Age Differences in Personality Across the Adult Life Span: Parallels in Five Cultures

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Both cross-sectional and longitudinal studies in the United States have shown consistent changes between college age and middle adulthood. There appear to be declines in 3 of the 5 major factors of personality—Neuroticism, Extraversion, and Openness—and increases in Agreeableness and Conscientiousness. To examine cross-cultural generalizability of these findings, translations of the Revised NEO Personality Inventory were administered to samples in Germany, Italy, Portugal, Croatia, and South Korea (N = 7,363). Similar patterns of age differences were seen in each country, for both men and women. Common trends were also seen for the more specific traits that define the major factors. Because these nations differ substantially in culture and recent history, results suggest the hypothesis that these are universal maturational changes in adult personality.

Although some research on adult personality development has been theoretically guided (e.g., Whitbourne, Zuschlag, Elliot, & Waterman, 1992), most has been exploratory and descriptive,

seeking to identify age trends in a variety of traits (McCrae & Costa, 1990). Findings from studies in American samples show consistent patterns; the present study asks whether these patterns can be generalized to other cultures. At the same time, these cross-cultural comparisons offer insight into the origins of adult age differences in personality that may advance description toward explanation.

At the broadest conceptual level, age differences or changes may be attributed to nature or to nurture: They may be due either to intrinsic, biologically based, and universal maturational processes or to environmental influences that are likely to vary across time and place (Cohler, 1985). Most personality theories have linked personality formation and change to features in the environment, including child-rearing practices (Whiting & Child, 1953), the cultural ethos (Fromm, 1941), and major historical events (Elder, 1974). However, evidence that personality traits are substantially heritable (Loehlin, 1992) makes it reasonable to postulate that there are biological bases for personality development, and a recent theoretical formulation of trait psychology has postulated that traits are endogenous dispositions whose maturation is minimally affected by environmental influences (McCrae & Costa, 1996). Of course, both genetic and environmental causes may play a role.

Cross-cultural comparisons are informative here because culture represents a powerful and pervasive set of environmental influences that shape the expression, and perhaps the development, of personality traits. There is as yet no articulated theory systematically linking culture-level variables to adult personality development, but environmental perspectives support the general hypoth-

esis that different cultures would be likely to produce different patterns of age changes and differences. By contrast, intrinsic maturational perspectives would suggest that even widely different cultures would show similar age trends.

Cross-cultural studies are also particularly useful in interpreting cross-sectional data. All cross-sectional studies confound intrinsic maturation with generational differences that result from growing up in a particular historical period. To the extent that personality is shaped by earlier life experience, different birth cohorts may show different personality profiles at a given point in time even if there are no age-related changes in personality. For example, older Americans today may score higher in Conscientiousness than American teenagers because children were better disciplined in the 1930s and 1940s than in the 1970s and 1980s.

Within any single culture, generational and maturational confounds are usually unavoidable in cross-sectional studies. But cross-cultural comparisons offer an interpretive tool because, as Riley, Johnson, and Foner (1972) noted, when cohort effects are considered, "our concern is not with dates themselves, but with the particular sociocultural and environmental events, conditions, and changes to which the individual is exposed at particular periods" (pp. 419–420). In other words, the same historical period may be different in its psychological effects in different countries.

That fact greatly complicates the interpretation of cross-cultural differences in age effects: Any such differences might be due either to culture or to differing historical influences on personality development. However, to the extent that similar patterns of age differences emerge in different cultures, the variation in histories strengthens the case for interpreting them as intrinsic maturational processes. One might argue, for example, that American college students today score low in Conscientiousness because they grew up spoiled by the affluence of the 1980s. However, that argument would not explain a similar finding in Croatian samples, because the 1980s were a period of economic decline in Yugoslavia. If Americans and Croatians were to show similar patterns of age differences in Conscientiousness, a common biological trend might offer a better explanation.

The present article reports secondary analyses of data from five societies—Germany, Italy, Portugal, Croatia, and South Korea—that differ substantially in both culture and recent history. By examining cross-sectional associations with age, we tested the generalizability of findings on adult personality development derived chiefly from American samples. Wide generalizability would suggest that intrinsic maturational processes are important influences; substantial cross-cultural divergence would point to the importance of environmental influences on development. More specific hypotheses are offered following a review of the empirical literature.

Age Differences and Changes in Personality Traits

Studies of adult personality development have generally shown little or no maturational change for most personality traits after age 30 (McCrae & Costa, 1990). For example, Costa et al. (1986) examined levels of Neuroticism, Extraversion, and Openness in a national sample of over 10,000 adults between the ages of 35 and 84. All three factors showed linear declines, but the magnitudes of the correlations with age were very small, ranging from −.12 to −.19. These cross-sectional findings are consistent with longitudinal and cross-sequential analyses that also show small

and inconsistent changes (e.g., Costa & McCrae, 1988; Siegler, George, & Okun, 1979).

Before age 30, however, there do appear to be important developmental changes in adult personality. Cross-sectional comparisons of college students and older adults on a measure of the five-factor model, the Revised NEO Personality Inventory (NEO-PI-R; Costa & McCrae, 1992), have consistently shown mean differences (Costa & McCrae, 1994): Students scored about one-half standard deviation higher than adult norms on Neuroticism (N), Extraversion (E), and Openness to Experience (O) and lower on Agreeableness (A) and Conscientiousness (C). Even larger effects were seen for some of the specific facets that define the five factors; in particular, college students scored a full standard deviation higher than adults on Excitement Seeking.

Because no longitudinal studies have yet been conducted that trace adolescents into middle adulthood using the NEO-PI-R, it is possible that these cross-sectional age differences reflect generational or cohort effects. However, other longitudinal studies in the literature have shown age changes that parallel these age differences. In longitudinal follow-ups of college students, Watson and Walker (1996) reported declines in Negative Affect, and Mortimer, Finch, and Kumka (1982) reported declines in Sociability, consistent with the NEO-PI-R age differences in N and E, respectively. Jessor (1983) found longitudinal increases in Achievement that mirrored cross-sectional differences in C. McGue, Bacon, and Lykken (1993) followed 127 pairs of twins over a 10-year interval from an initial mean age of 19.8 years. Although they reported no changes in scales related to E, they did find declines in Stress Reaction (related to N), Absorption (related to O), and Aggression (inversely related to A) and increases in Achievement and Control (related to C). Helson and Klohnen (1998) found a decline in negative emotionality and an increase in constraint in a sample of 80 women traced from age 27 to age 43 (although they also found an increase, rather than a decline, in positive emotionality). As Aldwin and Levenson (1994) concluded in their review, "There appears to be a decrease in levels of neuroticism and increases in those personality traits reflecting competence from early adulthood to midlife" (p. 194).

Studies in English-speaking countries outside the United States have tended to show similar patterns. Eysenck (1979) reported that E and Psychoticism were negatively related to age (rs = −.18 to −.29) in a random sample of English smokers and nonsmokers. Because Psychoticism is inversely related to A and C, its negative correlation with age is consistent with American age trends. N was unrelated to age in the English sample, but Schneider and Gibbins (1982) found that Australians over age 60 scored lower than adult norms on both E and N.

Research on adult age differences in personality traits in non-English-speaking countries has rarely been reported. Early cross-sectional (Angleitner, Schmitz-Scherzer, & Rudinger, 1971) and longitudinal (Angleitner, 1974) studies showed little effect of age on personality in middle-aged and older German samples. Japanese researchers (Shimonaka & Nakazato, 1986) have reported increasingly positive self-perceptions with age, as inferred from sentence-completion tests. Tarnowski, Shen, Diehl, and Labouvie-Vief (1996) administered the California Psychological Inventory (Gough, 1987) to U.S. and Chinese samples and found very similar patterns of age differences, with older adults scoring higher on Good Impression (a scale inversely related to N) and Norm-

Favoring (related to C) and lower on Social Presence (related to E) and Empathy (related to O) than younger adults in both cultures.

Two studies are of particular interest because they assessed personality with measures of the five-factor model. Krueger and Heckhausen (1993) administered adjective measures to young (20–35-year-old), middle-aged (40–55-year-old), and older (65–80-year-old) German adults. No age differences were found in self-descriptions, suggesting substantial stability across the adult age range. Caprara, Gentilomo, Barbaranelli, and Giorgi (1993) used a short version of the Big Five Questionnaire (Caprara, Barbaranelli, Borgogni, & Perugini, 1993) and reported that younger people (18–28-year-olds) were higher in E and lower in C than older people (55–85-year-olds). In contrast to American findings on A, however, younger Italians were significantly higher in Friendliness than older Italians—perhaps because Friendliness is related to E as well as A (Caprara, Barbaranelli, et al., 1993).

A Model and Measure of Personality for Cross-Cultural Comparisons

Comparing these studies with each other and with American studies is difficult because different variables and different methods of measurement were used. Direct comparisons across cultures are possible only when the same measures are used in each. In the present article, we report secondary analyses of NEO-PI–R data collected in five different societies.

There are four reasons why the NEO-PI–R is a good choice for cross-cultural research on age differences in personality. First, it has been used extensively in cross-sectional and longitudinal studies in the United States (Costa & McCrae, 1988, 1994), thus furnishing a set of hypotheses about developmental patterns that can be tested in other countries. Second, the five-factor model of personality that it operationalizes is widely recognized as providing a comprehensive framework for the description of personality traits (Digman, 1990; Goldberg, 1993); assessment of traits from all five factors allows a systematic evaluation of relations between age and personality traits.

Third, the factor structure of the NEO-PI–R has been shown to be cross-culturally invariant in a number of widely different languages, including German, Italian, Portuguese, Croatian, and Korean (Marušić, Bratko, & Eterović, 1996; McCrae & Costa, 1997b; McCrae et al., 1996; Piedmont & Chae, 1997). After targeted rotation, factor congruence coefficients between these translations and the normative American sample ranged from .89 to .98, with a median of .96. This strong factor replicability suggests that the instrument retains construct validity in different cultural contexts.

Finally, unlike global measures of the five-factor model, the NEO-PI–R includes 30 facet scales to measure specific aspects of each of the five broad factors. Cross-cultural comparisons of the full 30-facet profiles allow a more detailed assessment of personality development in adulthood. But the analysis of facet scale scores is partially redundant with the analysis of the five factors that they define; to identify age trends that are uniquely associated with individual traits, facet scores can be decomposed statistically and interpreted in terms of variance attributable to the five common factors and variance specific to each facet scale. Specific variance, calculated as the residual after regression of the facet on all five factors, has been shown to have retest reliability, cross-observer validity, and heritability (Jang, McCrae, Angleitner, Riemann, & Livesley, 1998; McCrae & Costa, 1992). In this study,

we asked whether specific variance is reliably associated with age across different cultures.

Hypotheses and Design

The intrinsic maturational perspective does not afford specific directional hypotheses; it merely asserts that effects found in any society are likely to be found in all societies. The largely American body of findings reviewed above can thus be taken as the basis of a set of hypotheses for the five cultures studied here. Specifically, we hypothesized that traits related to N, E, and O would decline with age whereas those related to A and C would increase.

American data also provide the basis for hypotheses about the time course of these changes (McCrae & Costa, 1990). Several studies have contrasted college students with older adults and suggest the hypothesis that late adolescents (18–21-year-olds) differ substantially from older adults on all five factors. Studies of adults over age 30 suggest little further personality change with increasing age (cf. Helson & Klohnen, 1998); comparison of adults between the ages of 30 and 49 with those over 50 provides a test of that hypothesis. Finally, at least one study (Costa & McCrae, 1994) found that 22–29-year-old men and women were intermediate between late adolescents and midlife adults.

Ideally, equal numbers of respondents in each of these four age groups would be compared. The present study, however, is based on reanalyses of data collected for other purposes. Sampling designs were based on the interests of the original investigators; the analyses reported here apply a common framework to all five studies. Sample sizes were modest for the youngest group in the Italian and Korean samples and for the oldest group in the Croatian and Korean samples, and no Croatian respondents were between the ages of 22 and 29 years, but otherwise sample sizes were adequate to generous.

In contrast to the nonspecific predictions of the intrinsic maturational perspective, the environmental perspective subsumes a number of different theoretical positions from which, given a knowledge of historical and cultural trends,[1] specific hypotheses might be deduced. A few such hypotheses can be offered illustratively.

Social role models of personality development hold that personality is shaped by age-graded social demands and opportunities (Baltes & Schmid, 1987). Older people might be expected to be better adjusted (lower in N) and more socially active (higher in E) than younger people in societies with traditions of filial piety, such as South Korea, where older persons are respected and admired; the opposite might be expected in youth-oriented cultures of the West.

Fromm's (1941) neoanalytic theory of social character holds that adult personality is shaped in childhood by social demands transmitted through child-rearing practices. From that perspective, cohorts raised in authoritarian cultures (such as pre-World War II Germany and Italy) should be much more conventional and conservative (lower in O) than cohorts born there after the war. South Koreans and Croatians were victims of—rather than participants in—fascism during the war and thereafter did not develop genuine democracies until the 1990s. Generational differences in O might be less marked in those countries.

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[1] Such information can be found in general sources (e.g., McHenry, 1993); for a comparative summary, see Costa and McCrae (in press).

Finally, contemporary theories of posttraumatic stress point to the lasting influence of severe stressors on mental health (e.g., Baum, O'Keefe, & Davidson, 1990). In the first half of this century, all five nations studied here endured periods of great hardship, ranging from the brutal Japanese occupation of Korea to the repressive dictatorship of Salazar in Portugal. A posttraumatic stress perspective leads to the hypothesis that the decline in N across generations seen in the United States would not be replicated in these five samples—indeed, the opposite pattern might be found.

Studies of cross-sectional age differences do not necessarily provide the optimal way to test environmental theories; for example, posttraumatic stress might better be studied in individuals who experienced specific traumatic events. But the theories provide one framework for interpreting personality differences among different age cohorts. The present research reports some of the first systematic comparisons of such age differences across a range of cultures.

Method

Participants

In the ideal design, national probability samples would have been gathered for each of these cultures. None of the available samples met that criterion, and some of the subsamples (such as the German twins) were distinctly nonrepresentative. Because sampling methods differed across cultures, the samples are not fully comparable. The present analyses are based on the assumption that these nonrandom samples would give at least rough approximations to age trends in each society. Where similar trends are seen despite differences in sampling, the case for common maturational processes is strengthened.

The German sample consisted of 2,205 women and 1,237 men between the ages of 18 and 83 recruited for a series of studies. About half the sample was recruited by psychology students, who asked their relatives, friends, partners, and acquaintances to participate in a psychological study by completing questionnaires at home. The rest of the sample consisted of twin pairs from the Bielefeld–Warsaw Twin Study (Angleitner et al., 1995). About 3% of the sample consisted of men and women from the former East Germany.

The Italian sample (N = 690) ranged in age from 18 to 70. They were recruited from three age groups by undergraduate psychology students who administered the questionnaires individually.

The Portuguese sample included 1,880 individuals between the ages of 18 and 84 from the Leiria region of Portugal. Participant recruitment began with random selection of towns and districts, where potential respondents were approached in their homes, at work, at school, in churches, and so forth. The full range of socioeconomic and educational levels was represented; the questionnaire was administered orally to participants who were unable to read it themselves. Participation rates (where recorded) exceeded 80%.

The Croatian sample consisted of 462 high school seniors from five cities and towns. The parents of students in Zagreb were also asked to participate, and 240 of them (about 60%) agreed to do so (Marušić et al., 1996). Students whose parents agreed to participate did not differ significantly from other students on any of the five NEO-PI–R domains. Parents ranged in age from 35 to 61; note that none of the respondents in the Croatian sample fell within the 22–29 age range.

Finally, the Korean sample included 649 men and women, all Catholics, recruited by clergy throughout South Korea. Of these, 267 were laity and 382 religious; all had at least a high school education. They ranged in age from 18 to 76 (Piedmont & Chae, 1997). A breakdown by age group and sex for all five samples is given in Table 1.

Table 1
Composition of the Samples by Age Group and Gender

| | Age group (in years) | | | | | | | |
| | 18–21 | | 22–29 | | 30–49 | | 50+ | |
Sample	M	W	M	W	M	W	M	W
German	159	455	588	836	359	666	131	248
Italian	26	41	75	67	117	122	123	119
Portuguese	205	253	271	305	201	348	134	163
Croatian	229	231	0	0	74	102	42	22
Korean	39	17	106	97	143	179	29	39

Note. Two Croatian students did not indicate their gender. M = men; W = women.

Measures

The NEO-PI–R (Costa & McCrae, 1992) is a 240-item questionnaire designed to operationalize the five-factor model of personality. Each factor is represented by six facet scales that assess more specific traits. The facet scales can be summed to create domain scales that approximate the five factors; more precise factor scores are based on a weighted combination of all 30 facets. These factor scores are essentially orthogonal, with a median absolute correlation of .11 across all pairs of factors in the five samples and with no correlation greater than .30. Evidence on the reliability and validity of the English version of the instrument is summarized in the manual (Costa & McCrae, 1992).

Translations of the NEO-PI–R were undertaken for a variety of research purposes. In each case, a preliminary translation was prepared by a psychologist, who then obtained an independent backtranslation into English. The test authors reviewed the backtranslation and identified items that appeared to need revision. This process was repeated until all items were acceptable. In some cases, further revisions were made on the basis of item analyses in pilot studies.

Internal consistency for the 48-item domain scales was uniformly high, ranging from .80 to .92. Coefficient alphas for the 8-item facet scales were predictably lower: The median alphas for German, Italian, Portuguese, Croatian, and Korean samples were .70, .69, .57, .69, and .64, respectively. Although these median values are low by conventional psychometric standards, it should be noted that the median alpha in the normative American sample is only .71, yet the English version of the NEO-PI–R has shown convergent and discriminant validity for facet scales in numerous studies (e.g., Dyce & O'Connor, 1998; McCrae & Costa, 1992). About 10% of the translated facet scales had alphas lower than .50, suggesting the need for revisions in the translations or the substitution of new items in future research.

Presentation of raw score results, although it might seem to permit cross-cultural comparisons of individuals in the same age group, would be potentially misleading, because it has not yet been established that raw scores have the same meaning (scalar equivalence) in the various translations (McCrae, Yik, Trapnell, Bond, & Paulhus, 1998). Observed differences in raw scores might be due to the translation, cultural patterns of self-description, or other artifacts unrelated to true personality scores. Therefore, T scores were calculated within each cultural sample on the basis of means and standard deviations of all adults over age 21 (these correspond to the combined-sex adult norms of the American NEO-PI–R). Because standardization was done within sample, any cultural differences in mean levels of traits—real or artifactual—were controlled.

Analyses

Analyses of variance (ANOVAs) with planned comparisons were used to test predictions about the generalizability of American age trends for the five factors. Specifically, late adolescents (18–21) were contrasted with

adults (30+) to test hypothesized changes, and middle-aged adults (30–49) were contrasted with older adults (50+) to test hypothesized stability. Because generally monotonic age associations were observed, linear regressions were used to estimate the rate of change for factors, facets, and the specific variance in facet scales. (Throughout this discussion, *slope* and *rate of change*, strictly speaking, refer only to change in a mathematical function because all these data were cross-sectional.) Comparison of these slopes across cultures was used to identify possible differences in age trends.

American data suggest that the true association of age with personality traits may be nonlinear, approaching a flat line in late middle age. However, curvilinear regressions were not examined here because the shape and significance of such curves is highly dependent on the distribution of cases by age, which varied widely across the samples (see Table 1). By contrast, linear trends are, by definition, uniform throughout the age range and thus were comparable across these samples. In future research, sampling designs should permit tests of nonlinear relations; with the present data, it seemed prudent to adopt the "less is more" principle (Cohen & Cohen, 1975, p. 225).

Introducing controls for specific aspects of culture or history that affect the levels of personality traits would allow a more precise estimate of any intrinsic maturational effects, but few environmental influences on personality have been documented. It is known, however, that O is consistently, albeit modestly, related to years of education—although it is not clear which is cause and which is effect (McCrae & Costa, 1997a). Because older generations are typically less well-educated than younger generations, age differences in O might be attributed to generational differences in educational opportunity. A conservative strategy, then, would be to examine associations of age and O after covarying years of education. Where possible, those analyses were also conducted.

Results

Analyses of the Five Factors

Age Group × Sex ANOVAs were computed for each of the five factor scores. Despite the large sample sizes, only 4 of 25 interaction effects were significant, none accounting for more than 2% of the variance and none replicated across cultures. Results were therefore collapsed across sex; mean levels are shown in Figures 1, 2, 3, 4, and 5.

With the exception of N factor scores in the Italian and Croatian samples (Figure 1), all main effects for age group were significant ($p < .01$). In support of the hypothesis that the youngest group would score higher in N, E, and O and lower in A and C factors than older adults, planned contrasts showed that the youngest group differed significantly ($p < .05$) in the expected direction from the two oldest groups in 22 of 25 comparisons (all except for N in the Italian and Croatian samples and A in the Italian sample). In partial support of the hypothesis that there would be no differences between the two oldest groups, planned comparisons showed significant differences in only 10 of 25 comparisons (E, O, A, and C in the German sample; O, A, and C in the Italian sample; O and A in the Portuguese sample; and O in the Korean sample). It must be recalled, however, that this second planned comparison involved substantially fewer respondents and thus had less power to detect effects than did the first planned comparison. Finally, as hypothesized, respondents in the 22–29-year-old group scored intermediate between the late adolescent and midlife groups in 16
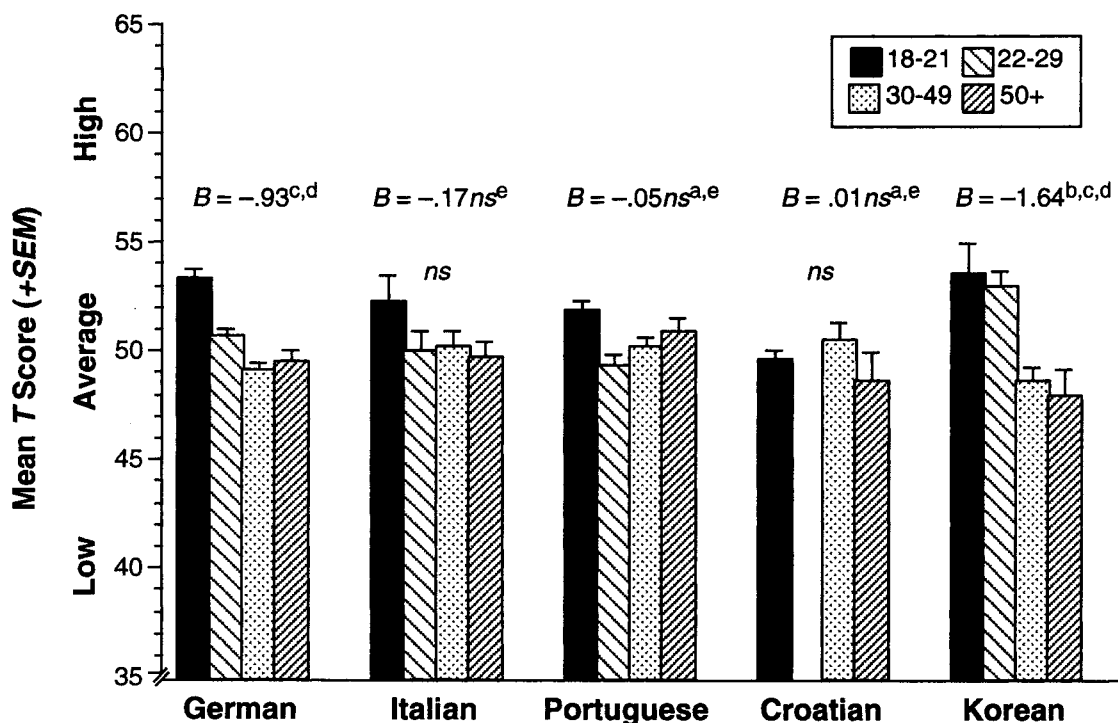

Figure 1. Mean levels of Neuroticism factor score in five cultures. *T* scores are based on the mean and standard deviation of all respondents over age 21 within each culture. [a] Significantly different from German slope. [b] Significantly different from Italian slope. [c] Significantly different from Portuguese slope. [d] Significantly different from Croatian slope. [e] Significantly different from Korean slope.
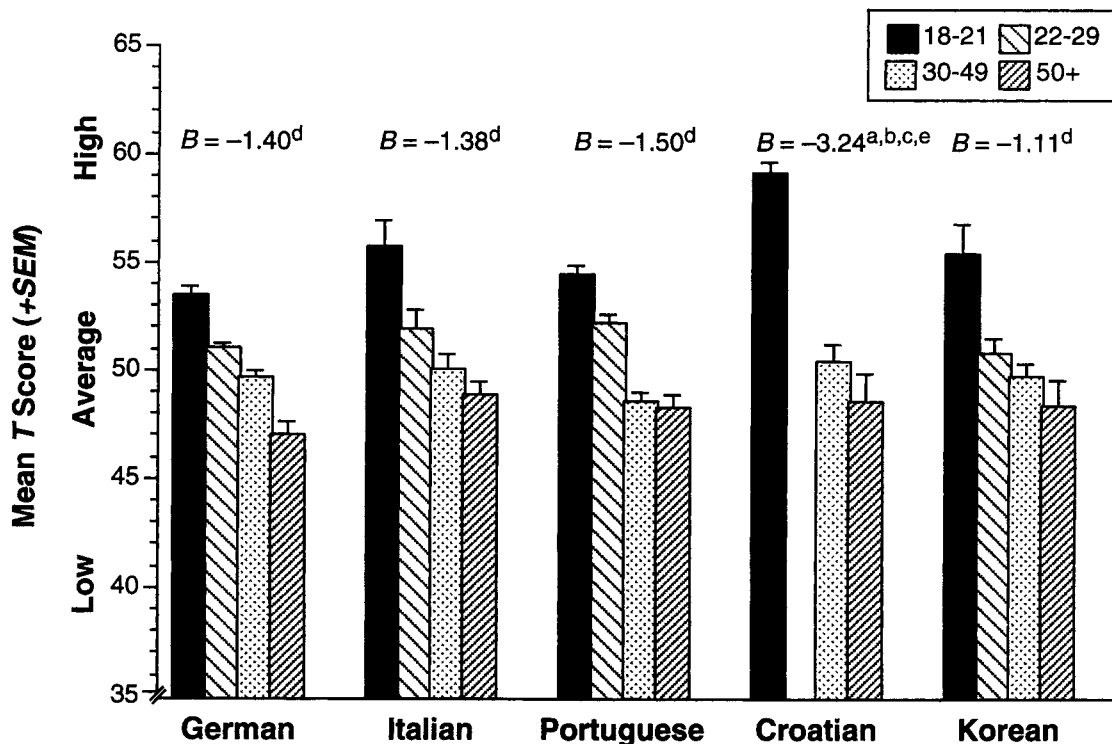
Figure 2. Mean levels of Extraversion factor score in five cultures. *T* scores are based on the mean and standard deviation of all respondents over age 21 within each culture. [a] Significantly different from German slope. [b] Significantly different from Italian slope. [c] Significantly different from Portuguese slope. [d] Significantly different from Croatian slope. [e] Significantly different from Korean slope.

of 20 cases, suggesting a monotonic progression. For each factor, the pattern of results was similar across all five samples and was consistent with previous results from American studies: There were age-related declines in N, E, and O and increases in A and C.[2]

Linear regression analyses predicting the five factors (expressed as *T* scores) from age in decades allowed estimates of rates of change that could be compared across cultures. Unlike correlations, regression coefficients were not sensitive to differences in the variance of age in the different samples; they could also be interpreted directly as *T*-score-per-decade rates of change. Regression coefficients (*B*s) are reported in Figures 1–5, together with the results of *z* tests ($p < .01$) comparing slopes in different samples. In the case of N, for example, these tests showed that the German and Korean slopes did not differ from each other, but they did differ from the (nonsignificant) slopes in the Portuguese and Croatian samples. In the case of O, all five cultures showed similar declines with age. Where significant differences in slope do appear, they may reflect true cultural differences in personality development, or they may be attributable to cohort differences or sampling biases.

Data in Figures 1–5 provide mixed support for the three illustrative environmental hypotheses. The cross-sectional decline in N was steepest, as predicted by social role theory, in South Korea, where traditions of filial piety lead to greater respect for elders. However, no effect of filial piety was seen for E. Despite differences in early life experience in these five cultures, there were no significant differences in the rate of decline of O. And despite widespread traumatic experience during childhood in the oldest

cohorts in all five cultures, there was no cross-sectional increase in N with age, as posttraumatic stress theory suggested. However, three of the samples (Italy, Portugal, and Croatia) did fail to replicate the American pattern, in which N declined with age.

Two features of Figures 1–5 require comment. First, across all factors and samples, the absolute differences between adjacent age group means were similar (*M*s = 2.07, 2.23, and 2.10 *T*-score points—about one fourth of a standard deviation—for first to second, second to third, and third to fourth age groups, respectively). This does not mean that the rate of change is constant, because the interval between the two youngest age groups was only 6 years on average, whereas the interval between the two oldest age groups was about 20 years. It appears that change occurs across the adult life span but that the rate of change is highest in the earliest years. Indeed, some of the most dramatic age differences were seen with the youngest group—the Croatian high school seniors.

A second notable feature of Figures 1–5 is that few of the differences were large in an absolute sense. The median absolute regression coefficient was 1.70 *T*-score points, implying that over a 10-year period, individuals changed on average only about one

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[2] Because Catholic clergy constituted a somewhat unusual sample, the Korean analyses were repeated as Age Group × Laity vs. Clergy ANOVAs. Significant interactions were found for E and O, showing larger age effects for E in clergy and larger age effects for O in laity. The direction of the effects was, however, similar in both groups for all factors.
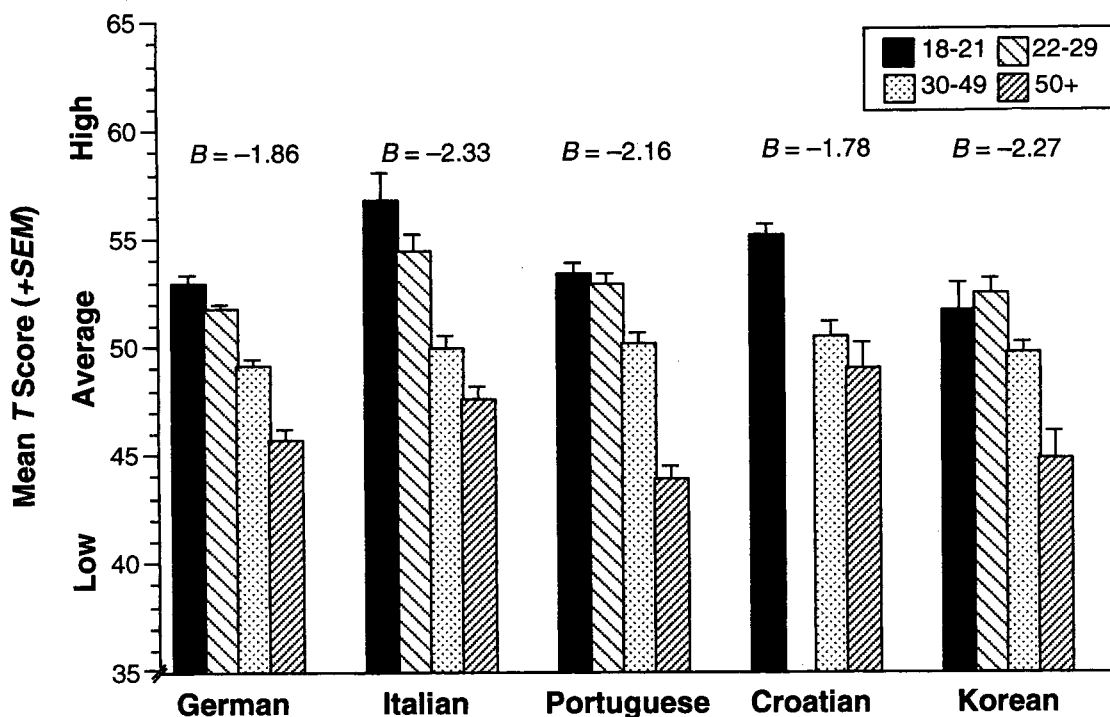
Figure 3. Mean levels of Openness factor score in five cultures. *T* scores are based on the mean and standard deviation of all respondents over age 21 within each culture.

sixth (1.7/10.0) of a standard deviation. In particular, differences between the two oldest groups were modest, consistent with American findings that mean levels of personality traits are generally stable after age 30 (McCrae & Costa, 1990). Only in the case of O in the Portuguese sample did the difference between the two oldest groups exceed one-half standard deviation. It seems likely that this effect is due in part to generational differences in educational level, which are pronounced in Portugal.

Years of education was ascertained only in the Italian and Portuguese samples. Supplementary analyses were conducted in those two samples, using education as a covariate. Neither the direction nor the statistical significance of the results was changed in these analyses, but the magnitude of the age effects on O was considerably attenuated. Adjusted for years of education, the oldest group in the Italian sample had a *T* score of 48.36 on O; the oldest group in the Portuguese sample had a *T* score of 48.18.

Analyses of Facet Scales

Inspection of means for the 30 facet scales across the four age groups in the five samples showed monotonic increases or decreases in most scales with significant age effects; thus, age effects can be reasonably portrayed by linear regressions. Table 2 reports regression coefficients predicting facet scale scores from age in decades. To assess the overall similarity of age associations across cultures, rank-order correlations were computed between pairs of the five columns. Values ranged from .80 to .94 (all *p*s < .001), suggesting considerable consistency across all five cultures. The general pattern at the facet level corresponded to the pattern at the factor level—that is, slopes for E and O facets were generally

negative, those for A and C facets were generally positive, and those for N facets were negative or near zero.

However, some differentiation within domains was also seen. In all five cultures, it was the Impulsiveness facet of N that showed the strongest and most uniform relation to age; facets like Anxiety and Depression, which assess negative affectivity, showed weaker patterns of age association. Similarly, the Excitement-Seeking and Positive Emotions facets of E were clearly and consistently related to age, whereas Warmth, Assertiveness, and Activity were not. Most facets of O showed moderate negative age correlations; most facets of A showed small positive correlations. Among C facets, Dutifulness was most strongly related to age. Together, these results suggest that older adults differed from late adolescents and younger adults chiefly in being better at controlling impulses, lower in thrill seeking and cheerfulness, more morally responsible, and—perhaps because of generational differences in education—generally less open to new experiences.

Tests of differences for slopes are also reported in Table 2. Despite considerable power in these large samples, of 300 comparisons, only 85 reached statistical significance (*p* < .01). (Note that for interpretive convenience, each effect is represented by two superscripts in Table 2.) Thus, most traits showed similar age relations in different cultures. Where there were differences, they were usually (73%) in degree rather than direction. For example, Excitement Seeking declined in all five cultures, but the rate of decline in the German sample was lower than in the Croatian sample and higher than in the Korean sample. These effects may represent true cultural differences in adult development, cohort effects, or sampling biases, and they are perhaps most useful as a
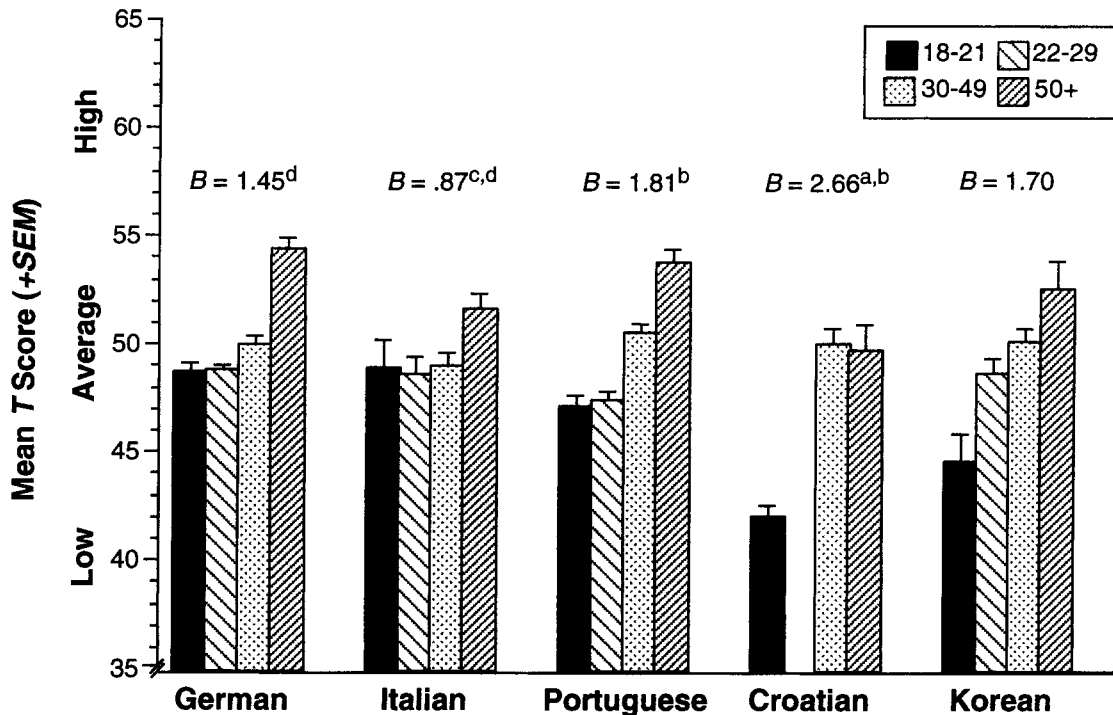
Figure 4. Mean levels of Agreeableness factor score in five cultures. T scores are based on the mean and standard deviation of all respondents over age 21 within each culture. [a] Significantly different from German slope. [b] Significantly different from Italian slope. [c] Significantly different from Portuguese slope. [d] Significantly different from Croatian slope.

stimulus to hypotheses that could be tested in future research. For example, it might be hypothesized that youthful stimulus seeking is attenuated in collectivist countries (e.g., South Korea) that focus on needs of the group rather than desires of the individual.

Facet scales define the five factors, and it is not immediately clear from Table 2 whether the effects attributed to individual facet traits provide new information or merely repeat the factor-level information displayed in Figures 1–5. Impulsiveness, for example, was positively related to N and E and negatively related to C (Costa & McCrae, 1992); because N and E decline and C increases with age, the decline in Impulsiveness was expectable. To assess age trends unique to specific facets, we analyzed residual facet scores from which the five factors had been partialed—just as epidemiologists control for standard risk factors in assessing the unique contribution of a possible new risk factor.

In part because residual scores are less reliable than raw facet scales (Jang et al., 1998), associations with age were quite small.[3] The median absolute regression coefficient was .40, implying that it would take 25 years to change the average facet scale by a single T-score point because of changes in the specific variance assessed by that facet.

But in these large samples, many of the regressions were statistically significant, and more important, many were replicated across different samples: Increases in the specific variance in Angry Hostility, Assertiveness, Activity, Trust, Tender-Mindedness, and Dutifulness and declines in the specific variance in Self-Consciousness, Excitement Seeking, Positive Emotions, Order, Achievement Striving, and Deliberation were significant in at least four of the five samples. Rank-order correlations of age

regression coefficients between pairs of the five samples ranged from .40 to .89 (all $ps < .05$).

Age differences in the five major factors of personality were relatively large; age differences in specific variance were so small that it would probably be difficult to discern their effects in either individuals or social groups. But their statistical significance demonstrates that age differences and changes should be examined at the level of facets as well as factors or domains, and the facet-level consistency across cultures is striking evidence that many independent developmental processes appear to be shared across a wide range of very different social environments.

Discussion

These data, from five samples with widely different languages and cultures, are remarkably consistent. Older men and women in each case were lower in E and O and higher in A and C than were younger adults. Although less consistent (cf. Eysenck, 1979), there was also a tendency for younger individuals to score higher on N. Similar patterns across cultures were also seen at the level of facet traits, and even in analyses of the specific variance in facet scales. All these age differences are consistent with previous cross-sectional and longitudinal findings in American samples. Older adults in all these cultures appear to be less emotionally volatile and more attuned to social demands, together amounting to an

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[3] A complete listing of age regressions for residual facet scores is available from Robert R. McCrae.
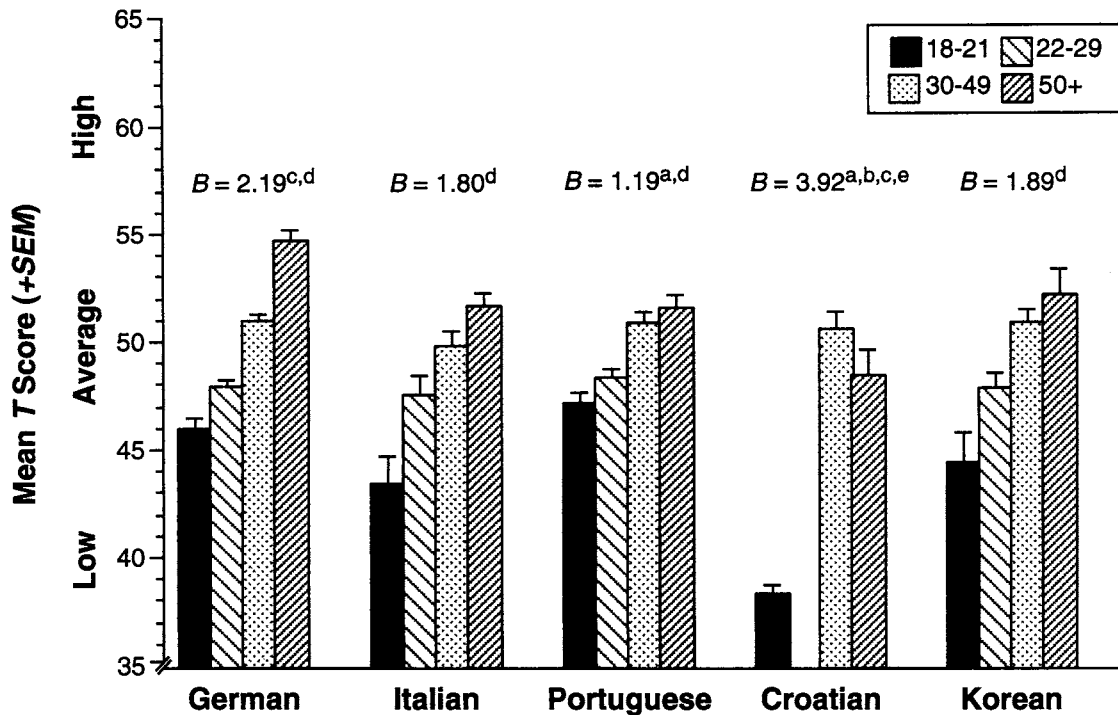
Figure 5. Mean levels of Conscientiousness factor score in five cultures. *T* scores are based on the mean and standard deviation of all respondents over age 21 within each culture. [a] Significantly different from German slope. [b] Significantly different from Italian slope. [c] Significantly different from Portuguese slope. [d] Significantly different from Croatian slope. [e] Significantly different from Korean slope.

increase in what Whitbourne and Waterman (1979) called "psychosocial maturity."

Because these studies were cross-sectional, it is possible that age differences reflect birth cohort effects rather than intrinsic maturation. Perhaps cultural changes common to all five countries over the past century explain the similar patterns of generational differences. The younger generation worldwide has experienced better health care and nutrition than their grandparents' generation, but they have also been exposed to mass media that sometimes conflict with traditional values. Conceivably, such influences might account for their relatively higher levels of E and O and lower levels of A and C.

But in many respects, the historical experience of the five societies has been very different and contrasts even more with the experience of Americans; yet these different experiences seem to have had little effect on the pattern of age differences in personality traits. Respondents who grew up during the totalitarian regimes of Hitler, Mussolini, and Salazar showed the same personality profiles relative to their children as Americans who grew up in the era of Franklin Roosevelt. Late adolescents from prosperous Germany and the United States resembled late adolescents from less affluent Portugal and Croatia. Even decades of occupation and oppression by the Japanese, a civil war, and military tension that continues to this day do not seem to have produced a different pattern of age differences in Koreans.

Evidence for universality is strongest for O, in which equivalent slopes were found in all five cultures, and weakest for N, in which only two cultures replicated the American pattern. It is likely that the observed trends reflect some combination of maturational,

cultural, cohort, and sampling effects but that maturational effects are strong enough to emerge in most cases. Their explanation might involve either social or biological factors (cf. Light, Grigsby, & Bligh, 1996). Haan, Millsap, and Hartka (1986) argued that personality changes between adolescence and young adulthood serve adaptive functions: "When people enter the adult world, they expose themselves to the binding, consequential claims of career, marriage, and parenthood. As a result, they must accommodate" (p. 229). Their argument suggests that personality traits change in response to social tasks, a hypothesis that is testable by comparing personality development in societies that impose very different tasks on the same age group. A fair test might require study of third-world nations, in which the experience of adolescence is dramatically different from that seen in the more highly developed countries studied here.

However, to the extent that the present results can be generalized across cultures, there is reason to think that these developmental changes may represent age changes in gene expression. Personality traits themselves are highly heritable (Riemann, Angleitner, & Strelau, 1997), and many processes under genetic control unfold over a fixed time course (cf. Cattell, 1973, on endogenous age curves). Each personality trait probably reflects the influence of a large number of specific genes (Eley & Plomin, 1997); if some of these switch on or off at particular times in adulthood, the result might be the subtle pattern of age differences noted in analyses of specific variance. This argument is made more plausible by evidence that personality changes from late adolescence to early adulthood are themselves modestly to moderately heritable (McGue et al., 1993).

Table 2

Regression Coefficients Predicting NEO-PI-R Facet Scale T Scores From Age in Decades

NEO-PI-R facet	Sample				
	German	Italian	Portuguese	Croatian	Korean
Neuroticism					
Anxiety	−0.86**[b,c,d,e]	0.00[a,e]	−0.07[a,e]	0.45[a,e]	−1.89***[a,b,c,d]
Angry Hostility	−0.88**[b,c]	0.16[a,d,e]	0.42***[a,d,e]	−0.89**[b,c]	−1.47**[b,c]
Depression	−1.08**[b,c]	−0.10[a,e]	0.60***[a,d,e]	−1.11**[c]	−1.43**[b,c]
Self-Consciousness	−0.89**[d]	−0.28[e]	−0.40**[e]	0.15[a,e]	−1.56**[b,c,d]
Impulsiveness	−2.25**	−1.90**	−1.96**	−2.67**	−2.78**
Vulnerability	−1.53**[b,c]	−0.66*[a]	−0.32*[a]	−0.90**	−1.13**
Extraversion					
Warmth	0.17[d]	−0.13	0.19[d,e]	−1.16***[a,c]	−0.84*[c]
Gregariousness	−1.50**[e]	−1.54**	−1.03**	−1.92**	−0.46[a]
Assertiveness	0.41**[c,d]	−0.12[c]	−1.13***[a,b,e]	−1.14***[a,e]	0.09[c,d]
Activity	0.42**[c]	−0.05	−0.56**[a]	0.22	−0.26
Excitement Seeking	−2.65**[d,e]	−2.18**[d]	−2.60**[d,e]	−4.93***[a,b,c,e]	−1.42***[a,c,d]
Positive Emotions	−1.41**[b,d]	−2.22***[a]	−1.84**[d]	−2.86***[a,c]	−1.81**
Openness					
Fantasy	−2.78**[c,d]	−2.53**[d]	−2.25***[a,d]	−3.64***[a,b,c]	−2.63**
Aesthetics	−0.74**	−1.35**[d]	−1.04**	−0.26[b]	−1.22**
Feelings	−1.42**	−1.95**	−1.82**	−2.09**	−1.50**
Actions	−2.10**	−2.30**	−1.73**	−2.21**	−1.39**
Ideas	−0.76**[c,d]	−1.52**	−2.19***[a]	−1.66***[a]	−1.71**
Values	−1.95**[d]	−1.85**	−1.83**[d]	−0.93***[a,c]	−1.49**
Agreeableness					
Trust	0.98**	0.73**	1.13**	1.60**	1.55**
Straightforwardness	1.44**[b,d]	0.61*[a,d]	1.39***[d]	2.94***[a,b,c,e]	1.50**[d]
Altruism	0.80**	0.51	0.66**	0.95**	1.26**
Compliance	1.48**	0.76**[c]	1.88**[b]	1.81**	1.81**
Modesty	1.64**[b,c]	0.64*[a]	0.87***[a]	1.39**	1.14**
Tender-Mindedness	0.22[c,d]	0.87**	0.79***[a]	1.13***[a]	1.22**
Conscientiousness					
Competence	1.52**[c]	1.08**	0.71***[a,d]	1.72**[c]	0.58
Order	1.16**[c]	1.08**[c]	0.12[a,b,d,e]	1.68**[c]	1.94**[c]
Dutifulness	2.45***[c,d]	2.09**[d]	1.60***[a,d,e]	5.19***[a,b,c,e]	2.87***[c,d]
Achievement Striving	0.29*	0.55*	−0.07	0.70**	0.31
Self-Discipline	1.90***[c,d]	1.15**[d,e]	0.86***[a,d,e]	3.37***[a,b,c]	2.66**[b,c]
Deliberation	1.22**[d]	0.68*[c,d]	1.73**[b,d]	2.95***[a,b,c,e]	1.52**[d]

Note. Ns = 3,442 (German), 690 (Italian), 1,880 (Portuguese), 702 (Croatian), and 649 (Korean). NEO-PI-R = Revised NEO Personality Inventory. [a] Significantly different from German slope. [b] Significantly different from Italian slope. [c] Significantly different from Portuguese slope. [d] Significantly different from Croatian slope. [e] Significantly different from Korean slope.
$*p < .05$. $**p < .01$.

Why would maturational changes in personality be genetically programmed? Possible explanations might be sought in evolutionary psychology (Buss, 1991; MacDonald, 1995). It could be argued that E and O would be advantageous to young adults still seeking mates, whereas C would be more valuable to parents raising a family. Whatever its origin, a biological explanation for personality changes would profoundly affect our interpretation of the relations between personality and society. Perhaps, in fact, Haan et al. (1986) had it backward, and it is society that must accommodate to personality, reserving heavy responsibilities for midlife adults, whose levels of emotional stability, dependability, and altruism are sufficiently developed to handle the task.

The cross-cultural findings reported here suggest a reinterpretation of some American findings. In previous research, longitudinal studies of age changes typically showed little consistent evidence of change (e.g., Costa & McCrae, 1988). In view of those findings, the small cross-sectional age differences frequently reported (e.g., Costa et al., 1986) could plausibly be interpreted as cohort effects. That argument is now less persuasive; the cross-cultural replication of adult age differences suggests that the small age differences in American samples probably reflect very slow maturational processes continuing after age 30. Figures 1–5 suggest that rates of change may differ in other cultures, even if the direction of change is the same (cf. Tarnowski et al., 1996); it would be of interest to determine what cultural influences may accelerate or retard mean-level changes in personality traits in adulthood.

The studies reported here were not originally designed to examine age differences and were less than optimal with respect to sampling procedures, age range, and information gathered (such as educational level). Certainly, however, they offer strong hypotheses that could be better tested in further research. In particular, it would be useful to begin longitudinal studies of personality in non-English-speaking countries. Such studies could reduce the possible effects of sampling bias and selective mortality in estimating mean-level changes in personality traits. More important, they would also offer the possibility of studying the stability of individual differences in personality. In the United States, person-

ality traits show high stability coefficients, especially after age 30 (McCrae & Costa, 1990). Longitudinal studies are needed to determine whether similar patterns of stability are seen in other cultures.

Conclusion

Like all human beings, personality psychologists are prisoners of the time in which they live. All the development they study, whether cross-sectionally or longitudinally, occurs in a particular historical era, and in principle they cannot replicate their studies in other eras to assess directly the generalizability of their conclusions. Unless they are prepared to abandon the quest for a cumulative science of psychology (Gergen, 1977), they must turn to indirect methods. The study of personality development in cultures with different recent histories provides one such method, and the evidence so far suggests that there are lawful patterns of adult personality development that are likely to hold in all times and places.

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