

## AGE DIFFERENCES IN THE RELATIONSHIP BETWEEN PERSONALITY QUESTIONNAIRE FACTORS AND SCHOOL ACHIEVEMENT<sup>1</sup>

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Two personality questionnaires and two achievement tests were administered to 104 third and 114 sixth graders in an attempt to investigate those personality questionnaire derived factors which best predict achievement at the elementary school level. Scores on Factor B (Intelligence) received the highest weight on all questionnaires in predicting both criteria. In addition to Intelligence, the following personality factors correlated significantly with school achievement: Ego Strength (C+), Surgency (F+), Self-Sentiment (Q<sub>s</sub>+), and Confident Adequacy (O-), but these correlations were not consistent across tests and age groups. When the personality factors are orthogonalized and their independent contribution to the criterion is assessed (semipartial correlations), only Intelligence proved to be a significant predictor of school achievement for the third graders. For the sixth graders Ego Strength (C+), in addition to Intelligence, predicted school success.

It is a common sense notion that academic success is not solely determined by intelligence or general ability, but that personality characteristics play an important role as well. This notion finds support in several studies which demonstrate a statistically significant relationship between a number of personality dimensions and academic achievement (e.g., Butcher, Ainsworth, & Nesbitt, 1963; Butcher & Gorsuch, 1960; Cattell, 1964; Cattell, Butcher, Connor, Sweney, & Tasujiok, 1962; Cattell & Sealey, 1965; Connor, 1962; Linton, 1967; Pierson, 1964; Sealey, 1963). The subjects for these studies range from seventh graders to college students, from delinquents to military trainees.

Although relationships between personality and achievement have been found for subjects of different ages, no study seems to exist which systematically investigated age differences with respect to the relative importance of given personality dimensions as predictors of school achievement.

There have been no studies which would show whether some personality dimensions are determining school achievement more at one age than at another, nor whether the same personality dimensions determine school achievement at different age levels. The purpose of the present study was, then, to examine such age differences in the relationship between personality factors and academic success. Furthermore, the study attempted to determine those personality factors which most effectively predict school achievement at certain age levels.

Since personality is a rather global and nonspecific concept, an operational definition, based on several factor analyses (e.g., Cattell, 1950), has been adopted for purpose of the present study. Personality is conceptualized here in terms of 13 or 14 personality dimensions, and is operationally defined in terms of an individual's score on each of these dimensions.

### METHOD

#### *Subjects*

The subjects were boys and girls from both the third grade ( $n = 104$ ) and the sixth grade ( $n = 114$ ). The sample was obtained in three elementary schools in Monongalia County in West Virginia. The schools were selected in order to include a broad representation of urban and rural children

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with a wide range of socioeconomic backgrounds. The subjects were, however, slightly above average in general ability. Detailed characteristics of these subjects have been reported elsewhere (Schaie, 1967).

### Test Instruments

1. *Achievement tests.* Measures on school achievement were obtained for all subjects on the Wide Range Achievement Test (WRAT), an individual test (Jastak, 1963); and on the Stanford Achievement Test (SAT), a group test. Both tests include an arithmetic section and a reading section. For purposes of the present study, the grade level indexes of both sections were combined.

2. *Personality questionnaires.* Two different personality questionnaires were administered to all subjects. The Children's Personality Questionnaire (CPQ; Porter, Scheier, & Cattell, 1965) was given to both age groups. In addition, the younger age group was presented with the Early School Personality Questionnaire (ESPQ; Coan, Baker, & Cattell, 1965), and the older age group with the High School Personality Questionnaire (HSPQ; Cattell & Beloff, 1953; Cattell, Karson, & Nuttall, 1966). For the CPQ and ESPQ both Forms A and B were administered, while only one form of the HSPQ was presented. In the former case, the scores on both forms were combined. Scores were obtained on each personality dimension for each subject.

### Method of Analysis

The intercorrelations between individual personality factor scores and the grade level indexes were calculated separately for each test and for each sample. The same procedure was applied for both samples combined.

Since the personality dimensions, as assessed by these questionnaires, are not orthogonal, their intercorrelation was taken into consideration in that semipartial correlations (part correlations) were computed between the factor scale scores and the criterion variable. This method yields correlations of the independent variables (personality factors scores) with the criterion (achievement level) where the intercorrelations of the former were partialled out, that is, set equal to zero. Hence, the independent contribution of each personality variable to the multiple correlation with the criterion variable is assessed.

In order to pick out the best set of variables, the method starts out with that variable which correlates highest with the criterion variable. All possible semipartial correlations with the criterion are computed when the first variable is partialled out. The variable with the largest values is then selected as the next variable, and again semipartial correlations with all variables are computed, etc. One stops adding variables when the next variable to be added fails to have a statistically significant semipartial correlation with the criterion variable, or equivalently, if it fails to produce a significant

increment in the multiple correlation, when the latter is corrected for shrinkage. This procedure is discussed at more length by Nunnally (1967).

The significance of the semipartial correlations was tested with the *t* test which is conventionally used to test the significance of partial correlation coefficients (McNemar, 1962). The significant increment in the multiple *R* was tested by means of an *F* test (Guilford, 1956).

### RESULTS

Table 1 summarizes the intercorrelations between the personality dimensions and achievement scores separately for each test and each age group. As might be expected, scores on Intelligence (Factor B) have the highest correlation with the criterion, ranging from .45 to .70. This finding is consistent for all tests and samples.

With respect to personality factors, there are several significant correlations with achievement, notably of the factors of Ego Strength (C), Surgency (F), and Self-Sentiment ( $Q_3$ ). Guilt Proneness (O) correlates negatively with the criterion, that is, the negative pole of Factor O, Confident Adequacy, contributes to school achievement. These correlations, however, do not seem to show a consistent pattern across tests or age groups.

When semipartial correlations are considered, a more clear-cut pattern seems to emerge. As can be seen from Table 2, the number of personality dimensions independently contributing to school achievement is considerably reduced. The only significant contributions to the multiple correlation with the criterion, in addition to Intelligence, were made by the factor Confident Adequacy (O-) from the ESPQ in predicting the SAT grade level for third graders; by the factor Ego Strength (C+) from the CPQ in predicting both SAT and WRAT grade levels for the sixth graders; and by the factor Surgency (F+) from the CPQ in predicting the SAT grade level for the combined third- and sixth-grade sample. None of the HSPQ scales other than Intelligence (B+) improved prediction of school achievement for the sixth graders, nor did any of the CPQ scales other than Intelligence improve prediction for the third graders.

TABLE 1  
CORRELATIONS BETWEEN PERSONALITY FACTORS AND SCHOOL ACHIEVEMENT PER TEST AND SAMPLE

Personality Factor	Grade 3 (N = 104)				Grade 6 (N = 114)				Grades 3 & 6 (N = 218)	
	CPQ		ESPQ		CPQ		HSPQ		CPQ	
	WRAT	SAT	WRAT	SAT	WRAT	SAT	WRAT	SAT	WRAT	SAT
Affectothymia (A+)	.02	.03	.11	.15	.02	.05	-.03	.01	-.11	-.12
Intelligence (B+)	.58**	.70**	.48**	.48**	.45**	.50**	.47**	.46**	.53**	.55**
Ego Strength (C+)	.15	.12	.18	.23*	.35**	.35**	.10	.06	.23*	.18**
Excitability (D+)	-.07	-.13	.07	.06	-.05	-.07	-.10	-.07	-.07	-.09
Dominance (E+)	.00	.03	.06	.16	-.11	-.01	-.02	.06	.09	.15
Surgency (F+)	-.03	.04	.02	-.07	.06	.22*	-.15	-.20*	.14*	.22**
Super Ego Strength (G+)	.17	.27**	.09	.18	.06	.06	.10	.16	.10	.11
Parmia (H+)	.05	.07	.02	.07	.05	-.02	.13	.14	.10	.09
Premia (I+)	.16	.15	.01	-.03	.05	-.03	.09	.11	.01	-.03
Coasthenia (J+)	-.13	-.17	-.15	-.14	.03	.06	.13	.15	-.04	-.04
Shrewdness (N+)	.02	-.07	.01	-.02	-.13	-.07	—	—	-.03	-.01
Guilt Proneness (O+)	-.14	-.11	-.25**	-.35**	-.33**	-.28**	.18	.15	-.19**	-.15**
Self-Sufficiency (Q <sub>3</sub> +) )	—	—	—	—	—	—	.10	.03	—	—
Self-Sentiment Strength (Q <sub>3</sub> +) )	-.03	-.03	—	—	-.01	-.06	.23**	.15	.18**	.20**
Ergic Tension (Q <sub>4</sub> +) )	.07	.03	.00	-.05	-.11	-.12	-.13	-.06	-.01	-.01

Note.—Abbreviated: CPQ = Children's Personality Questionnaire, ESPQ = Early School Personality Questionnaire, HSPQ = High School Personality Questionnaire, WRAT = Wide Range Achievement Test, SAT = Stanford Achievement Test.

\*  $\alpha < .05$ .  
\*\*  $\alpha < .01$ .

The most interesting finding relates to the age difference in the personality factors which significantly contribute to school achievement. The CPQ was given to both third and sixth graders thus permitting direct age comparisons. Intelligence

(B) was the only CPQ scale which predicted WRAT and SAT grade levels for the third grade (see Table 2), while Ego Strength (C+), in addition to Intelligence, improved prediction of both achievement measures for the sixth graders. Interestingly enough, however, the multiple correlation with the criterion does not increase with the additional predictor for the sixth graders but rather decreases (from .58 to .53 for the WRAT, and from .70 to .57 for the SAT).

TABLE 2  
CORRELATION WEIGHTS OF ORTHOGONALIZED PERSONALITY DIMENSIONS FOR GRADES 3 AND 6 ON BOTH ACHIEVEMENT TESTS (WRAT AND SAT)

Measure	Grade 3	Grade 6	Grades 3 & 6
CPQ			
WRAT	.53 B	.45 B + .27 C	.53 B
SAT	.70 B	.50 B + .26 C	.55 B + .17 F
ESPQ			
WRAT	.48 B	—	—
SAT	.48 B - .20 O	—	—
HSPQ			
WRAT	—	.47 B	—
SAT	—	.46 B	—

Note.—Abbreviated: CPQ = Children's Personality Questionnaire, ESPQ = Early School Personality Questionnaire, HSPQ = High School Personality Questionnaire, WRAT = Wide Range Achievement Test, SAT = Stanford Achievement Test.

The multiple correlations of the predictors with the criterion, and the percentage of variance predicted by them, are shown in Table 3. It can be seen that the multiple correlations (and concomitantly the amount of variance predicted) are highest when the predictors are measured with the CPQ, and lowest when measured with the HSPQ; furthermore they seem to be smaller for the sixth-grade sample than for the third-grade sample.

TABLE 3  
MULTIPLE PREDICTION OF ACHIEVEMENT FROM  
PERSONALITY QUESTIONNAIRES: MULTIPLE  
CORRELATION (*R*) AND PERCENTAGE OF  
VARIANCE PREDICTED

Measure	Grade 3		Grade 6		Grades 3 & 6	
	<i>R</i>	% variance	<i>R</i>	% variance	<i>R</i>	% variance
CPQ						
WRAT	.58	34	.53	28	.53	28
SAT	.70	49	.57	32	.58	33
ESPQ						
WRAT	.48	23	—	—	—	—
SAT	.53	27	—	—	—	—
HSPQ						
WRAT	—	—	.47	22	—	—
SAT	—	—	.46	21	—	—

Note.—Abbreviated: CPQ = Children's Personality Questionnaire, ESPQ = Early School Personality Questionnaire, HSPQ = High School Personality Questionnaire, WRAT = Wide Range Achievement Test, SAT = Stanford Achievement Test.

### DISCUSSION

In considering the uncorrected correlations between personality factors and the criterion variables, the present results are not completely consistent with those reported by other authors. In a review of five studies, Cattell, Sealey, and Sweney (1966) cite as the most important personality dimensions for predicting school achievement in seventh to ninth graders: Affectothymia (A+), Dominance (E+), Super-Ego Strength (G+), Coasthenia (J+), and Self-Sentiment Strength (Q<sub>3</sub>+). Of these only the last, Self-Sentiment Strength, proved to be a significant predictor of school achievement in the present study. This discrepant finding may be a function of the difference in the age groups of the subjects. While the oldest age group in the present study were sixth-grade children, the above cited studies were based on children from Grades 7 to 9.

It should be noted, however, that the correlations reported by Cattell et al. (1966) are not consistent across samples, that is, not all five factors correlated significantly with school achievement in all five samples (Butcher, Ainsworth, & Nesbitt, 1963; Cattell et al., 1962; Cattell & Sealey, 1965; Connor, 1962; Sealey, 1963). The computation of part correlations in these studies might have resulted in more stable findings.

With respect to the independent contribution of personality factors to school achievement (part correlations), the results of the present study provide clear evidence that different personality dimensions differentially predict school achievement at different age levels. While Intelligence (B+) alone seems to be the primary variable in predicting academic success for third-grade subjects, the factor of Ego Strength (C+) becomes increasingly important in predicting school performance for the sixth grade.

Intelligence, as measured by Factor B, is defined by Cattell as "crystallized" intelligence (e.g., Cattell, 1965; Cattell & Beloff, 1962; Horn & Cattell, 1966, 1967). In contrast to "fluid" intelligence, it is said to measure the accumulated knowledge an individual has acquired in the course of education by applying his fluid intelligence to school opportunities (Cattell, 1963, 1965). Therefore, it seems not surprising that a high correlation exists between crystallized intelligence and school achievement. In this sense, the present study supports the construct validity of Cattell's Factor B.

It is surprising, however, that crystallized intelligence correlates less well with academic success for the older age group as compared to the younger subjects. This finding may indicate that variables such as personality factors (as demonstrated in the present study) and motivational factors (e.g., Cattell, 1965; Cattell et al., 1966) become increasingly more important in determining school success with advancing age. In other words, school success in the higher grades may depend on more than merely "accumulated knowledge."

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