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*Psychological Science* 2013 24: 2530 originally published online 18 October 2013

DOI: 10.1177/0956797613498396

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# Personality Maturation Around the World: A Cross-Cultural Examination of Social-Investment Theory

Psychological Science  
24(12) 2530–2540  
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DOI: 10.1177/0956797613498396  
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## Abstract

During early adulthood, individuals from different cultures across the world tend to become more agreeable, more conscientious, and less neurotic. Two leading theories offer different explanations for these pervasive age trends: Five-factor theory proposes that personality maturation is largely determined by genetic factors, whereas social-investment theory proposes that personality maturation in early adulthood is largely the result of normative life transitions to adult roles. In the research reported here, we conducted the first systematic cross-cultural test of these theories using data from a large Internet-based sample of young adults from 62 nations ( $N = 884,328$ ). We found strong evidence for universal personality maturation from early to middle adulthood, yet there were significant cultural differences in age effects on personality traits. Consistent with social-investment theory, results showed that cultures with an earlier onset of adult-role responsibilities were marked by earlier personality maturation.

## Keywords

personality development, Big Five, social investment, culture, adult development, cross-cultural differences, personality

Received 10/21/12; Revision accepted 6/26/13

During the period of early adulthood, individuals across the world tend to become more agreeable, more conscientious, and less neurotic (Roberts, Wood, & Caspi, 2008). Two leading theories offer radically different explanations for these pervasive age trends. Five-factor theory argues that personality development is largely controlled by genetically determined biological influences, with environmental influences having only a negligible role (McCrae & Costa, 2008). In contrast, social-investment theory argues that investment in age-graded social roles, such as spouse, parent, and employee, is a key influence on personality development (Roberts, Wood, & Smith, 2005).

In the present research, we evaluated these two competing theories by testing whether cultural differences in personality development are associated with cultural differences in the normative timing of adult-role transitions. Social-investment theory predicts such an association,

whereas five-factor theory predicts no association. We tested for this association across 62 nations spread over five continents (America, Australia, Africa, Asia, and Europe).

## Personality Maturation: A Pancultural Phenomenon?

A large body of research has suggested that normative personality development in early adulthood reflects growth in the direction of greater maturity. In terms of the Big Five model of personality (McCrae & John, 1992), both longitudinal and cross-sectional studies have shown

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that individuals tend to become more agreeable, more conscientious, and less neurotic from early adulthood through middle age (for reviews see, Roberts, Walton, & Viechtbauer, 2006; Roberts et al., 2008). This robust pattern has often been referred to as the *maturity principle* of personality development (Roberts et al., 2008). Less consistent results have been reported for extraversion and openness, which generally show rather modest age differences across the life span (Soto, John, Gosling, & Potter, 2011).

Most studies have used samples from Western societies, but there is some evidence to suggest that age trends are relatively similar in different cultures. Specifically, McCrae and colleagues (1999) showed relatively consistent age differences in Big Five self-reports across six nations. A subsequent study based on data from 50 nations revealed that all 50 were characterized by age-related increases in conscientiousness (McCrae & Terracciano, 2005). Effects for extraversion and openness were also relatively consistent and suggested that levels of both traits are slightly higher in college-aged relative to middle-aged adults in almost every culture.

What can explain these consistent patterns across cultures? As noted above, two prominent theories—five-factor theory and social-investment theory—claim to illuminate this question.

### **Five-factor theory**

Five-factor theory defines personality traits as basic tendencies representing “endogenous dispositions that follow intrinsic paths of development essentially independent of environmental influences” (McCrae et al., 2000, p. 173). Thus, both stability and change in traits should be under the control of biological factors that are mainly determined by genes. According to this position, a lack of cross-cultural differences in age trends in personality supports the assumption that the timing of personality development is a genetically determined human universal. To the extent that there are any cultural differences in age trends, they should be neither systematic nor related to any socio-cultural markers.

### **Social-investment theory**

An alternative account for why normative personality changes are consistent across different cultures and occur predominantly during early adulthood has been elaborated within the framework of social-investment theory (Roberts et al., 2005). Social-investment theory proposes that age-graded life transitions in early adulthood—such as completing education, entering the labor force, marrying, and becoming a parent—stimulate personality maturation because they force individuals to invest in and

commit to new social roles. These roles are connected to culture-specific societal expectations at a given age. To the extent that these expectations can be formulated in terms of traits (e.g., an expectation to act in a conscientious way), transitional-role experiences are assumed to form a reward structure for personality maturation.

According to social-investment theory, the observed normative increases in maturity can be explained by the fact that a large portion of the population is engaged in these universal life tasks during the period of early adulthood (Bleidorn, 2012; Lodi-Smith & Roberts, 2007). That is, people across many different cultures may change in broadly similar ways because these universal life tasks are promoted by most modern cultures, and a majority of people in a majority of cultures go through similar life transitions at approximately the same ages. As a result, in examinations of broad developmental trends across broadly similar cultures, the predictions of five-factor theory and social-investment theory will converge.

The predictions of the two theories will diverge only in comparisons of cultures that are sufficiently diverse to differ in their cultural expectations regarding the normative timing of adult-role transitions. Specifically, social-investment theory would predict earlier personality maturation in cultures in which individuals take on adult-role responsibilities at an earlier age. That is, cultural differences in age trends in personality should be a function of culture-specific social clocks that define the normative timing of those transitions (Neugarten, Moore, & Lowe, 1965). For example, the average U.S. female marries (for the first time) at age 26, much later than the average female from India, who marries at age 20, but substantially earlier than the average Swedish female, who is already 32 on her wedding day (United Nations, Department of Economic and Social Affairs, Population Division, 2008). Social-investment theory would therefore predict earlier changes in maturity-related traits in India compared with the United States, which in turn should be marked by earlier changes than Sweden.

Cultural differences in the normative timing of adult-role transitions are also captured in the theory of emerging adulthood (Arnett, 2000). This theory places less emphasis on demographic role transitions, but it also views the attainment of adult status as a process of psychological maturation (Arnett, 2001). Building on the observation that this process has considerably slowed down in Western cultures, Arnett introduced the concept of *emerging adulthood* as a new life stage between adolescence and full-fledged adulthood in industrialized cultures that postpone entry into adult roles. Emerging adulthood is supposed to be a distinctive period in life that offers the most opportunity for explorations in the areas of love, work, and worldviews before one takes on enduring adult responsibilities. Accordingly, this period

should be marked by increases in emerging adults' openness to new ideas and experiences.

Combining the assumptions of social-investment theory and the theory of emerging adulthood, it can be hypothesized that cultures with a late transition to adult roles should be marked by delayed increases in emotional stability, agreeableness, and conscientiousness along with more pronounced increases in openness. Cultures with an earlier onset of adult-role responsibilities, on the other hand, should be characterized by accelerated increases in maturity-indicating traits but less pronounced increases in openness.

## The Present Study

The present study was meant to extend previous work on cultural variation in age differences in personality by providing the first large-scale systematic test of the conflicting predictions of five-factor theory and social-investment theory. First, to confirm the well-established universal age trends in the direction of greater maturity, we examined the average effects of age on Big Five personality traits across 62 cultures. We then examined the degree of cross-cultural variance in these effects. Finally, we examined whether cross-cultural variation in patterns of change was associated with the normative timing of adult-role transitions (e.g., marriage, parenthood) across cultures.

## Method

### *Participants and procedure*

To provide a meaningful test of five-factor theory and social-investment theory, we needed to gather personality data from as broad a range of cultures as possible and from young adult participants in the age ranges in which the personality changes are hypothesized to occur. Thus, we made use of a large sample of participants who had provided personality and demographic information over the World Wide Web as part of the Gosling-Potter Internet Personality Project (for details, see Gosling, Vazire, Srivastava, & John, 2004). Potential respondents could find out about this noncommercial, advertisement-free Web site through several channels, including search engines and unsolicited links on other Web sites. After submitting their responses, participants were presented with a customized personality evaluation.

To capture the period of early adulthood, we focused on an age range of 16 to 40 years. Preliminary analyses had indicated that samples of at least 100 participants were necessary to estimate reliable age-group-specific means and systematic age trends. So, to ensure sufficiently large samples in a large number of countries, we

pooled participants within each country into five age groups of 5 years each (ages 16–20, 21–25, 26–30, 31–35, and 36–40) and selected cases only from those nations with at least 100 cases per age group. To increase the diversity of cultures in our analyses, we relaxed the criterion slightly for Kenya, Saudi Arabia, the United Arab Emirates, and Zimbabwe, which came very close to meeting the inclusion threshold. Finally, because of a tremendous overrepresentation of participants from the United States (51%), we selected a random subsample of cases from the United States (10%). As a result of the selection criteria, the initial pool of 3,116,516 participants was reduced to 884,328 participants (63% females, 37% males) from 62 nations. The list of selected nations and nation-specific sample characteristics are shown in Table 1.

## Measures

**Personality.** Big Five personality traits were measured by using the Big Five Inventory (BFI; John, Donahue, & Kentle, 1991). Participants provided self-ratings for all items, using 5-point scales from 1 (*strongly disagree*) to 5 (*strongly agree*). In the current sample, 56% of the participants completed the original English version, 32% the Spanish version (Benet-Martínez & John, 1998),<sup>1</sup> 7% the German version (Rammstedt, 1997) and 5% the Dutch version (Denissen, Geenen, van Aken, Gosling, & Potter, 2008). All scales showed satisfactory to excellent reliabilities across age groups and nations (see Table 1).

BFI raw scores were transformed to the *T*-score metric (standard scores with a mean of 50 and standard deviation of 10). In addition to age and nation effects, we also controlled for gender effects when converting to *T* scores, following a procedure suggested by Soto et al. (2011). That is, we computed the overall mean for each BFI scale by first computing its mean in each of the 620 age-, gender-, and nation-specific samples (5 age groups × 2 genders × 62 nations) and then averaging these 620 group means. Similarly, we computed the overall standard deviation of each scale as the square root of the pooled within-group variance term from a three-way analysis of variance. This produced a *T*-score distribution uninfluenced by nation, age, and gender differences.

**Culture-level role-transition indices.** To derive indices that captured the social norms regarding the timing of transitions into roles in marriage, parenthood, and the labor force (i.e., the roles typically considered to mark the transition to adulthood), we drew on secondary culture-level data for the nations studied. Specifically, to create indices of the normative timing of marriage and parenthood, we retrieved data from the United Nations Statistics Division (<http://unstats.un.org>) on the percentage of (a) male and (b) female teenagers (aged 15–19) ever

**Table 1.** Sample Characteristics

Nation	N	Female respondents (%)	CRT index (z score)		BFI scales (Cronbach's $\alpha^a$ )				
			Family	Job	Neuroticism	Extraversion	Openness	Agreeableness	Conscientiousness
Argentina	55,030	73	0.75	-0.04	.77-.81	.78-.80	.75-.77	.69-.76	.75-.77
Australia	34,004	62	-1.04	-1.51	.84-.86	.87-.88	.75-.80	.78-.81	.83-.84
Austria	6,026	60	-0.60	0.23	.83-.87	.87-.90	.79-.80	.72-.75	.84-.86
Belgium	8,721	62	-1.07	-1.71	.84-.88	.85-.87	.76-.79	.73-.76	.81-.85
Bolivia	3,231	66	1.26	0.39	.75-.81	.79-.82	.73-.80	.45-.83	.73-.83
Brazil	3,682	49	1.23	0.93	.80-.82	.80-.85	.68-.75	.64-.74	.75-.78
Canada	74,602	63	-0.46	-1.77	.83-.85	.86-.87	.76-.81	.78-.80	.81-.83
Chile	25,134	72	0.44	0.31	.78-.82	.79-.83	.76-.78	.66-.77	.76-.79
China	10,103	65	-0.10	1.14	.78-.81	.72-.78	.73-.75	.66-.72	.73-.77
Colombia	17,367	71	1.21	0.28	.77-.82	.77-.82	.74-.76	.69-.74	.74-.77
Costa Rica	2,826	70	0.66	-0.16	.77-.80	.75-.83	.67-.79	.70-.84	.73-.78
Croatia	1,774	66	-0.61	0.80	.84-.88	.77-.85	.63-.70	.72-.78	.76-.83
Cuba	1,075	74	1.64	0.59	.78-.82	.72-.81	.72-.80	.64-.74	.70-.75
Denmark	3,492	49	-1.31	-0.95	.82-.86	.83-.85	.74-.79	.74-.79	.79-.84
Dominican Republic	3,589	76	1.53	0.20	.78-.80	.70-.80	.73-.77	.71-.79	.66-.76
Ecuador	3,649	69	2.00	0.00	.74-.81	.75-.81	.75-.79	.68-.76	.74-.76
Egypt	2,206	65	0.30	0.57	.80-.85	.71-.76	.65-.81	.60-.79	.75-.79
El Salvador	1,990	69	1.53	0.39	.77-.81	.76-.82	.70-.77	.67-.79	.71-.76
Finland	6,618	66	-1.13	-0.89	.82-.86	.83-.85	.71-.75	.71-.77	.79-.82
France	4,279	54	-1.29	-0.94	.80-.86	.82-.85	.75-.81	.70-.76	.79-.83
Germany	56,723	58	-1.27	-1.56	.83-.87	.86-.88	.78-.80	.71-.73	.83-.85
Great Britain	79,091	58	-0.07	-1.46	.83-.86	.86-.87	.76-.81	.78-.80	.83-.84
Greece	3,288	64	-0.66	0.11	.78-.82	.75-.81	.67-.73	.65-.74	.78-.82
Guatemala	2,872	67	1.36	1.22	.76-.84	.76-.81	.75-.77	.64-.81	.69-.77
Hong Kong	4,942	66	-1.20	0.17	.82-.85	.80-.82	.73-.80	.67-.74	.77-.81
Hungary	1,251	61	-1.01	-0.07	.81-.87	.80-.85	.67-.74	.72-.76	.76-.83
India	26,691	49	1.14	0.43	.81-.83	.79-.80	.64-.69	.69-.72	.78-.83
Indonesia	3,846	60	0.39	-0.24	.77-.83	.76-.81	.64-.72	.65-.73	.75-.80
Iran	1,787	59	0.51	0.74	.80-.83	.72-.79	.66-.74	.65-.74	.73-.79
Ireland	9,677	59	-1.12	-0.71	.82-.86	.83-.86	.78-.80	.76-.78	.83-.85
Israel	2,038	56	-0.50	-1.57	.85-.89	.79-.82	.65-.71	.70-.78	.79-.85
Italy	3,716	57	-1.21	0.39	.81-.85	.78-.84	.71-.76	.66-.74	.76-.82
Jamaica	1,361	76	-1.04	-0.47	.75-.85	.79-.83	.68-.76	.61-.77	.79-.86
Japan	2,506	69	-1.00	-0.48	.77-.82	.77-.81	.71-.80	.74-.81	.74-.78
Kenya	1,354	61	1.25	0.70	.74-.83	.76-.82	.67-.77	.75-.79	.79-.83
Malaysia	9,397	67	-0.29	1.87	.79-.85	.76-.79	.64-.73	.69-.76	.78-.81
Mexico	67,492	66	1.47	1.12	.77-.81	.76-.80	.76-.77	.70-.74	.74-.76
The Netherlands	44,493	63	-1.31	-2.40	.83-.87	.84-.85	.76-.79	.72-.73	.81-.82
New Zealand	10,189	65	0.47	-1.04	.83-.86	.86-.87	.76-.80	.77-.79	.82-.83
Nigeria	1,645	56	1.71	0.48	.72-.83	.72-.76	.66-.73	.68-.77	.79-.84
Norway	10,900	59	-1.41	-1.20	.81-.85	.81-.85	.74-.78	.70-.74	.76-.80
Pakistan	4,830	50	0.53	2.21	.79-.82	.74-.80	.59-.73	.64-.72	.72-.82
Peru	11,084	68	0.28	-0.76	.75-.81	.79-.83	.74-.78	.64-.76	.77-.79
Philippines	20,328	75	0.47	0.47	.76-.82	.75-.79	.67-.73	.71-.75	.76-.80
Poland	3,762	62	-0.43	0.31	.82-.85	.82-.85	.65-.75	.74-.77	.75-.85
Portugal	1,749	52	-0.22	0.55	.80-.87	.75-.87	.75-.77	.70-.77	.75-.83
Romania	4,080	68	-0.34	0.94	.81-.85	.83-.84	.74-.77	.71-.75	.77-.82
Russia	2,630	67	0.27	-0.07	.80-.85	.79-.82	.68-.74	.66-.75	.78-.81

(continued)

**Table 1.** (continued)

Nation	N	Female respondents (%)	CRT index (z score)		BFI scales (Cronbach's $\alpha^a$ )				
			Family	Job	Neuroticism	Extraversion	Openness	Agreeableness	Conscientiousness
Saudi Arabia	1,657	56	-0.19	1.48	.75-.85	.68-.80	.65-.77	.64-.71	.77-.81
Serbia	1,679	61	-0.37	0.67	.82-.87	.82-.84	.56-.72	.63-.72	.78-.86
Singapore	8,648	64	-0.87	1.02	.81-.87	.82-.84	.73-.78	.74-.78	.80-.84
South Africa	6,011	66	-0.08	0.88	.81-.84	.84-.86	.72-.78	.74-.77	.82-.83
South Korea	2,896	50	-1.08	-0.27	.65-.77	.73-.80	.71-.77	.68-.72	.71-.77
Spain	80,916	70	-0.98	-0.88	.80-.86	.82-.84	.78-.80	.66-.71	.78-.80
Sweden	10,173	57	-1.42	-0.81	.82-.86	.84-.86	.72-.78	.74-.77	.80-.83
Switzerland	6,609	58	-1.11	-0.51	.82-.85	.85-.87	.78-.79	.66-.74	.81-.84
Turkey	1,802	55	0.32	0.71	.78-.83	.79-.85	.62-.71	.65-.73	.78-.84
United Arab Emirates	2,295	64	0.01	0.38	.78-.85	.75-.81	.66-.77	.69-.77	.71-.83
United States of America	83,381	64	0.44	-2.02	.83-.85	.87-.87	.78-.81	.80-.80	.82-.83
Uruguay	3,674	73	1.02	0.30	.77-.82	.75-.81	.75-.81	.61-.64	.75-.78
Venezuela	10,709	74	1.51	-0.39	.77-.81	.78-.81	.73-.76	.65-.77	.73-.76
Zimbabwe	758	65	1.09	1.90	.81-.86	.78-.82	.69-.77	.74-.77	.80-.84

Note: CRT Index = cultural-role-transition indices (z scores).

<sup>a</sup>The table shows the range of Cronbach's alphas across the five age groups for each nation.

married, (c) teenage birth rates (number of annual live births per 1,000 women aged 15–19), and mean age at first marriage for (d) males and (e) females. To create indices of culture-level normative timing of completion of education and entry into the labor force, we retrieved data from the UNESCO Institute for Statistics (<http://www.uis.unesco.org>) on (f) years of compulsory education and (g) the percentage of the population that had completed tertiary education (i.e., received a bachelor's degree or higher).

We ran a principal component analysis with Promax rotation on these variables across the 62 cultures, which resulted in two moderately correlated factors ( $r = .45$ ) that explained 77% of the variance among cultures. The first component was marked by the first five variables selected to indicate the transition to marriage and parenthood; we therefore labeled this component the family index. The second component was marked by the variables selected to indicate the transition to the labor force, so we labeled it the job index. Figure 1 shows each culture's position on the two components as indicated by the regression-based factor scores (see also Table 1). Higher values point to an earlier normative timing of family and job transitions.

## Analyses

We used multilevel modeling techniques (using Mplus 6.11; Muthén & Muthén, 1998) to account for the nested

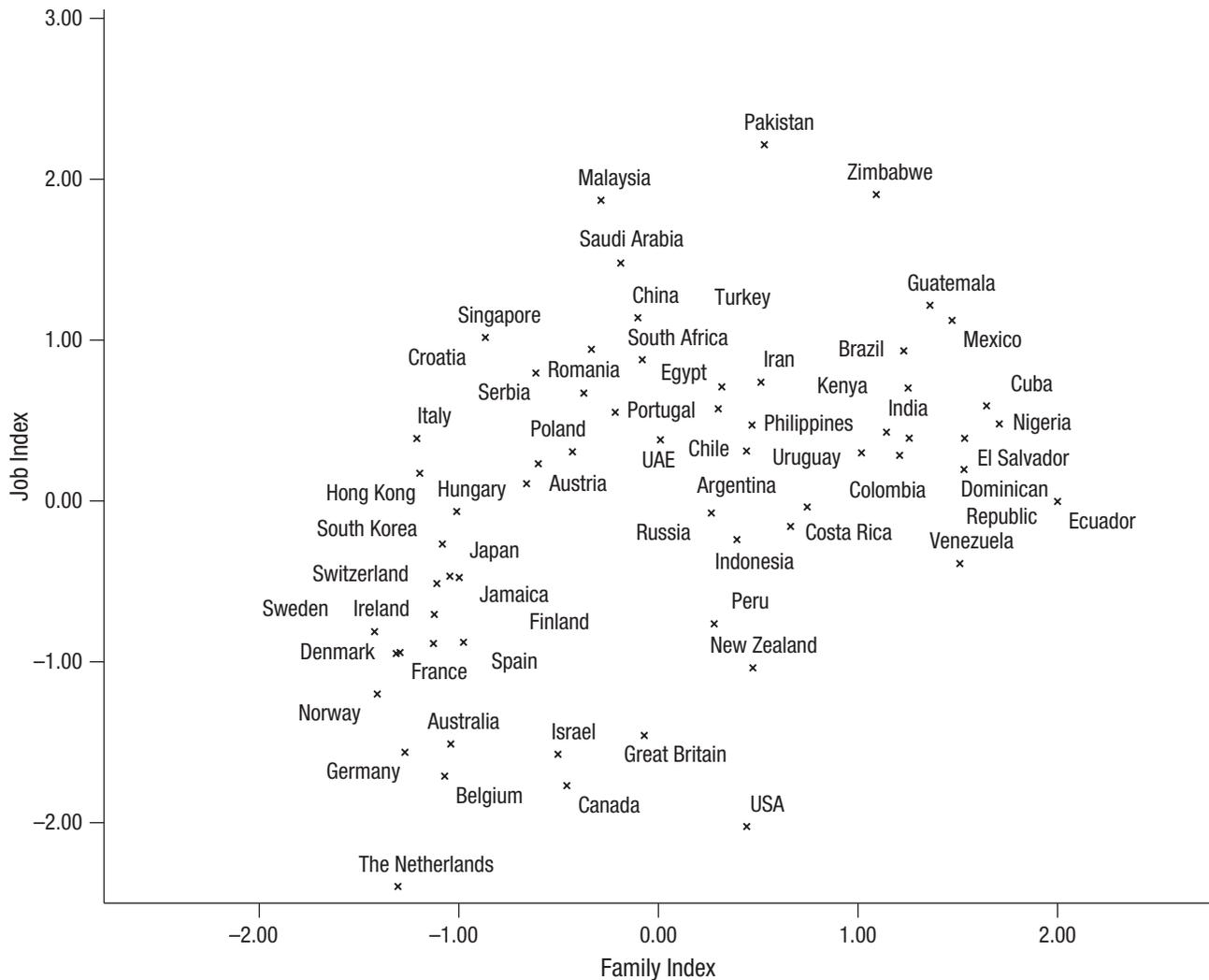
structure of the data. Level 1 represented variation among individuals within nations, and Level 2 represented the variation among nations.

In a first step, we ran a series of random-coefficient regression models (Hox, 2002) to examine the average age effects on the five BFI scales across all nations. In addition to age, we included gender at Level 1 to account for the widely established gender differences in the Big Five (e.g., Schmitt, Realo, Voracek, & Allik, 2009). In these models, the intercept and slope coefficients were allowed to vary on Level 2 to capture the cross-cultural variation in BFI means as well as in age and gender effects. In a second step, we extended these models to intercept-and-slope-as-outcome models. That is, we included the two culture-level role-transition indicators (family and job) as explanatory variables at Level 2 to test whether these could explain cultural differences in age trends in personality traits. (See the Supplemental Material, available online, for details of the multilevel analyses, measurement invariance, and auxiliary statistics.)

## Results

### Random-coefficient regression models

Table 2 shows the results of the random-coefficient regression models. Given the coding of both explanatory Level 1 variables (age and gender), the estimated fixed parameters can be interpreted as referring to the expected outcomes for a male individual aged 16 to 20.



**Fig. 1.** Scatter plot showing the relation between regression-based factor scores on the family- and job-role-transition indices for 62 nations (see Table 1 for exact  $z$  scores). UAE = United Arab Emirates; USA = United States of America.

In line with the maturity principle and consistent with prior research, results showed the strongest age effects on neuroticism, agreeableness, and conscientiousness and only moderate effects on extraversion and openness. Specifically, neuroticism decreased about 2  $T$ -score points, agreeableness increased about 3  $T$ -score points, and conscientiousness increased nearly 8  $T$ -score points from teenage years to middle age. According to Cohen's (1988) guidelines for interpreting effect sizes, the age differences in neuroticism and agreeableness represent small effects, whereas the difference of 8  $T$ -score points in conscientiousness can be considered a large effect.

The random parameters indicated that the magnitude of the age effects varied significantly among nations. This result justified the use of further analyses to test whether these cultural differences in age trends were related to cultural norms regarding the timing of adult-role transitions.

For the sake of completeness, Table 2 also shows the gender differences in personality across cultures. In line with previous cross-cultural findings (e.g., Schmitt et al., 2009), on average, females scored higher on neuroticism, extraversion, agreeableness, and conscientiousness, whereas males had higher scores on openness. Also consistent with prior research, the magnitude of these sex differences varied substantially across cultures.

### ***Intercept-and-slope-as-outcome models***

We extended our initial models by including the two culture-level variables indicating the normative timing of family-role and job-role transitions as explanatory variables at Level 2. The top portion of Table 3 shows the direct cross-level effects of the two culture-level variables on mean levels for Big Five factors. The family index

**Table 2.** Results From Random-Coefficient Regression Models: Predicting the Effects of Age and Gender on Big Five Inventory (BFI) Scales Within and Between Nations

Parameter	BFI scale				
	Neuroticism	Extraversion	Openness	Agreeableness	Conscientiousness
Fixed effects					
Intercept	49.12	48.73	50.10	48.16	45.70
Level 1					
Age	-0.56***	0.22**	0.26***	0.76***	1.91***
Gender	4.08***	1.48***	-1.22***	1.14***	1.16***
Random parameters					
Level 1					
$\sigma^2$ intercept	100.93***	99.62***	101.84***	93.96***	99.52***
Level 2					
$\sigma^2$ intercept	2.20***	0.95***	4.35***	3.88***	2.84***
$\sigma^2$ age	0.09***	0.08***	0.16***	0.08***	0.10***
$\sigma^2$ gender	0.64***	0.56***	0.67***	0.56***	0.78***

Note: At Level 1,  $N = 884,328$  individuals; at Level 2,  $N = 62$  nations.  $\sigma^2$  intercept,  $\sigma^2$  age, and  $\sigma^2$  gender = Level 1 and Level 2 variance components for mean trait-level, age, and gender effects, respectively.

\*\* $p < .01$ . \*\*\* $p < .001$ .

showed positive main effects on openness and conscientiousness. The job index showed a positive main effect on neuroticism and a negative main effect on extraversion.

It is important to note that we had no strong hypotheses regarding these main effects. Rather, our main focus was on the cross-level interactions between the two role-transition indices and age (Age  $\times$  Family and Age  $\times$  Job) because these parameters should illuminate the question of whether cultural norms regarding the timing of adult-role transitions moderate age trends in personality. There was only one significant cross-level interaction involving the family index, which indicated that age-related increases in openness tended to be less pronounced in nations with an earlier onset of family-role responsibilities. We found a similar marginally significant effect for the job index.

We estimated the proportional reduction of cross-cultural variance in age effects in comparison with the random-coefficient regression models as a baseline, a measure analogous to the  $R^2$  statistic used in ordinary regression analyses (Hox, 2002; see the Auxiliary Statistics section of the Supplemental Material for more details on this multilevel effect-size measure). Accordingly, the two culture-level predictors together explained 25% of the cross-cultural variance in age effects on openness. We found three further cross-level interactions between the job index and age that were all in line with the predictions of social-investment theory. Specifically, there were two positive cross-level interactions suggesting accelerated increases in agreeableness and conscientiousness in cultures with an earlier normative timing of job-role

transitions. These effects explained 13% and 20% of the cross-cultural variation in age differences in agreeableness and conscientiousness, respectively. In addition, there was a negative cross-level interaction that explained about 11% of the cross-cultural variance in age differences in neuroticism. This effect implied more pronounced age-related decreases in neuroticism in cultures with earlier job-role transitions. Figure 2 illustrates this effect by showing the age trends in neuroticism implied by the model for the cultures with the highest scores (Pakistan), average scores (Argentina), and the lowest scores (The Netherlands) on the job index.

## Discussion

The present study provides the first systematic cross-cultural examination of the conflicting predictions generated by the two leading theories on personality development. In line with both five-factor theory and social-investment theory, results revealed strong evidence for the assumption that personality maturation during early adulthood is a universal phenomenon: Across 62 cultures from all over the world, neuroticism tended to decrease and extraversion,<sup>2</sup> openness, agreeableness, and conscientiousness tended to increase from early to middle adulthood. Yet there were slight but significant cultural differences in age effects on personality traits, which could be partly explained by cultural differences in the normative timing of adult-role transitions in the domains of work and family.

**Table 3.** Results From Intercept-and-Slope-as-Outcome Models: Predicting the Effects of Age, Gender, and the Normative Timing of Social-Role Transitions on Big Five Inventory (BFI) Scales Within and Between Nations

Parameter	BFI scale				
	Neuroticism	Extraversion	Openness	Agreeableness	Conscientiousness
	Fixed effects				
Intercept	48.64	48.95	50.20	47.95	45.78
Level 1					
Age	-0.51***	0.19**	0.33***	0.70***	1.84***
Gender	4.28***	1.70***	-1.29***	1.37***	1.39***
Level 2					
BFI score regressed on family index	0.10	0.12	1.44***	0.28	0.58**
BFI score regressed on job index	0.70***	-0.33*	-0.30	0.27	-0.18
Age × Family	0.03	0.01	-0.14**	-0.01	0.04
Age × Job	-0.10*	0.05	-0.10 <sup>†</sup>	0.09 <sup>†</sup>	0.10*
	Random parameters				
Level 1					
σ <sup>2</sup> intercept	100.93***	99.62***	101.84***	93.96***	99.52***
Level 2					
σ <sup>2</sup> intercept	1.60***	0.85***	2.65***	3.41***	2.29***
σ <sup>2</sup> age	0.08***	0.08***	0.12***	0.07***	0.08***
σ <sup>2</sup> gender	0.64***	0.56***	0.67***	0.56***	0.78***

Note: At Level 1,  $N = 884,328$  individuals; at Level 2,  $N = 62$  nations;  $\sigma^2$  intercept,  $\sigma^2$  age, and  $\sigma^2$  gender = Level 1 and Level 2 variance components for mean trait-level, age, and gender effects, respectively. "Family index" and "job index" refer to cultural indicators for the normative timing of family- and job-role transitions, respectively.

<sup>†</sup> $p < .10$ . \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

Our findings largely support the assumptions of social-investment theory. That is, the overall pattern of age trends across cultures seems not to be fully determined by a universal genetic maturation program. Rather, our findings suggest that universal life tasks during early adulthood—such as finding a partner, starting a family, and establishing one's career—are also important catalysts for personality maturation (Roberts et al., 2005).

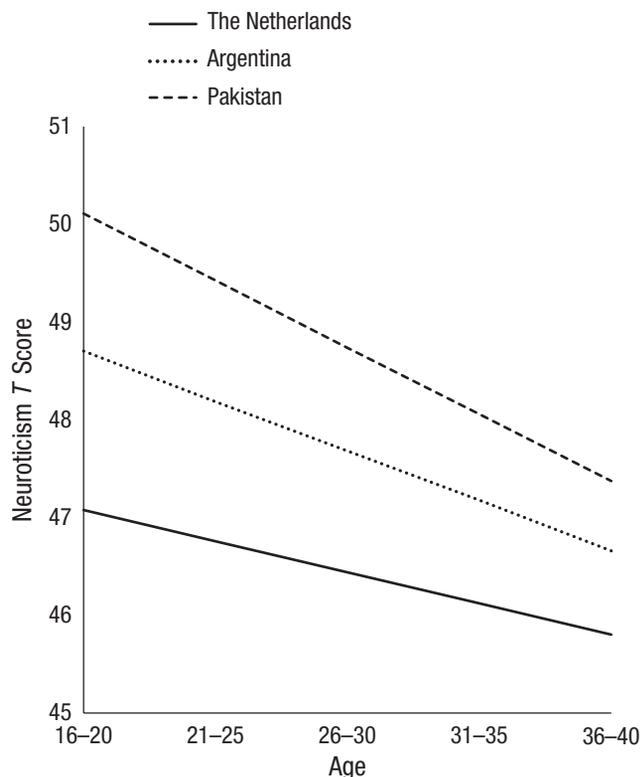
Strikingly, transitions to the labor force turned out to be more important than family-role transitions. In fact, the expected pattern of an earlier onset of age trends in neuroticism, agreeableness, and conscientiousness was found only for cultures with an earlier normative onset of job-role responsibilities. The lack of effects of cultural norms regarding family-role transitions is especially notable given that psychologists (Lodi-Smith & Roberts, 2007), sociologists (Hogan & Astone, 1986), and anthropologists (Schlegel, 1995) generally consider marriage and parenthood to be the most pervasive markers of adult status. Interestingly, laypeople themselves—young as well as middle-aged adults—view occupational status and career, not marriage and parenthood, as the key markers of adult status (Arnett, 2001). Perhaps the family role is marked by more freedom and less strict behavioral expectations than is the job role. In other words, the job role is probably

characterized by well-defined and relatively strict demands providing a strong reward structure for personality maturation (Roberts, Caspi, & Moffitt, 2003). The family role, on the other hand, might afford more leeway, resulting in more variance at the individual level, which might in turn have diluted potential differences at the cultural level.

Cultural norms regarding the timing of both family- and job-role transitions had an effect on age trends in openness. Consistent with the theory of emerging adulthood (Arnett, 2000), our results revealed pronounced age-related increases in openness for those cultures with a late onset of family- and job-role responsibilities. This finding supports the idea of emerging adulthood as a period of prolonged identity exploration that allows young adults to broaden their horizons and to try out different lifestyles before they take over the relatively enduring responsibilities of adult life.

### Limitations

The current study used a large sample and advanced analytic methods, but the findings must still be considered in light of some important limitations. First, our Internet-based samples were not representative of the general populations of the nations examined. However, it



**Fig. 2.** Neuroticism as a function of age, as implied by the model. Results are shown for the cultures with the highest factor scores (Pakistan), average factor scores (Argentina), and the lowest factor scores (The Netherlands) on the job index (cf. Table 1).

should be noted that Internet-based samples are much more diverse and more representative than are the convenience samples commonly used in social-science research (Gosling et al., 2004), and similar results are typically obtained across Internet and non-Internet samples, especially with regard to personality variables (Srivastava, John, Gosling, & Potter, 2003). More importantly, the representativeness is likely to be poorest for developing countries in which Internet penetration is lowest. As a result, the samples obtained in developing countries are likely to be the least representative with regard to the role-transition indices associated with those countries. This restriction would tend to diminish the effects reported here, making our findings conservative estimates of the underlying effects.

Second, the cross-sectional nature of the design raises the possibility that some of the observed age trends might reflect birth-cohort effects. However, the data were collected over an 8-year period (2001–2009). Therefore, each specific age group included members of several different birth years (e.g., the oldest age group comprised 36- to 40-year-old individuals who were born between 1961 and 1973), which provided a degree of generalizability across cohorts (Soto et al., 2011). Two further

aspects of the present findings argue against the influence of cohort effects. First, the observed age trends are consistent with findings from longitudinal studies, which are not susceptible to cohort effects (Roberts et al., 2006). Second, the observed effects of cultural norms regarding the timing of role transitions are difficult to explain as a result of cohort effects.

A further limitation can be seen in the use of secondary data to develop the two culture-level predictors. These variables are only indirect markers for cultural norms regarding the timing of adult-role transitions. More proximal indicators might show even stronger effects.

Finally, cultures that differ in their onset of family- and job-role transitions might differ in numerous other ways, too. In fact, both indices were negatively correlated with nations' per capita income. However, there is neither a theoretical nor an empirical foundation for prosperity (or lack of prosperity) as an underlying source of personality maturation. But there are both theoretical and empirical reasons to view social-role transitions as key drivers of personality maturation in early adulthood (Roberts et al., 2005).

## Conclusion

Our results suggest that personality maturation in early adulthood can be observed in different cultures across the world. Cultural differences in age effects can be attributed to cultural differences in the normative timing of the social-role transitions that mark entry into adulthood. These findings clearly support social-investment theory. Although genetically shaped maturation processes certainly play a role in personality development, they apparently do not tell the whole story. Rather, the majority of young adults in the majority of cultures seem to show similar age trends in personality because they to go through similar role transitions at roughly the same ages. The investment in these age-graded social institutions, such as marriage, parenthood, and work, can therefore be seen as one of the key driving mechanisms of personality change in early adulthood.

## Author Contributions

W. Bleidorn developed the study concept. S. D. Gosling, P. J. Rentfrow, and J. Potter collected the data. W. Bleidorn analyzed the data, and T. A. Klimstra and J. J. A. Denissen helped with interpreting the results. W. Bleidorn drafted the manuscript, and S. D. Gosling, P. J. Rentfrow, J. J. A. Denissen, and T. A. Klimstra provided critical revisions. All authors approved the final version of the manuscript for submission.

## Acknowledgments

We are grateful to Oliver Lüdtke for providing helpful advice regarding the statistical analyses.

## Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

## Supplemental Material

Additional supporting information may be found at <http://pss.sagepub.com/content/by/supplemental-data>

## Notes

1. Because of a programming error, we had to exclude one item from the Spanish agreeableness scale ("starts quarrels with others"; reverse-coded). However, the reliability of the Spanish agreeableness scale was only marginally affected and remained in the range of the original Spanish version ( $\alpha = .64$ ; Benet-Martínez & John, 1998).
2. Prior research suggested that two subcomponents of extraversion—social dominance and social vitality—demonstrate different developmental patterns (Roberts et al., 2006). In light of these differences, we ran all analyses for the two BFI extraversion facet scales measuring assertiveness and activity (Soto & John, 2009). Random-coefficient regression models revealed small but significant positive age effects on both facets. Also, we found no significant cross-level effects involving the job or family indices on either assertiveness or activity.

## References

- Arnett, J. J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist*, *55*, 469–480. doi:10.1037//0003-066x.55.5.469
- Arnett, J. J. (2001). Conceptions of the transition to adulthood: Perspectives from adolescence through midlife. *Journal of Adult Development*, *8*, 133–143.
- Benet-Martínez, V., & John, O. P. (1998). Los Cinco Grandes across cultures and ethnic groups: Multitrait-multimethod analyses of the Big Five in Spanish and English. *Journal of Personality and Social Psychology*, *75*, 729–750. doi:10.1037/0022-3514.75.3.729
- Bleidorn, W. (2012). Hitting the road to adulthood: Short-term personality development during a major life transition. *Personality and Social Psychology Bulletin*, *38*, 1594–1608. doi:10.1177/0146167212456707
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.
- Denissen, J., Geenen, R., van Aken, M., Gosling, S., & Potter, J. (2008). Development and validation of a Dutch translation of the Big Five Inventory (BFI). *Journal of Personality Assessment*, *90*, 152–157.
- Gosling, S. D., Vazire, S., Srivastava, S., & John, O. P. (2004). Should we trust Web-based studies? A comparative analysis of six preconceptions about Internet questionnaires. *American Psychologist*, *59*, 93–104. doi:10.1037/0003-066x.59.2.93
- Hogan, D. P., & Astone, N. M. (1986). The transition to adulthood. *Annual Review of Sociology*, *12*, 109–130.
- Hox, J. J. (2002). *Multilevel analysis*. Mahwah, NJ: Erlbaum.
- John, O. P., Donahue, E. M., & Kentle, R. L. (1991). *The Big Five Inventory: Versions 4a and 54*. Berkeley: Institute of Personality and Social Research, University of California, Berkeley.
- Lodi-Smith, J., & Roberts, B. W. (2007). Social investment and personality: A meta-analysis of the relationship of personality traits to investment in work, family, religion, and volunteerism. *Personality and Social Psychology Review*, *11*, 68–86. doi:10.1177/1088868306294590
- McCrae, R. R., & Costa, P. T., Jr. (2008). The five-factor theory of personality. In O. P. John, R. W. Robins, & L. A. Pervin (Eds.), *Handbook of personality: Theory and research* (3rd ed., pp. 159–181). New York, NY: Guilford Press.
- McCrae, R. R., Costa, P. T., de Lima, M. P., Simões, A., Ostendorf, F., Angleitner, A., . . . Piedmont, R. L. (1999). Age differences in personality across the adult life span: Parallels in five cultures. *Developmental Psychology*, *35*, 466–477.
- McCrae, R. R., Costa, P. T., Jr., Ostendorf, F., Angleitner, A., Hrebickova, M., Avia, M. D., . . . Smith, P. B. (2000). Nature over nurture: Temperament, personality, and life span development. *Journal of Personality and Social Psychology*, *78*, 173–186.
- McCrae, R. R., & John, O. P. (1992). An introduction to the five-factor model and its applications. *Journal of Personality*, *60*, 175–215.
- McCrae, R. R., & Terracciano, A. (2005). Universal features of personality traits from the observer's perspective: Data from 50 cultures. *Journal of Personality and Social Psychology*, *88*, 547–561.
- Muthén, L. K., & Muthén, B. O. (1998). *Mplus user's guide* (6th ed.). Los Angeles, CA: Author.
- Neugarten, B. L., Moore, J. W., & Lowe, J. C. (1965). Age norms, age constraints, and adult socialization. *American Journal of Sociology*, *70*, 710–717.
- Rammstedt, B. (1997). Die deutsche version des Big Five Inventory (BFI): Übersetzung und validierung eines fragebogens zur erfassung des fünf-faktoren-modells der persönlichkeit [The German version of the Big Five Inventory (BFI): Translation and validation of a questionnaire assessing the five factor model of personality]. Unpublished manuscript, University of Bielefeld, Germany.
- Roberts, B. W., Caspi, A., & Moffitt, T. (2003). Work experiences and personality development in young adulthood. *Journal of Personality and Social Psychology*, *84*, 582–593.
- Roberts, B. W., Walton, K. E., & Viechtbauer, W. (2006). Patterns of mean-level change in personality traits across the life course: A meta-analysis of longitudinal studies. *Psychological Bulletin*, *132*, 1–25. doi:10.1037/0033-2909.132.1.1
- Roberts, B. W., Wood, D., & Caspi, A. (2008). The development of personality traits in adulthood. In O. P. John (Ed.), *Handbook of personality: Theory and research* (3rd ed., pp. 375–398). New York, NY: Guilford Press.
- Roberts, B. W., Wood, D., & Smith, J. L. (2005). Evaluating Five Factor Theory and social investment perspectives on personality trait development. *Journal of Research in Personality*, *39*, 166–184. doi:10.1016/j.jrp.2004.08.002
- Schlegel, A. (1995). A cross-cultural approach to adolescence. *Ethos*, *23*, 15–32. doi:10.1525/eth.1995.23.1.02a00020
- Schmitt, D. P., Realo, A., Voracek, M., & Allik, J. (2009). "Why can't a man be more like a woman? Sex differences in

- Big Five personality traits across 55 cultures": Correction to Schmitt et al. (2008). *Journal of Personality and Social Psychology*, *96*, 118. doi:10.1037/a0014651
- Soto, C. J., & John, O. P. (2009). Ten facet scales for the Big Five Inventory: Convergence with NEO PI-R facets, self-peer agreement, and discriminant validity. *Journal of Research in Personality*, *43*, 84–90. doi:10.1016/j.jrp.2008.10.002
- Soto, C. J., John, O. P., Gosling, S. D., & Potter, J. (2011). Age differences in personality traits from 10 to 65: Big Five domains and facets in a large cross-sectional sample. *Journal of Personality and Social Psychology*, *100*, 330–348. doi:10.1037/a0021717
- Srivastava, S., John, O. P., Gosling, S. D., & Potter, J. (2003). Development of personality in early and middle adulthood: Set like plaster or persistent change? *Journal of Personality and Social Psychology*, *84*, 1041–1053. doi:10.1037/0022-3514.84.5.1041
- United Nations, Department of Economic and Social Affairs, Population Division. (2010). *World marriage data 2008*. Retrieved from <http://unstats.un.org/unsd/demographic/products/indwm/default.htm>