change model.

and social investment. A latent change model uses two waves of data to estimate the intercept and slope of a variable over time, controlling for measurement error. This allows us to calculate latent estimates of the correlations among intercepts and slopes (McArdle, 1980). In the models, we specified that the intercept be centered at time 1, thus the correlation between intercepts and slopes would be considered prospective. Additionally, latent change models use FIML estimation to fit the models directly to the raw data. This allows estimation of the model parameters using all available data (Hox, 2000). This is preferable to procedures that use only complete case data or data imputation, which can lead to biased estimates (Wothke, 2000). Fig. 1 contains the latent change model used in the present study. At each time point, latent variables were constructed to represent individuals' personality and social investment at work scores. These latent variables were created by parceling the items contained within each scale. To create each parcel, three to four scale items were averaged together. A benefit of using such parcels is that it first reduces the complexity of the models and may also allow for more stable estimates. As shown in Fig. 1, second-order latent intercept and slope variables were then estimated from the time 1 and time 2 latent scores.

A benefit of the latent change model is that it lets us simultaneously estimate the latent correlation between levels at time 1 of personality and social investment (path *A* in Fig. 1), the prospective relation between levels at time 1 and change over time (paths *B* in Fig. 1), as well as the simultaneous latent change between personality and work-related social investment (path *C* in Fig. 1), all uncontaminated by measurement error. We controlled for age as a covariate in all of our models, which allowed us to ascertain

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[2] The decision to use indicator scales for extraversion, agreeableness, emotional stability, and openness while measuring conscientiousness as a conglomerate of all of its facets afforded several benefits. First, the present study used a subset of measures taken from a much larger study containing dozens of measures spanning almost 100 printed pages. As such, reducing the questionnaire length was of paramount importance. Measuring only one indicator scale for extraversion, agreeableness, emotional stability, and openness, as opposed to all facets thereof, reduced the total questionnaire length by 338 items, while still providing excellent reliability for each personality dimension. Second, conscientiousness, which is the personality dimension that is most empirically and theoretically well linked to work variables, was assessed as thoroughly as possible, maximizing the stability of our conscientiousness-related results.

the change in personality and social investment above and beyond the effects of maturation. This was accomplished by adding age into the model as an exogenous variable that simultaneously predicted personality slope and intercept and social investment slope and intercept.

3. Results

3.1. Latent change models

To examine the relationships between personality traits and work social investment, we constructed latent change models. In our preliminary models, all of the social investment at work variables were used to estimate a single latent variable representing composite social investment at work. Five models were constructed to examine the relationship between composite social investment at work and the five personality factors. Subsequently, separate models were constructed to examine the relationship between each personality trait and each individual work social investment variable. Each model estimated slopes and intercepts for the latent personality and social investment variables. The intercepts are equivalent to the latent scores on the variable at time 1. The slopes are equivalent to the latent difference scores between time 2 and time 1 (latent T2–latent T1), controlling for all time 1 variables. Model fit was good for the composite social investment models (all RMSEAs < .07, CFIs > .91), and even better for the relatively simpler individual social investment variable models (all RMSEAs < .05, CFIs > .96).

3.2. Evidence for personality development

Table 1 contains the descriptive statistics for all personality and social investment at work variables, as well as the relationships between age and the intercept at time 1 and slope from time 1 to time 2 for each variable. The age associations in Table 1 are standardized β-weights estimated through the latent change models by regressing age onto the intercept and slope of each variable. As expected, we found cross-sectional evidence for normative personality development. In the latent change models, age was significantly associated with extraversion ($\beta = -.12$, $p < .05$), agreeableness ($\beta = .23$, $p < .05$), conscientiousness ($\beta = .20$, $p < .05$), and emotional stability ($\beta = .17$, $p < .05$), but not openness to experience ($\beta = -.03$, $p = .59$). This is consistent with the personality development literature, which suggests that individuals become more agreeable, conscientious, and emotionally stable, and less extraverted with age (Lucas & Donnellan, 2011; Soto et al., 2011).

To examine whether longitudinal mean-level changes occurred in the five personality dimensions, we tested whether the mean of the personality slope parameters in our models were significantly different from zero. Longitudinally, significant mean-level changes were observed for extraversion ($M = 0.82$, $SE = 0.37$, $p < .05$) and agreeableness ($M = -0.92$, $SE = 0.46$, $p < .05$), but not for conscientiousness ($M = -0.40$, $SE = 0.54$, $p = .46$), emotional stability ($M = 0.60$, $SE = 1.04$, $p = .57$), or openness ($M = -0.26$, $SE = 0.51$, $p = .60$). When controlling for age, the longitudinal changes in extraversion and agreeableness were mitigated to the point of non-significance, $ps > .27$. These patterns of short-term longitudinal change, which trend toward opposing the cross-sectional norms, are very similar to those found by Lucas and Donnellan (2011). That is, normative changes in personality traits may take longer periods of time in order to become manifest, as seen in the cross-sectional age differences. Irrespective, our subsequent analyses examine the *variance*, or individual differences, in change, which focus on why some people increased or decreased around these overall trends, or lack thereof.

3.3. Changes in social investment at work

Using the latent change models, we also found normative developmental patterns for social investment at work. While there was no relationship between age and overall composite social investment ($\beta = .06$, $p = .33$), normative age trends were found for several of the individual social investment variables. With increasing age, adults tended to perform more organizational citizenship behaviors ($\beta = .13$, $p < .05$) and fewer counterproductive behaviors ($\beta = -.11$, $p < .05$) at work. No significant relationship between age and job involvement ($\beta = .07$, $p = .25$) or work investment ($\beta = .10$, $p = .17$) was found. Taken together, these cross-sectional results suggest that adults may become increasingly socially invested at work as they age. Examining the means of the slope parameters, we found no significant longitudinal mean-level changes in social investment at work over the course of 3 years, all $ps > .12$.

3.4. Concurrent relationships between personality traits and social investment in work

Table 2 contains the estimated correlations at time 1 between personality traits and both the composite social investment work and the specific measures making up the composite (i.e., the correlated intercepts; path A in Fig. 1). At time 1, our composite measure of social investment at work was positively related to extraversion ($r = .14$, $p < .05$), agreeableness ($r = .14$, $p < .05$), conscientiousness ($r = .23$, $p < .05$), and emotional stability ($r = .13$, $p < .05$). The composite measure of social investment was unrelated to openness.

To test whether the time 1 associations between overall social investment and personality differed across the specific measures

Table 1
Descriptive statistics for personality and social investment variables.

	Time 1 ($n = 391$)		Time 2 ($n = 146$)		Associations with age	
	M	SD	M	SD	$\beta_{intercept}$	β_{slope}
Extraversion	3.11	0.79	3.04	0.78	−.12[*]	.22[*]
Agreeableness	4.22	0.53	4.23	0.58	.23[*]	−.15[*]
Conscientiousness	3.91	0.52	3.87	0.50	.20[*]	−.03
Emotional stability	3.46	0.68	3.44	0.74	.17[*]	.16
Openness	3.66	0.60	3.72	0.61	−.03	−.07
Job involvement	2.99	0.78	2.98	0.78	.07	−.17
Organizational citizenship	5.82	0.84	5.85	0.76	.13[*]	.11
Work investment	3.77	0.59	3.80	0.59	.10	−.16
Counterproductive behaviors	2.35	0.77	2.45	0.78	−.11[*]	−.13

Note: The standardized β-weights were computed by regressing age onto the intercept and slope for each variable, using latent change models.
[*] $p < .05$.

Table 2
Correlation between latent personality level and latent social investment level.

	SI	JI	OCB	WI	CPB
Extraversion	.14*	−.01	.20*	.17*	.02
Agreeableness	.14*	−.11	.61*	.15*	−.29*
Conscientiousness	.23*	.09	.40*	.26*	−.43*
Emotional stability	.13*	−.01	.30*	.08	−.35*
Openness	.08	−.10	.29*	.04	.10

Note: SI, social investment at work composite; JI, job involvement; OCB, organizational citizenship behaviors; WI, work investment; CPB, counterproductive behaviors at work.
* $p < .05$.

of social investment and personality, we ran latent change models with each specific measure of social investment at work and each of the Big Five traits. As seen in Table 2, at time 1, conscientiousness was correlated with three of the four work social investment variables. More conscientious people at time 1 reported higher organizational citizenship behaviors ($r = .40$, $p < .05$) and work investment ($r = .26$, $p < .05$), and fewer counterproductive behaviors ($r = −.43$, $p < .05$). Extraversion at time 1 was related to variables representing positive affect and strong social ties to work. Specifically, extraverted individuals tended to perform more frequent organizational citizenship behaviors ($r = .20$, $p < .05$) and be more invested ($r = .17$, $p < .05$) at work. Higher levels of agreeableness at time 1 were associated with prosocial variables, including increased organizational citizenship behaviors ($r = .61$, $p < .05$) and work investment ($r = .15$, $p < .05$), and fewer counterproductive behaviors ($r = −.29$, $p < .05$). Emotionally stable adults performed more frequent organizational citizenship behaviors ($r = .30$, $p < .05$) and less frequent counterproductive behaviors ($r = −.35$, $p < .05$). Finally, higher levels of openness to experience at time 1 related to increased frequency of organizational citizenship behaviors, $r = .29$, $p < .05$. Taken together, these results replicate many cross-sectional relationships known to exist, especially between conscientiousness and work-related variables.

3.5. Predicting changes in social investment at work and changes in personality traits

Before testing for the relation between individual differences in changes in personality traits and changes in social investment, it is appropriate to first test whether there is statistically significant variation in individual differences in change. In this case, we checked for significant individual differences in change by testing for statistically significant variance in the latent slope parameters. This requirement was met, as we found significant variance in the slopes for the global social investment composite, all of the specific measures of work social investment, as well as for the personality variables, all $ps < .05$. Thus, ample individual differences in change existed in both sets of variables that could be predicted.

In predicting changes in personality and social investment in work, we first tested whether static personality levels at time 1 predicted subsequent growth in work social investment, and vice versa. In terms of the relation between work social investment level and personality slope variance, these analyses test whether work experiences at time 1 prospectively relate to changes in personality (path B_2 in Fig. 1). Conversely, the relation between personality level at time 1 and subsequent work social investment slope variance tests whether personality level predicts subsequent change in work (path B_1 in Fig. 1). As can be seen in Table 3, at time 1, agreeableness predicted subsequent changes in composite social investment at work, $\beta = .24$, $p < .05$. The intercepts of the other personality dimensions did not predict subsequent changes in social investment at work, all $\beta s < .12$, $ps > .05$. Similarly, time 1 levels

of composite social investment at work predicted changes agreeableness between time 1 and time 2 ($\beta = .17$, $p < .05$), which indicates a truly prospective, reciprocal relation between social investment at work and agreeableness. Social investment in work at time 1 also predicted changes in extraversion ($\beta = −.22$, $p < .05$), but not any of the other personality dimensions (all $|\beta|s < .07$, $ps > .05$).

Subsequent analyses examining the individual social investment variables revealed that the work investment facet appeared to be the key component of overall social investment, in terms of contributing to the prospective relationships with agreeableness and extraversion. Specifically, time 1 levels of agreeableness predicted subsequent changes in work investment, $\beta = .45$, $p < .05$. Also, time 1 levels of conscientiousness predicted changes in work investment over time, $\beta = .23$, $p < .05$. Conversely, time 1 levels of work investment predicted later changes in agreeableness ($\beta = .18$, $p < .05$) and extraversion ($\beta = −.19$, $p < .05$). Job involvement, organizational citizenship behaviors, and counterproductive behaviors did not exhibit such prospective relationships with personality traits.

Second, we tested whether change in work social investment was correlated with change in personality traits over time by correlating the latent slope parameters from both sets of variables (path C in Fig. 1). These analyses tested whether individual differences in work social investment change were associated with individual differences in personality trait change over time. Table 4 contains the correlated change between social investment in work and personality traits. Changes in overall levels of social investment at work were positively related only to changes in conscientiousness ($r = .19$, $p < .05$), but were unrelated to changes in extraversion, agreeableness, emotional stability, or openness, all $ps > .05$.[3]

We found more numerous relations between changes in personality traits and changes in specific social investment at work variables (C paths). Looking at the individual work social investment variables, changes in job involvement correlated positively with changes in openness ($r = .32$, $p < .05$). Increases in organizational citizenship behaviors were positively associated with changes in conscientiousness over time ($r = .22$, $p < .05$), as were changes in work investment ($r = .27$, $p < .05$). Finally, changes in counterproductive behaviors were negatively associated with changes conscientiousness over time ($r = −.35$, $p < .05$).

The correlated change between personality traits and social investment has several possible interpretations (Roberts et al., 2003). The overall direction of change in a specific variable frames the interpretation of the change correlation. For example, if the norm is for people to decrease on a variable, such as neuroticism, then a positive relation between a variable like counterproductive behaviors and changes in neuroticism can mean several things. It could mean that people high in counterproductive behaviors increased in neuroticism, or it could mean that people high in counterproductive behaviors simply failed to decrease as is normal. Graphical representations of the correlated change are helpful in distinguishing between these various interpretations. For purely illustrative reasons and to help interpret the significant associations between changes in social investment at work and changes in personality, we plotted several associations.

Fig. 2 provides an illustration of the relationship between change in conscientiousness and change in work investment over time ($r = .27$). We used the latent difference scores from time 1 to time 2 of work investment and conscientiousness (d = latent

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[3] It is worth mentioning that the threshold for significant correlations varies by model, due to the fact that each model estimates a separate variance–covariance matrix, and the subsequently estimated standard errors for each correlation differ based on these matrices.

Table 3
Standardized regression coefficients predicting slopes from intercepts.

	SI		JI		OCB		WI		CPB	
	B_1	B_2	B_1	B_2	B_1	B_2	B_1	B_2	B_1	B_2
Extraversion	−.02	−.22*	.07	−.08	.09	−.04	−.04	−.19*	−.02	.02
Agreeableness	.24*	.17*	.15	.15	−.04	.11	.45*	.18*	−.03	.00
Conscientiousness	.05	.05	.09	.02	.09	−.04	.23*	.03	.08	.02
Stability	.05	−.07	.08	.04	−.08	.04	.15	−.06	.02	.09
Openness	.12	.06	.08	.04	.09	.12	.17	.10	−.07	−.19

Note: B_1 paths represent personality trait intercept predicting social investment at work slope; B_2 paths represent social investment at work intercept predicting personality slope; SI, social investment at work composite; JI, job involvement; OCB, organizational citizenship behaviors; WI, work investment; CPB, counterproductive behaviors at work.
* $p < .05$.

Table 4
Correlation between latent personality change and latent social investment change.

	SI	JI	OCB	WI	CPB
Extraversion	.06	.01	.11	.06	−.09
Agreeableness	.15*	.01	.13	.25	−.08
Conscientiousness	.19*	.11	.22*	.27*	−.35*
Emotional stability	.00	−.05	.21	.03	−.11
Openness	.24	.32*	.21	.16	−.25

Note: SI, social investment at work composite; JI, job involvement; OCB, organizational citizenship behaviors; WI, work investment; CPB, counterproductive behaviors at work.
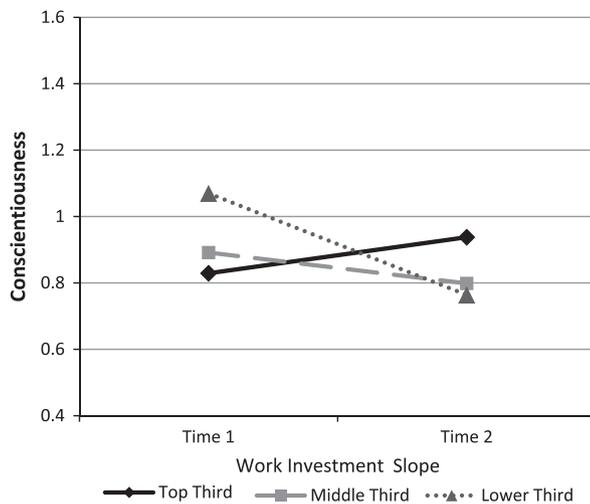* $p < .05$.

Fig. 3. Latent conscientiousness scores at time 1 and time 2 as a function of counterproductive behaviors (CPB) slope, slope = latent T2–latent T1.

Fig. 2. Latent conscientiousness scores at time 1 and time 2 as a function of latent work investment slope, slope = latent T2–latent T1.

T2–latent T1). The sample was then divided into thirds based on the work investment difference scores. As can be seen in Fig. 2, the correlated change between conscientiousness and work investment is primarily driven by what appears to be de-investment processes. That is, individuals who decreased most in work investment showed simultaneous decreases in conscientiousness from time 1 to time 2. Conversely, participants who increased most in work investment showed extremely moderate, if any increases in conscientiousness. This same basic pattern occurred for the correlated change between organizational citizenship behavior and conscientiousness ($r = .22$).

Of all of the variables measured in this study, only counterproductive work behaviors showed both investment and de-investment patterns ($r = −.35$). As can be seen in Fig. 3, participants who increased most in counterproductive behaviors exhibited simultaneous decreases in conscientiousness (de-investment).
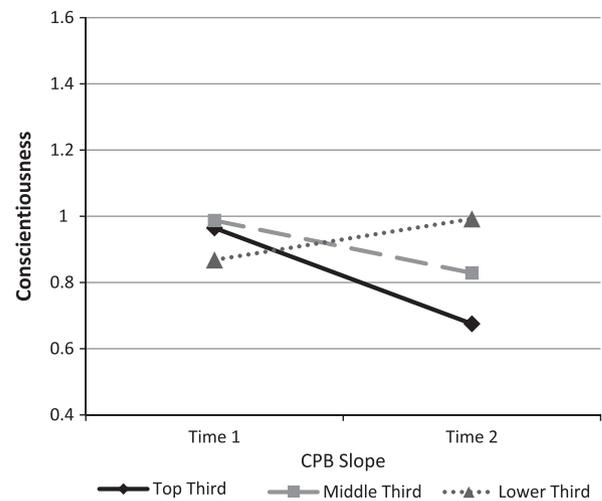
Complementarily, participants who decreased most in counterproductive behaviors showed concurrent increases in conscientiousness, representing an investment process. Taken together, our results provide evidence primarily for de-investment processes, and more limited evidence for investment processes.

3.6. Do individuals become less plastic with age?

In our second set of analyses, we sought to test whether the association between work social investment and personality trait change was limited to young adults only, or alternatively, whether changes in work social investment were associated with changes in personality traits across the lifespan. As social investment is thought to predominantly occur in young adulthood we divided our sample into young adults (39 or younger; $n = 191$) and middle-aged adults (40 or older; $n = 200$). First, we tested whether the structure of the composite latent social investment variable was structurally invariant across these age groups. To test this, we constructed two multiple-group models using the aforementioned age groups. In each model, the four social investment variables loaded onto a single latent variable (composite social investment). In the reduced model, the factor loadings for each social investment variable were forced to be invariant across the age groups. In the full model, the factor loadings for each variable were free to vary across age groups. Freeing the factor loadings to vary across age groups did not significantly improve the fit of the model, $\chi^2(3) = 5.49$, $p = .14$. This indicates that the factor structure of the latent composite social investment variable is invariant across age groups.

After establishing the structural invariance of the latent composite social investment variable, we tested whether age moderated first the prospective relationships, and second, the correlated change between social investment in work and personality traits. To do so, we fit multiple-groups models—using the aforementioned age groups—to each latent change model that we had previously used (Fig. 1). In our first series of tests, in the reduced models the prospective relationships between personality and social investment at work (B paths in Fig. 1) were constrained to be equal across the age groups. In our second series of tests, in the reduced models, the correlation between social investment intercept and personality intercept (path A in Fig. 1) and the correlated change between social investment and personality variables (path C in Fig. 1) were constrained to be equal across the age groups. All of the reduced models fit well (all $CFI > 0.90$, $RMSEA < .06$). In the full models, all parameters were free to vary across the groups.

We first examined whether age moderated the prospective relationships between personality and social investment at work (paths B_1 and B_2 in Fig. 1). Specifically, using the multiple group models, in the reduced models we constrained paths B_1 and B_2 to be equal across age groups. In the full models, these parameters were freed to vary across age groups. With one exception, freeing these parameters to vary did not improve the fit of any of the models, all $\chi^2(2) < 2.86$, $ps > .05$. This suggests that prior levels of personality (or social investment at work) do not predict differential subsequent changes in social investment at work (or personality) for young adults as opposed to middle-aged adults. The one exception to this result is that constraining the prospective paths to be equal significantly worsened the fit of the agreeableness/social investment model, $\chi^2(2) = 9.57$, $p < .05$. Point estimates of the prospective relationships between agreeableness and social investment at work suggest that higher levels of agreeableness at time 1 predicted larger subsequent changes in social investment at work for young adults ($\beta = .42$) than for middle age adults ($\beta = .08$). Similarly, higher levels of social investment at work at time 1 were associated with larger subsequent increases in agreeableness for young adults ($\beta = .42$) than for middle-aged adults ($\beta = -.07$). This suggests that more agreeable young adults may be more susceptible to later changes in social investment, but this may not hold true for middle-aged adults. Conversely, higher initial social investment at time 1 may lead to greater subsequent increases in agreeableness for young adults than for middle-aged adults.

Subsequently, we examined whether age moderated the correlated change between social investment at work and personality traits. In the reduced models, the correlated intercepts (path A) and correlated slopes (path C) were constrained to be equal across the age groups. In the full models, these parameters were freed to vary. When examining the social investment at work composite variable, freeing the parameters to vary did not improve the fit of any of the models in terms of χ^2, all $\chi^2(2) < 3.93$; $p > .05$. Table 5 provides a comparison of the correlated change between

personality and composite social investment at work for young and middle aged adults. In addition to providing the estimated correlated change in personality and social investment at work for each age group, Table 5 also contains 95% confidence intervals around the estimated covariance between changes in personality traits and changes in social investment at work. As the confidence intervals demonstrate, the estimates of covariance in change generally overlap considerably for young and middle-aged adults.

Examining the individual social investment at work variables separately, with one exception, allowing the correlated changes in personality and social investment at work to vary between young and middle aged adults did not improve the fit of any of the models in terms of χ^2, all $\chi^2(2) < 5.25$; $p > .05$. The only exception to this rule was that constraining the correlated change between conscientiousness and counterproductive behaviors to be equal across age groups significantly worsened the fit of the model, $\chi^2(2) = 6.85$, $p < .05$. The point estimates of the correlated change for each age group suggest that the association between counterproductive behaviors and changes in conscientiousness was stronger for middle-aged adults ($r = -.45$) than for young adults ($r = -.37$). This is directly contrary to what we would expect to find if changes in social investment only exerted influence on personality traits in young adulthood.

4. Discussion

The present study tested whether social investment in work was related to changes in personality traits over time and age. Using cross-sectional data, we replicated normative developmental trends in personality traits. Older individuals tended to be more agreeable, conscientious, and emotionally stable, and less extraverted than younger individuals. Additionally, we found support for developmental trends in social investment at work. Particularly, middle age adults more frequently engaged in organizational citizenship behaviors, and they performed fewer counterproductive behaviors. Due to the short duration of the study, mean-level longitudinal changes in both personality traits and social investment at work were largely absent from the data. This, however, was not a primary issue because our analyses focused on explaining individual differences, or variance, in personality trait change over time.

Using latent change models with two waves of longitudinal data, we examined the correlations between personality and work social investment at time 1, and the correlates of changes in personality traits and social investment at work. We found that extraversion, agreeableness, conscientiousness, and emotional stability were correlated with a composite measure of social investment at work at time 1. This replicated past researching showing relationships between personality traits—like conscientiousness—and indicators of social investment at work, such as job involvement (Judge, Heller, & Mount, 2002; Judge et al., 1999).

Table 5
Comparison of correlated change for young adults and middle-aged adults.

	Correlated change				Model comparison
	Young adults		Middle-age adults		
	r	Covariance 95% CI	r	Covariance 95% CI	$\chi^2(2)$
Extraversion	−.01	0.00 ± 0.12	.06	0.03 ± 0.10	0.16
Agreeableness	.33	0.09 ± 0.14	.12	0.10 ± 0.12	2.42
Conscientiousness	.21	0.16 ± 0.14	.15	0.09 ± 0.07	3.93
Emotional stability	.30	0.22 ± 0.31	−.05	−0.05 ± 0.22	1.90
Openness	.00	0.09 ± 0.18	.13	0.08 ± 0.12	0.84

Note: 95% CI = 95% confidence interval; all correlations are between personality traits and composite social investment at work; all chi-square values were not statistically significant, indicating that constraining the correlated change to be equal across young and middle-age adults did not significantly improve the fit of the model.

Looking specifically at the correlates of change over time for personality traits and social investment, we found patterns largely consistent with the social investment model. When examined prospectively, levels of overall social investment at time 1—and particularly the facet of work investment—predicted changes in agreeableness over time. Although we had no hypotheses concerning the trait, we also found that composite social investment and work investment both predicted decreases in extraversion over time. When we examined the simultaneous correlated change between personality traits and social investment at work, the majority of significant associations were with conscientiousness. Changes in overall social investment were correlated with changes in conscientiousness, as were changes in the specific work-related social investment variables organizational citizenship behaviors, work investment, and counterproductive behaviors. In addition, changes in job involvement were associated with changes in openness over time.

Between the prospective and concurrent change analyses, social investment in work was primarily associated with changes in agreeableness and conscientiousness, which is consistent with the social investment hypothesis on the relation between becoming invested in social institutions and changes in personality (Lodi-Smith & Roberts, 2007; Roberts & Wood, 2006). Conspicuously absent from the significant findings were any patterns of associations with emotional stability, as the social investment model focuses on the three traits of agreeableness, conscientiousness, and emotional stability. This set of null findings could mean one of two things. First, it is possible that the social investment hypothesis needs to be revised so as to not focus on emotional stability. Alternatively, changes in emotional stability may come about because of changes in domains other than work (e.g., Lehnart, Neyer, & Eccles, 2010). The idea of social investment transcends specific social role domains, and therefore it is quite possible that investments in relationships or community-based roles would lead to changes in emotional stability. Clearly, more longitudinal research with a specific focus on social investment processes is needed.

Another feature of the findings was a mix of prospective and concurrent associations between social investment and changes in personality. Time 1 social investment predicted changes in agreeableness and extraversion, whereas changes in social investment over time correlated with changes in conscientiousness and openness. Although some have argued that prospective effects are more indicative of causal effects (Maxwell, Cole, & Mitchell, 2011), we prefer to interpret both types of associations as correlational. At a minimum, causality requires that one not only have a theoretical time ordering of variables, but also the ability to isolate one's independent variable and control most potential confounds. The reality of passive longitudinal studies is that the prospective structure seldom reflects a theoretical structure that affords one the ability to satisfy these minimal requirements of causal inference. For example, if social investment at time 1 truly reflected the sample's first experience of social investment, then it would be a better test of causal ordering. But, like most longitudinal studies, we have dipped into the stream of experience—not at the origin, but somewhere in the middle. Thus, even time 1 social investment could be the result of other factors in the past making the prospective relations spurious.

We do not believe that backing away from causal claims in anyway diminishes the significance of our findings. Our study reflects a burgeoning group of studies that show not only that personality traits change, but they do so in concert with life experiences (e.g., Jackson, Hill, Payne, Roberts, & Stine-Morrow, 2012; Lehnart et al., 2010; Lodi-Smith & Roberts, 2012; Ludtke, Roberts, Trautwein, & Nagy, 2011). The observation that personality traits change and that this change is linked to environmental experiences clarifies several strongly opposing theoretical positions on personality development. Specifically, these findings render obsolete ideas that place traits at the base of a causal path in the form of "hard wired" or "basic" dimensions.

Finally, we found that age largely did not moderate the relationship between social investment at work and personality traits. That is, irrespective of age, changes in individuals' workplace environments predicted simultaneous changes in their personality traits. The fact that subjective ratings of work social investment continued to predict personality trait change beyond young adulthood holds important theoretical implications for how personality is conceived. The empirical topography of personality theory must start with the fact that personality traits become increasingly consistent with age (Roberts & DelVecchio, 2000). In the Five-Factor Model, this increasing consistency is a result of personality becoming increasingly calcified and thus resistant to change regardless of what the external press may be (McCrae & Costa, 1999). Under the FFM, one would expect the correlation between changes in social investment and changes in personality to diminish with age as the variability in personality change diminishes. Our findings did not support this model.

Alternatively, Baltes (1987) argued that the personality was an open system and remained open to the influence of the environment. This provides a different perspective on the increasing consistency that comes with age and the relation between life experiences and personality change. Rather than personality traits having "critical periods" or becoming calcified at a later age, it is the increasing stability of the environment that presses less for change as people age that is the cause of increasing personality continuity. According to this view, the environmental demands that precipitated trait change earlier in the life course eventually promote trait stability, once individuals reach equilibrium with the environmental demands. The fact that changes in subjective ratings of social investment retain their ability to predict personality change in middle age supports the latter model of personality development; the covariance between changes in work experience and trait change remains equally strong (or, in the case of counterproductive behaviors, becomes stronger), even if the sheer amount of change experienced in work decreases with age.

4.1. Limitations and future directions

One of the major limitations of the present study is that we assessed changes in work social investment as a subjective variable rather than as an objective transition such as hours spent at work each week. That being said, investment is intrinsically a psychological variable and demographic measures often fail to capture the important features of life experiences that may be related to psychological development (Roberts et al., 2003). This is compounded by the fact that our sample was age stratified and did not focus exclusively on a sample of individuals traversing the transition from adolescence to young adulthood, in which both demographic and subjective changes occur in combination. Due to these factors, it is still possible that work-related social investment, when assessed more thoroughly with a more focused age range, would reveal stronger associations with personality change in young adulthood than middle age.

Furthermore, while we were able to detect significant individual differences in changes in personality traits and social investment variables over time, the present study lacked a sufficient duration to find significant mean-level longitudinal changes in personality traits and social investment variables. Future research should examine social investment processes over a longer period of time in order to be able to examine mean-level changes in personality traits and social investment. This would bolster claims that more social investment occurs in young adulthood than in

later years, which, in turn, precipitates the great amount of personality change typically observed during young adulthood. Additionally, a finer temporal resolution (i.e., more frequent data points) would be helpful for teasing apart the immediate versus delayed effects of social investment. Future studies also would benefit from more objective measures of social investment. Peer and supervisor ratings of investment at work would likely provide results convergent with self-report. However, observer-ratings may provide insights that are not easy to ascertain via self-report data. Finally, ideally, the claim that social investment causes trait change should be demonstrated experimentally. However, social investment is a primarily self-directed, willful commitment to societal structures. In this sense, it would be very difficult to manipulate directly. Longitudinal quasi-experimental field studies in the workplace may be the best route to strengthen claims that social investment causes changes in personality, as opposed to the two possessing a spurious relationship due to confounds such as third variables, history, or maturation.

5. Conclusion

Social investment—the process of becoming invested in and committed to adult roles—shows promise of being a viable personality development mechanism. It has been linked to predictable personality trait change in a variety of contexts, including in relationships (Lehnart et al., 2010), and, in the present study, in the workplace. Moreover, the present study provides the first evidence that social investment processes are not limited to young adulthood. Changes in social investment may influence personality trait development well into late midlife. Taken together, these results suggest that understanding the roles that people commit to, and the environments they find themselves in, is crucial for understanding how their personalities develop across the lifespan.

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