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Does Core Self Evaluations predict career success? A reanalysis of Judge and Hurst (2008)

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ABSTRACT

We conducted a replication of Judge and Hurst's (2008) study that suggest that Core Self Evaluations (CSE) have a significant *positive* effect on growth in career success (as well as on mediators of growth in career success). We found that, if anything, CSE has a significant *negative* relationship with growth in career success (as well as its mediators). We attribute the difference in findings to the timing of measurement of CSE in Judge and Hurst's (2008) study and to the lack of control for General Mental Ability (GMA), arguing that when GMA is controlled for, CSE does not affect career success. Reasons for the observed negative relationship between CSE and career success are discussed.

1. Introduction

The interest in the role of personality in shaping career success has dramatically grown over the past two decades after many years in which this construct was quite peripheral to the mainstream research agenda. Among the various personality factors, Core Self Evaluations (CSE), a personality trait which encompasses an individual's fundamental evaluations about themselves, and involves four personality characteristics: self-esteem, general self-efficacy, locus of control and neuroticism (see Judge, Bono, & Locke, 2000, for a comprehensive discussion of this concept), received special attention in the literature and has been the focus of numerous studies (for example, according to Google scholar, in between 2010 and 2012, 143 papers cited this concept in their titles). Thus, because of its central role in the literature about the effect of personality on career success, it is important that the way CSE is studied and used in research will be closely examined. In this context, the current study critiques Judge and Hurst's (2008) analytic methods in studying the effect of CSE on growth in career success, and re-examine their results.

Judge and Hurst (2008) used longitudinal data taken from the National Longitudinal Study of Youth (NLSY) and concluded, based on growth modeling analysis, that people with high CSE enjoy faster growth in career success than people with low CSE, both with regard to extrinsic success (operationalized in terms of pay and occupational status) and with regard to intrinsic success (operationalized in terms of job satisfaction). They also argued that these effects are mediated by educational attainment and health problems interfering with work.

However, Judge and Hurst (2008) study suffered from three major problems. One problem is the inappropriate temporal order between the measurement of CSE and the measurement of career success and its mediators, as 7 out of the 12 items in their CSE measure were taken during or after the measurement of career success and its mediators (Judge & Hurst, 2008, p. 863). Apparently, the construction of a single scale out of items measured at time points that are several years apart was based on an assumption that CSE reflect a stable personality characteristic (e.g., Trzeniewski, Donnelon, & Robins, 2003). Under such an assumption, it might have been legitimate to disregard the specific timing of measurement.

However, a close scrutiny of the particular relationships between CSE and the criteria of career success raises questions concerning such disregard. The components of CSE, particularly self-esteem and self-efficacy, are likely to increase as a result of accumulated successes and to decrease as a result of failure (Bandura & Walters, 1963; Bernick, 1981; Gecas & Seff, 1990; Pelham, 1995; Weidman, Phelan, & Sullivan, 1972). The ease by which CSE are influenced by experimental manipulations (e.g., Brockner, 1988), particularly by manipulated feedback about past performance success (e.g., Eden & Kinnar, 1991; Hogg & Terry, 2000) lend

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further support for the instability of CSE and its responsiveness to prior achievements. Though in one study career outcomes did not alter self-esteem (Kammeyer-Mueller, Judge, & Piccolo, 2007), the dependence of self-esteem and self-efficacy on past performance should call for special care with regard to measurement timing. Thus, because CSE may be consequences – as well as a determinants – of career success, research on CSE as antecedents of subsequent career success should pay special attention to the correct order of measuring a potential cause before a potential outcome.

A second problem in Judge and Hurst's (2008) study was that they examined the effects of CSE without controlling for GMA. This omission may bias their estimates. First because GMA and personality (e.g., Ackerman & Heggestad, 1997; Goff & Ackerman, 1992), particularly GMA and CSE (Austin, Deary, Whiteman, Fowkes, Pedersen, Rabbitt, & McInnes, 2002; Demetriou, Kyriakides, & Avraamidou, 2003, and in particular see our results below), are correlated. And second, because GMA is an important determinant of success, receiving considerable attention in the literature (e.g., Gottfredson, 2003; Schmidt & Hunter, 2004, and in particular, see Herrnstein & Murray, 1994, and see the debate that followed their book, e.g., Fraser, 1995).

The third problem is relevant only to the model in which pay was used as an indicator of success, and it has to do with Judge and Hurst's (2008) use of nominal pay, rather than the logarithm of pay, as a dependent variable. Using nominal pay is very unusual in remuneration research. In practically every paper published in last five years in the Journal of Labor Economics – the most prominent journal in the area of remuneration research, the logarithm of pay rather than nominal pay was used. This is also the case in most papers published in the applied psychology literature (see for example, Casey & Delquié, 1995; Gerhart & Milkovich, 1989; Kuhberger, Schulte-Mecklenbeck, & Perner, 1999; Seibert, Crant, & Kraimer, 1999). To see the problem in using nominal pay rather than the logarithm of pay, consider, for example, two individuals, one is high on a characteristic that determines initial pay, but does not affect growth in pay, and another is low on this characteristic. Assume that the former earns $100,000 and the latter earns $10,000. If the salaries of both individuals increase at a rate of 10% a year, their nominal pay in the second year will be $110,000 and $11,000 correspondingly. Using a logarithmic scale, their annual growths are equal, log (110,000/100,000) for the former, log(11,000/10,000) for the latter. On the other hand, when using an nominal pay scale, the annual growth of the former is 10, whereas the annual growth of the latter is 1. Thus, using nominal pay leads to inflating the growth of pay of individuals with high characteristic's value, since they tend to have higher initial pay (see also Ganzach, 2010; Ritov & Baron, 2004, for further discussions of the problems of using nominal rather than logarithmic scale).

Judge and his co-workers seemed to be aware of all three problems, and to some extent they tried to overcome them in their work. First, Judge and Hurst (2008) examined whether the temporal order between the measurement of CSE and the measurement of career success affects their results, concluding that when the appropriate temporal order is being kept "the coefficient estimates changed very slightly" (p. 858, bottom paragraph). However, in this examination they did not control for GMA. Second, in an a study that examined the effect of GMA on growth in career success, Judge, Klinger, and Simon (2010), using the same database used by Judge and Hurst (2008) report the results of an auxiliary analysis that re-examined the Judge and Hurst's (2008) effects of CSE on growth in pay and occupational status (but not on job satisfaction, educational attainment and health problems), concluding that "both GMA and CSE make independent contributions to growth in extrinsic career success over time" (p. 101). However, in this examination they did not control for the temporal order between the measurement of CSE and the measurement of career success, as the measurement of CSE had not been taken prior to the measurement of career success (see Judge et al., 2010, footnote 4). Third, in an earlier paper, Judge and Hurst (2007) do mention the prevalent method of taking the log pay rather than pay. They discard it citing Gullikson (2006) that "Taking the natural log of the independent variable... implies a 'diminishing returns' relationship." (see p. 1216 of their paper). Our example above regarding the earnings of two individuals suggests that in the context of growth in career success, the relationship between pay and career success does imply diminishing returns.

Apparently, being aware of all three problems, and even attempting to examine whether they constitute a threat to the validity of their results in some cases, Judge and his co-workers did not test the robustness of their results when all three problems are *simultaneously* controlled. In the current paper we do that. We test the relationship between CSE and career success and its mediators when CSE are measured *prior* to the measurement of career success, the effect of GMA is properly controlled, and logarithm of pay rather than absolute pay is used as a measure for career success. In addition, we also examine the relationship between CSE and career success and its mediators when CSE are measured during or after the measurement of career success, and compare it to this relationship when only the early measure is used.

2. Method

In this study we conducted a literal replication (see Lykken, 1968) of Judge and Hurst's (2008) study, except of the three changes required by our critique above. We used the same sample, the same measurements (except, as noted above, for the measurement of CSE and the measurement of pay) and the same method of analysis, including the same model specification (except, as noted above, adding GMA to the model).

2.1. Participants and procedure

The data were taken from the National Longitudinal Survey of Youth (NLSY), a national sample of Americans born between 1957 and 1964. Following Judge and Hurst (2008), we used measures of career success and its mediators collected between 1979 and 2004, which altogether constituted 21 such measures (the interviews were administered annually until 1994 and bi-annually from 1996). The measures of the independent variables were collected in 1979 and 1980, except of the items of CSE which included items that were collected also in 1987 and 1992.

The original sample included 12,686 participants. Due to funding constraints, 1,079 participants were dropped in 1984 and 1643 in 1990. Natural sample attrition was about 10% a year.

2.2. Measures

As the current study is a literal replication, except where noted otherwise, all our measures were identical to those used by Judge and Hurst (2008).

2.2.1. Time

The survey year was used as a measure of time. The first year of the survey, 1979 was coded as 1, 1980 was coded as 2, and so on.

2.2.2. Pay

Judge and Hurst (2008) used respondents' reports about their annual income in the 21 survey years. These reports were obtained from answers to two questions, one regarding their civilian income and the other regarding their military income. We used the same

answers, but took the logarithm of the self-reported annual income as a measure of pay.

2.2.3. Occupational status

We used the Duncan index, which ranges between 0 and 100 (Duncan, 1961), as a measure of occupational success. At each interview participants described their occupation, and this description was converted into a 3-digit census occupational classification. These codes were used to obtain the Duncan index in the 21 survey years.

2.2.4. Job satisfaction

The measure for job satisfaction was derived from answers to the question "How much do you like you job" expressed on a four level response scale ranging from "dislike it very much" to "like it very much". This measure was also available for each of the 21 survey years.

2.2.5. Education attainment

We used the answer to a question, asked in each of the surveyed years, about the highest grade ever completed.

2.2.6. Health problems interfering with work

We used answers to a question which was asked in each survey year "Are you limited in the amount of work you do because of your health" coded a 1 (yes) or 0 (no).

2.2.7. Core Self Evaluations

Judge and Hurst (2007, 2008) used a measure of CSE which was constructed from 12 items collected in the NLSY surveys. Two items, collected in the 1979 survey, were taken from Rotter's (1966) internal–external locus of control measure. Five items, collected in the 1980 survey, were taken from Rosenberg's (1965) self-esteem scale. Two items, collected in the 1987 survey, were taken from the Center for Epidemiological Studies Depression scale (Radloff, 1997). Three items, collected in the 1992 survey, were taken from the Pearlin Personal Mastery Measure (Pearlin, Menaghan, Lieberman, & Mullan, 1981), which assesses the degree to which individuals perceive themselves in control of forces that impact their lives (see Appendix A for a detailed description of the items).

We divided the 12 items of Judge and Hurst (2008) CSE measure into two measures. One, *early-CSE*, was composed of the 7 items measured in 1979 and 1980. We consider this an appropriate measure with regard to the temporal order between the measurement of CSE and the measurement of career success. The other measure of CSE, *late-CSE*, was composed of the 5 items measured in 1987 and 1992. We consider it to be inappropriate with regard to temporal order.

2.2.8. GMA

The measure of GMA study was derived from participants' test scores in the Armed Forces Qualifying Test (AFQT), the standard measure of intelligence used by the US army. This test was administered to groups of five to ten participants of the NLSY during the period of June through October 1980. Respondents were compensated, and the overall completion rate was 94%. The *GMA* score in the NLSY is the sum of the standardized scores of four tests: arithmetic reasoning, paragraph comprehension, word knowledge and mathematics knowledge, and is expressed as a percentile score from the general population.

The reliability of the AFQT in our data is 0.92. The validity of the AFQT was demonstrated in numerous studies including the prediction of training success (e.g., Ree & Earles, 1991) job performance (e.g., Scribner, Smith, Baldwin, & Phillips, 1986), as well as other measures of socio-economic success (see an extended discussion of the validity of the AFQT in Herrnstein & Murray (1994), "The Bell Curve").

2.2.9. Age, gender and ethnic background

Date of birth, sex and ethnic background were collected at the first year of the survey. Ethnic background was coded as 0 if the participant was black or Hispanic, 1 if he or she was not. Age was coded as participant's age at 2004.

2.2.10. Analyses

It is instructive to think about the data in terms of 21 observations for each participant, one for each of the 21 years of the survey. In each observation there is one time-varying dependent variable (career success or its mediator), one time-varying independent variable (time), and five time-invariant independent variables (CSE, GMA, sex, race and age). Omitted from the analyses were observations for which one of these variables was missing.

To statistically examine the effects of CSE we used an HLM analysis (Bryk & Raudenbush, 1987). This analysis could be viewed as consisting of two stages. At the first stage each individual's indicators of success are regressed on time (Eq. (1)). At the second stage, the intercepts and the slopes of these individual regressions are regressed on CSE, GMA and the time-invariant controls (Eqs. (2) and (3), respectively) to obtain estimates of the effects of the individual characteristic on the intercept and the slope.

$$SUC_{ij} = B_{0j} + B_{1j} \cdot TIME + r_{ij} \quad (1)$$

$$B_{0j} = C_{00} + C_{01} \cdot GMA_j + C_{02} \cdot CSE_j + Controls + u_{0j} \quad (2)$$

$$B_{1j} = C_{10} + C_{11} \cdot GMA_j + C_{12} \cdot CSE_j + u_{1j} \quad (3)$$

where SUC_{ij} is the career success or the mediator of participant j at time i. The critical parameter for estimating the effect of CSE on growth is C_{12}. A significantly positive value suggests a positive relationship between CSE and growth in success and a significantly negative value suggest a negative relationship.

3. Results

3.1. Descriptive statistics

Descriptive statistics are presented in Table 1. To allow comparison with Judge and Hurst's (2008) data, the table presents the time varying variables in terms of their mean over the 21 longitudinal observations. Indeed, it appears that the data we use are very similar to the data used by Judge and Hurst (2008), since the means and standard deviations are very similar (see Table 1 of their paper). The only exceptions are the mean pay which is about 40% lower than the mean pay in their data and the mean of race which was 0.59 in our data and 0.69 in Judge and Hurst (2008).[1] The first difference is most likely due for a different base used for adjusting for the consumer price-index. We could not resolve the inconsistency regarding the second difference although the mean we report is consistent with the report in the NLSY user guide (http://www.nlsinfo.org/nlsy79/docs/79html/79text/front.htm, chapter 3).[2]

One finding that is apparent in Table 1 is that the correlations of the mean logarithm of pay with predictors of success – GMA and CSE as well as sex and age (see or example, Borjas, 2004 for the ef-

[1] Judge and Hurst (2008) code race as White = 1, and otherwise = 0. However, in the NLSY race is coded in terms of non-Black and non-Hispanic. We used this code in our analysis.

[2] These differences are not consequential as a difference in level may affect the intercept but not the slopes. The difference in race has a minor impact on the parameter estimates, since the results of models that do not include race yield very similar estimates as models that include it.

Table 1
Descriptive statistics and inter-correlations.

	M	SD	1	2	3	4	5	6	7	8	9	10	11
1. Age	44.66	2.25	–										
2. Early-CSE	3.14	0.48	0.20	–									
3. Late-CSE	3.29	0.48	−0.03	0.29	–								
4. GMA	40.95	28.76	0.20	0.46	0.31	–							
5. Sex	0.50	0.50	0.01	−0.02	−0.04	−0.02	–						
6. Race	0.59	0.49	0.07	0.15	0.14	0.44	0.00	–					
7. Average occupational status	35.72	16.73	0.08	0.31	0.26	0.52	0.23	0.11	–				
8. Average log pay	8.76	0.90	0.08	0.26	0.28	0.36	−0.29	0.11	0.34	–			
9. Average nominal pay	11714	12902	0.13	0.19	0.18	0.27	−0.20	0.08	0.29	0.53	–		
10. Average education	12.31	2.07	0.06	0.38	0.29	0.62	0.06	0.13	0.60	0.33	0.29	–	
11. Average health problems	0.04	0.09	0.17	−0.10	−0.17	0.15	0.08	−0.04	0.12	−0.27	−0.13	−0.13	–
12. Average job satisfaction	3.24	0.42	0.03	0.08	0.16	0.01	0.06	0.02	0.19	0.09	0.12	0.09	−0.03

Males were coded as 1, females as 0. Non-Black non-Hispanic were coded as 1, others as 0. GMA is expressed in percentiles. Correlations above 0.04 are significant on the 0.0001 level.

fects of sex and age) – are higher than the corresponding correlations of the mean nominal pay (all differences are significant, $p < .0001$). This is consistent with the idea that career success is better expressed on a logarithmic than on a nominal pay scale. Note also that the correlation between log pay and nominal pay is as low as 0.53, which illustrate the considerable difference between reliance on log pay and reliance on nominal pay.

3.2. Exact replication of *Judge and Hurst (2008)*

We begin our analysis by reproducing Judge and Hurst's (2008) effect of CSE on growth in career success and its mediators. The models we estimated were identical to those estimated by Judge and Hurst (2008). That is, we used their (full) measure of CSE and the same controls, omitting GMA from the analysis. Similar to Judge and Hurst (2008), we find the slope of time to be significantly *positively* related to CSE in the models of occupational status ($B = 0.41$, $t = 11.0$, $p < 0.0001$), job satisfaction ($B = 0.006$, $t = 6.4$, $p < 0.0001$), nominal pay ($B = 875.9$, $t = 12.2$, $p < 0.0001$), educational attainment ($B = 0.042$, $t = 13.3$, $p < 0.0001$), and health problems ($B = -0.004$, $t = 11.1$, $p < 0.0001$). The coefficients we obtained are very similar to those obtained by Judge and Hurst (2008), except of the coefficient of pay which is about half of the coefficient estimated by Judge and Hurst (2008).[3]

We turn now to an examination of the consequences of the methodological changes we introduce into Judge and Hurst (2008) model. As our focus is on the effect of CSE on growth in career success, our discussion concentrates on the effect of CSE on the slope of time in the trajectories of our measures of career success and its mediators.

3.3. The relationships between early-CSE and career success and its mediators

Table 2 presents the results of a growth modeling HLM analysis with time as level 1 variable and GMA, early-CSE and the controls as level 2 variables. It is clear from these results that the relationship between Core Self Evaluations, as measured by early-CSE, and *extrinsic* career success is *negative*. Both in the pay model and in the occupational success model the sign of the effect of early-CSE on the slope of time is negative, $p < 0.0001$ and $p < 0.01$, respectively.[4] Figs. 1 and 2 provide, respectively, a graphical representation of trajectories of pay and occupational status for participants low (one standard deviation below the mean) or high (one standard deviation above the mean) on early-CSE, keeping the other variables constant at their means. The graphs demonstrate that the extrinsic success trajectory of low early-CSE participants is steeper than the trajectory of high early-CSE participants, in contrast to Judge and Hurst (2008) who found that the trajectory of high-CSE participants is steeper than this of low-CSE participants (see Figs. 2 and 3 of their paper), and in contrast to Judge et al. (2010) replications of these effects. Thus, while Judge and his co-authors find that CSE are positively associated with growth in extrinsic success, we find that CSE, at least when measured prior to career success, are *negatively* associated with growth in extrinsic success.

The results of the job satisfaction model indicate that early-CSE is not related to growth in career success, as its effect on the slope of time is not significant ($p > 0.7$). Fig. 3 provides a graphical representation of trajectories of job satisfaction for participants low and high on early-CSE. The graphs demonstrate that the slope of the trajectory of low early-CSE participants is similar to the slope of the trajectory of high early-CSE participants,[5] in contrast to Judge and Hurst (2008) who found that the trajectory of high-CSE participants is steeper than this of low-CSE participants (see Fig. 1 of their paper). Thus, while they find that CSE are positively associated with growth in intrinsic success, we find that CSE, at least when measured prior to career success, are *not* associated with growth in intrinsic success.

Finally, the results of the models of the mediators also reveal a pattern very different from the pattern obtained by Judge and Hurst ($p < 0.0001$). We find that CSE are negatively related to growth in educational attainment (see Table 2), and that they have no relationship with growth in health problems interfering with work, $p > 0.3$ (Figs. 4 and 5 provide, respectively, graphical representations of the relationships between early-CSE and trajectories of educational attainment and health problems). Judge and Hurst (2008), on the other hand, find that CSE are positively related to

[3] However, a close examination of Judge and Hurst (2008) reveals an inconsistency regarding the value of the coefficient of CSE on the slope of time in the pay model. For example, when CSE is one standard deviation above the mean, the value of this coefficient from Table 2 of their paper is $-4395 + 3.58 * 1890 = 2371$, two and a half times larger than the coefficient derived from the information in Fig. 2 of their paper, $(35817 - 16004)/21 = 943$. This last coefficient is closer to the coefficient we obtain in our pay model.

[4] Note that, in contrast to the effect of CSE, the effect of GMA on the slope of time is significantly positive, $p < 0.0001$, for both pay and occupational success (in agreement with Judge et al., 2010). Note also that in contrast to its negative relationship with the slope of the trajectories of extrinsic career success, early-CSE has a significant relationship with the intercept of the trajectories, which suggest that early-CSE is positively related to the level of extrinsic success (or perhaps to success at entry to the job market).

[5] Again (see footnote 4) the results of the job satisfaction model indicate that, although not related to growth in career success, early-CSE is related to the level of career success.

Table 2
The relationship between early- CSE and growth in pay, occupational status, job satisfaction, educational attainment and health problems.

	Pay		Occupational status		Job satisfaction		Educational attainment		Health problems	
Parameter	*B*	*t*-Ratio	*B*	*t*-Ratio	*B*	*t*-Ratio	*B*	*t*-Ratio	*B*	*t*-Ratio
Intercept										
Intercept, C_{00}	3.79 (0.15)	26.1	−7.47 (2.52)	3.0	2.76 (0.08)	35.5	−2.55 (0.25)	10.2	−0.060 (0.016)	3.7
GMA, C_{01}	0.0045 (0.0004)	11.9	0.213 (0.006)	34.0	−0.0019 (0.0002)	9.0	0.032 (0.0005)	59.0	−0.00004 (0.00004)	1.1
Early-CSE, C_{02}	0.305 (0.023)	13.1	5.08 (0.38)	13.3	0.099 (0.013)	7.8	0.53 (0.031)	16.9	−0.0084 (0.0024)	3.5
Sex, C_{03}	−0.519 (0.013)	39.1	8.42 (0.23)	35.9	0.051 (0.007)	7.1	0.23 (0.02)	9.5	0.010 (0.002)	14.0
Race, C_{04}	0.051 (0.015)	3.4	−3.74 (0.27)	14.1	0.052 (0.008)	6.4	−0.53 (0.03)	19.2	0.0071 (0.0017)	4.1
Time of study, C_{06}	0.073 (0.003)	23.7	0.21 (0.05)	3.9	−0.00053 (0.0016)	0.3	0.25 (0.006)	45.1	0.002 (0.0003)	6.1
Average pay,C_{07}					$3.0 * 10^{-6}$ (0.0000)	>100				
Slope of time										
Intercept, C_{10}	0.097 (0.006)	17.3	0.72 (0.10)	6.9	0.014 (0.003)	4.8	0.098 (0.009)	11.0	0.0062 (0.0010)	6.1
GMA, C_{11}	0.00046 (0.00003)	15.7	0.0113 (0.0006)	20.5	0.00013 (0.00002)	8.3	0.0013 (0.00005)	28.0	−0.00006 (0.00000)	10.5
Early-CSE, C_{12}	−0.0073 (0.0019)	3.8	−0.108 (0.035)	3.1	−0.0008 (0.0010)	0.4	−0.011 (0.003)	3.6	−0.0003 (0.0003)	0.8

t-Ratios above 2.5 are significant at the 0.01 level. *t*-ratios above 4.5 are significant at the 0.0001 level.

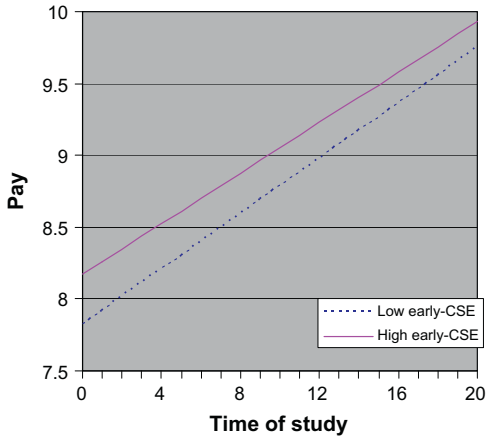

Fig. 1. Trajectories of pay over time as a function of low (one standard deviation below the mean) and high (one standard deviation above the mean) levels of early-CSE.

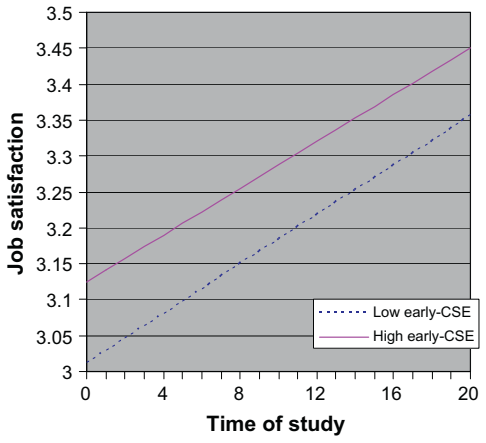

Fig. 3. Trajectories of job satisfaction over time as a function of low (one standard deviation below the mean) and high (one standard deviation above the mean) levels and early-CSE.

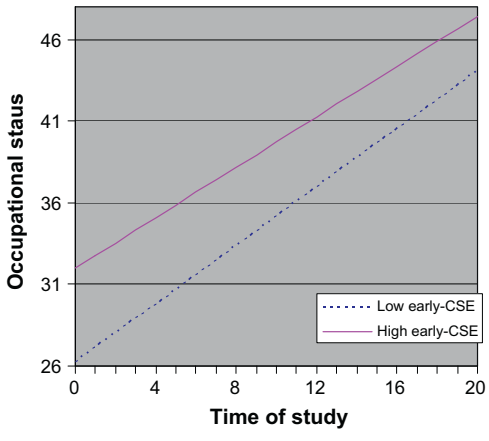

Fig. 2. Trajectories of occupational status over time as a function of low (one standard deviation below the mean) and high (one standard deviation above the mean) levels and early-CSE.

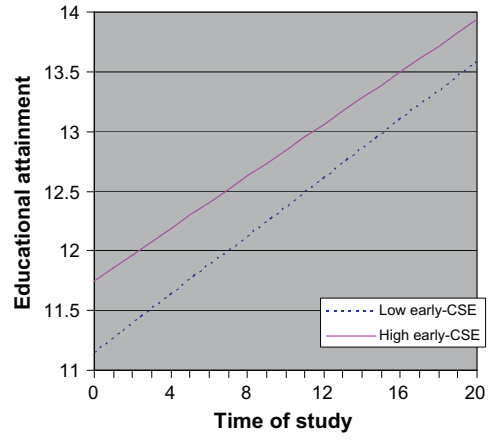

Fig. 4. Trajectories of educational attainment over time as a function of low (one standard deviation below the mean) and high (one standard deviation above the mean) levels and early-CSE.

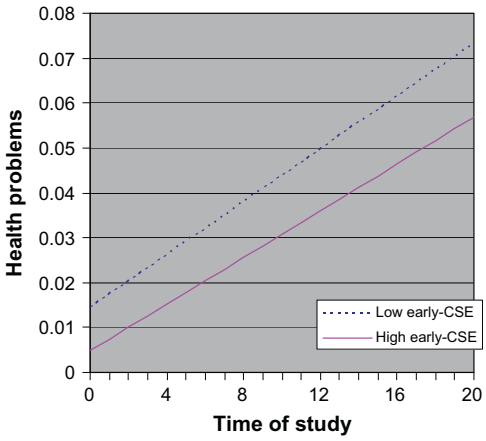

Fig. 5. Trajectories of health problems interfering with work over time as a function of low (one standard deviation below the mean) and high (one standard deviation above the mean) levels and early-CSE.

growth in educational attainment and negatively related to growth in health problems (see Figs. 4 and 5 of their paper).

3.4. The relationship between late-CSE and career success and its mediators

Table 3 presents the results of our HLM when late-CSE rather than early-CSE is used as a measure of Core Self Evaluations. In this analysis, the interaction between time and CSE is significantly *positive* for pay, occupational status, job satisfaction and educational attainment ($p < 0.0001$) and significantly negative for health problems ($p < 0.0001$), suggesting that when the temporal order between the measurement of CSE and the measurement of career success is disregarded, CSE appear to have a significant positive effect on growth in career success, as well as on possible mediators of this growth.[6] Thus, our results regarding late-CSE are similar to Judge and Hurst's (2008), but diametrically opposite to our results regarding early-CSE.

3.5. A changing validity approach to the analysis of career success trajectories

In the analysis above we relied on HLM to examine the effects of CSE on growth in career success. We present here a complimentary methodology that relies on changes in the validity of CSE as a predictor of success. To introduce this methodology, consider Fig. 6 that describes the career trajectories of two groups of individuals, that are either high or low on a characteristic that is instrumental to career success. The gap in success of the two groups will be greater in a later time (t2) than in an earlier time (t1), because of the greater (or faster) advance of the former group. As a result, the validity of the characteristic will be higher in t2 than in t1. The increase in gaps between t1 and t2 represents this change in validity. Thus changes in validity over time can be the basis for the examination of the effect of a characteristic on growth in career success. Increasing validity is consistent with the characteristic having a positive effect on career success. Stable, or decreasing validity is not consistent with such an effect (we discuss possible reasons for negative relationships below).

To examine changes in validities of early and late CSE in predicting career success, we correlated for each year of the survey the validities of these two measures, defined as their partial correlations with our measures of career success, pay and occupational status, and job satisfaction, controlling for intelligence, sex, race, age (the controls used in the HLM analysis) as well as income at 1979. By controlling for the 1979 income we estimate the validity of CSE in predicting *change* in pay from 1979 (this analysis included only subjects that were employed in 1979 and did not attend school).[7]

Figs. 7–9 present, respectively the validities of pay occupational status and job satisfaction, both for early and for late CSE. The results of these figures show a decreasing validity of early-CSE in predicting career success. The correlation between time of study and early-CSE was −.79, −.38 and −.04 for pay, occupational status and job satisfaction, respectively. These results are consistent with the results of the HLM analysis (Figs. 1–3, respectively, as well as Table 2) in showing that early-CSE is negatively related to growth in career success.

The results of Figs. 7 and 8 also show an increasing validity of late-CSE in predicting career success. The correlation between time of study and late- CSE was .87, .27 and .46 for pay occupational status and job satisfaction, respectively. These results are consistent with the results of the HLM analysis (Table 2) in showing that late-CSE is positively related to growth in career success.[8]

4. Discussion

Our replication of Judge and Hurst's (2008) study shows a dramatic change in the conclusions that can be drawn about the relationship between CSE and growth in career success. We show that when the temporal order between CSE and career success is kept, and GMA is controlled for, CSE do not affect growth in intrinsic career success, and it has a clear *negative* relationship with growth in extrinsic success. In sharp contrast to Judge and Hurst (2008) results suggesting a positive relationship between CSE and growth in pay, occupational status and job satisfaction, we find *negative* relationships for pay and occupational status, and no relationship with job satisfaction. In addition, Judge and Hurst found a positive relationship between CSE and growth in educational attainment and a negative relationship with growth in health problems. We, on the other hand, find a negative relationship with the former mediator and no relationship with the latter.

The timing of the measurement of CSE plays a major role in the results obtained by Judge and Hurst (2008). We demonstrated this by dividing the CSE measure that they used to early and late measures, and analyzing the data based on each of the two separately. We found that even when GMA was controlled for, the results obtained on the basis of the late-CSE measure indicated – similar to the results obtained by Judge and Hurst (2008), Judge et al. (2010) – a positive relationship between CSE and success and its mediators, in sharp disagreement to the results obtained from the early-CSE-based analysis. represent

We turn now to the question of why is the relation between early-CSE and growth in career success negative. As the purpose of this paper is methodological rather than theoretical, the explanations we suggest are preliminary and sketchy, and may be more

[6] To conserve space, we do not draw the trajectories of our dependent variables as a function of low and high *late*-CSE. However when drawn, the curves of low and high late-CSE fan out (unlike the curves of early-CSE which fan in), which indicate a positive relationship between late-CSE and growth in career success.

[7] This partial correlation analysis is equivalent to the familiar multiple regression analysis of change in which the effect of a characteristic on change in the dependent variable is estimated by regressing the value of the dependent variable in time t2 on its value in time t1, the value of the characteristic at t1, and the control variables.

[8] In this respect, the changing validity representation is easier to communicate than the HLM representation in showing the effect of a characteristic on growth in career success since the former requires only one graph whereas the later requires two. Thus, unlike Figs. 1–5 we are able to show on one graph both the effect of early-CSE and the effect of late-CSE on growth in career success.

Table 3
The relationship between late- CSE and growth in pay, occupational status, job satisfaction, educational attainment and health problems.

	Pay		Occupational status		Job satisfaction		Educational attainment		Health problems	
Parameter	*B*	*t*-Ratio	*B*	*T*-Ratio	*B*	*t*-Ratio	*B*	*t*-Ratio	*B*	*t*-Ratio
Intercept										
Intercept, C_{00}	4.87 (0.17	28.1	−3.46 (3.05)	1.1	2.52 (0.09)	27.2	−2.70 (0.32)	8.55	−0.065 (0.018)	3.5
GMA, C_{01}	0.0060 (0.0004)	13.8	0.236 (0.007)	34.0	−0.0012 (0.0002)	5.5	0.034 (0.0006)	54.9	−0.00005 (0.00004)	1.1
Late-CSE, C_{02}	0.119 (0.025)	4.8	2.16 (0.39)	5.6	0.063 (0.013)	4.9	0.29 (0.032)	9.1	0.0023 (0.0024)	0.9
Sex, C_{03}	−0.519 (0.015)	35.0	8.73 (0.27)	32.8	0.041 (0.008)	5.1	0.22 (0.03)	7.6	0.010 (0.002)	6.1
Race, C_{04}	0.041 (0.017)	2.4	−3.20 (0.30)	10.5	0.046 (0.009)	5.1	−0.40 (0.03)	12.2	0.0049 (0.0019)	2.6
Time of study, C_{06}	0.069 (0.003)	17.5	0.30 (0.06)	4.8	0.0085 (0.0018)	4.6	0.27 (0.007)	40.8	0.0014 (0.0004)	3.8
Average pay,C_{07}					$2.4 * 10^{-6}$ (0.0000)	>100				
Slope of time										
intercept, C_{10}	0.029 (0.006)	5.1	−0.10 (0.11)	1.0	−00062 (0.003)	2.1	−0.009 (0.008)	1.1	0.0146 (0.0010)	15.1
GMA, C_{11}	0.00031 (0.00003)	10.5	0.0091 (0.0005)	16.8	0.00007 (0.00002)	4.4	0.0011 (0.00005)	23.7	−0.00004 (0.00000)	7.9
Late-CSE, C_{12}	0.0148 (0.0018)	8.3	0.165 (0.033)	5.0	0.0055 (0.0010)	6.0	0.023 (0.003)	8.7	−0.0030 (0.0003)	9.9

t-Ratios above 2.5 are significant at the 0.01 level. *t*-ratios above 4.5 are significant at the 0.0001 level.

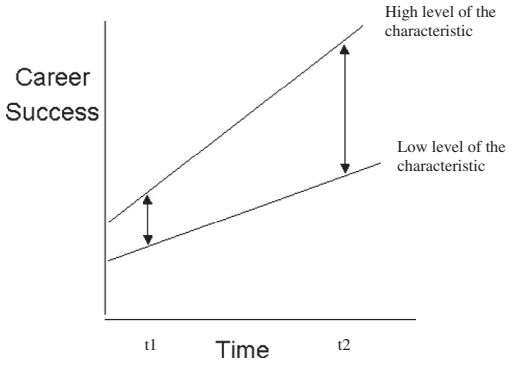

Fig. 6. Changin (increasing) validity illustrated by differences in career trajectories. The characteristic predicts the level of career success (since at any point of time the career success of the high level group of is higher than the low level group), as well as the change in career success (since the trajectory of the high level group is steeper than the low level group). The increased gap in career success between groups is associated with increasing validity. At each point of time, the length of the arrow between the trajectory of the low and high characteristic's group is proportional to the validity of the characteristic.

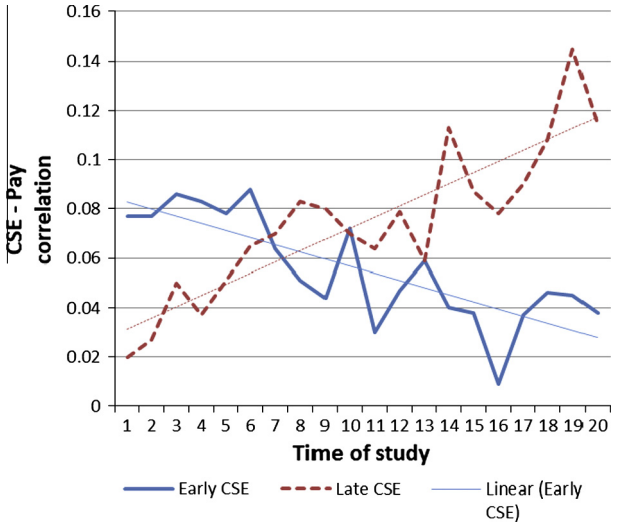

Fig. 7. Changing validity of early and late CSE in predicting pay.

relevant to some of the dependent variables we examined and less relevant to others.

The intuition regarding a positive relationship between the level of (early) CSE and career success (e.g., Judge, 2009 Judge & Bono, 2001; Bernick, 1981; Gecas & Seff, 1990), does not necessarily imply a positive relationship between CSE and growth in success. A similar case in point is the relationship between relevant individual characteristics and performance. The literature indicates that quite often a positive relationship between an initial measurement of a characteristic and subsequent performance is associated with a negative relationship between this measurement and change in performance; i.e., the higher the initial measurement, the less positive the change in performance (e.g., Hulin, Henry, & Noon, 1990)."

The reason for this phenomenon is that the relationship between characteristics and performance weakens with increased experience. Our results are consistent with this literature. Viewing success as a type of performance, Figs. 1 and 2 above indicate that although the relationship between CSE and success is generally positive – those with high CSE are more successful than those with low CSE at all times – this positive relationship declines over time, as the gap between those high on early-CSE and those low on early-CSE decreases with time (Appendix B below presents a formal description of this argument).

This explanation for the negative relationship between CSE and growth in career success assumed that the causal relationship goes from CSE to success. But as we noted in the introduction, the causal relationship between the two is not clear at all, and it is quite possible that it goes from success to CSE as well. Assuming such a (reverse) causal relationship, early success should be more strongly related to early-CSE than late success, and therefore the relationship between early success and CSE should decrease with time.

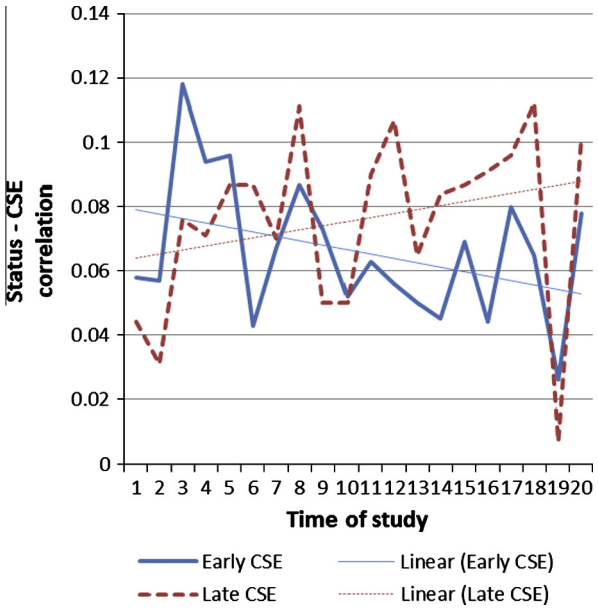

Fig. 8. Changing validity of early and late CSE in predicting occupational status.

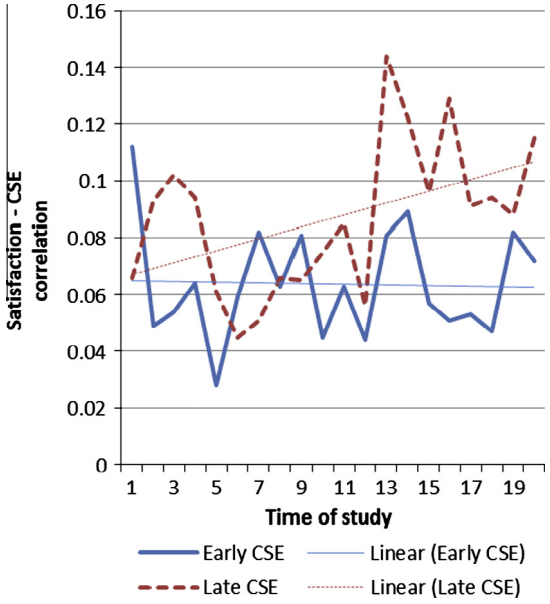

Fig. 9. Changing validity of early and late CSE in predicting job satisfaction.

In addition, late success should be more strongly related to late-CSE than early success, and the relationship between late success and CSE should increase with time. Thus, both a success → CSE model and a CSE → model can explain the negative relationship between CSE and growth in career success (see also Roberts, Caspi, & Moffitt, 2003, for a discussion of reciprocal mutual causation).

In conclusion, our replication of Judge and Hurst's (2008) study suggests that the relationship between growth in career success and CSE is not positive: It is negative for extrinsic success, and non-significant for intrinsic success. In addition, the paper highlights the importance of controls in the analysis of correlational data: A comparison of our results to those of Judge and Hurst (2008) and Judge et al. (2010) suggests that the outcomes of such analyses based are not robust to adding appropriate controls. Finally, we believe that the current paper provides an example for the importance of replications, critiques and corrections. Though such endeavors are essential for science, and there is a wide consensus regarding their importance to our field (e.g., Eden, 2002), very little effort is devoted to conducting them. We hope that this study will contribute to encouraging such efforts.

Appendix A. Items used to measure core self-evaluations

Earlier items

(1) What happens to me is of my own doing. (1979).
(2) When I make plans, I am almost certain to make them work. (1979).
(3) I feel that I am a person of worth, on an equal basis with others. (1980).
(4) I feel that I have a number of good qualities. (1980).
(5) All in all, I am inclined to feel that I am a failure. (1980; reverse-scored).
(6) I feel I do not have much to be proud of. (1980; reverse-scored).
(7) I wish I could have more respect for myself. (1980; reverse-scored).

Later items

(1) I have been depressed. (1987; reverse-scored).
(2) I have felt hopeful about the future. (1987).
(3) What happens to me in the future mostly depends on me. (1992).
(4) I have little control over the things that happen to me. (1992; reverse-scored).
(5) There is little I can do to change many of the important things in my life. (1992; reverse-scored).

Note. Years in which items were measured in the NLSY79 are in parentheses. The years of some of the items are different form the years listed in Judge and Hurst's (2008) appendix (see p. 863), but the years in the current appendix are consistent with those reported in the NLSY user guide (see chapter 4.5, http://www.nlsinfo.org/nlsy79/docs/79html/79text/attitude.htm)

Appendix B.

More formally, this argument could be portrayed as follows. If SUC_{1i} and SUC_{2i} are, respectively, the measures of career success at earlier and later points in time of individual i, and CSE_{1i} and CSE_{2i} are, respectively, earlier and later measures of CSE of individual i, then the cross-sectional relationships between career success and CSE at these two time points, as well as the relationship between the two measures of CSE, can be written as (for simplicity we omit the index i):

$$SUC_1 = \beta * CSE_1 + e \quad (1)$$

$$SUC_2 = \beta * CSE_2 + e \quad (2)$$

$$CSE_2 = \beta' * CSE_1 + e' \quad (3)$$

From (2) and (3) we obtain:

$$SUC_2 = \beta(\beta' CSE_1 + e') + e = \beta\beta' CSE_1 + \beta e' + e \quad (4)$$

And assuming without loss of generality that all our variables are standardized, it is easy to show that (since $\beta < 1$ and $\beta' < 1$) the effect of CSE_1 on SUC_1 (Eq. (1)) is stronger than the effect of CSE_1 on SUC_2 (Eq. (4)).

Note that this line of reasoning also suggests why the relationship between late-CSE and career success increases over time (i.e., why late-CSE is associated with growth in career success). Late-CSE should be more strongly related to later, rather than to earlier, success, showing an increase in the relationship between CSE and success. Formally this is portrayed by noting that

$$CSE_1 = \beta' * CSE_2 + e' \quad (5)$$

And note that β' in this equation is indeed β' from Eq. (3), since both are equal to the correlations between CSE_1 and CSE_2.

From (1) and (5) we obtain:

$$SUC_1 = \beta(\beta' CSE_2 + e') + e = \beta\beta' CSE_2 + \beta e' + e \quad (6)$$

And, since $\beta\beta' < \beta$, it is clear that the coefficient obtained from regressing SUC_2 on CSE_2 (Eq. (2)) is larger from the coefficient obtained from regressing SUC_1 on CSE_2 (Eq. (6)).

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