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Introduction

As a result of considerable psychological investigation in the field of individual differences, Tyler (3) and others have stated that social factors, such as amount of education, are related to mental abilities. This statement suggested the possibility that social factors may be related to changes in mental abilities over a chronological age span. The knowledge of social correlates, if any, of the changes in mental abilities is an important preliminary step for further research designed to determine causation.

Due to the lack of information in the literature concerning this relationship, it was believed worthwhile to conduct a longitudinal study directly concerned with the social correlates of intellectual changes with age.

The purpose of this study was to determine the relationship, if any, between certain social factors and the changes in mental abilities over a 31-year age span. This was part of a larger study made possible through a grant by the Office of Naval Research, and was under the guidance of Dr. W. A. Owens, Jr. The primary purpose of the larger study was a longitudinal approach to changes in mental abilities as age advances, and it will be made available in written form at a later date.

Materials

The materials used in this study were the Army Alpha Examination, Form 6, and a Personal Information Sheet. The Army Alpha is a partially speeded, group examination of mental abilities devised for use in the United States Army of World War I. Scores may be obtained for each of eight tests and a total. The eight tests are titled as follows: Test 1 (following directions), Test 2 (arithmetical problems), Test 3 (practical judgment), Test 4 (synonym-antonym), Test 5 (disarranged sentences), Test 6 (number series completion), Test 7 (analogies), and Test 8 (information). Jones and Conrad (1) have reported the split-half reliability of the total score of Army Alpha as 0.977. The present writer computed split-half reliabilities corrected by the Spearman-Brown formula of 0.728 to 0.965 for Test 2 through Test 8 and 0.487 for Test 1. Yerkes (4) reported an estimate of validity in terms of correlations ranging

from 0.60 to 0.75 inclusive for the eight tests and total score of Army Alpha with number of years of schooling.

A Personal Information Sheet was constructed by the present writers to obtain the ten social factors considered in this study.

Procedure

The procedure involved retesting in 1950, with the Army Alpha, 127 male subjects who, as undergraduates at Iowa State College in the 1918-1919 academic year, took the same examination. At the time of retesting, the 127 subjects filled in the Personal Information Sheet which yielded the social correlates.

The changes in mental abilities were determined in the following way. First, the raw scores of a group of 1000 male undergraduate students who took the Army Alpha at Iowa State College in 1923-1924 were converted to McCall's (2) T-scores. Next, the two sets of raw scores for the 1918-1919 testing and the 1950 testing of the 127 subjects were changed to T-scores found for the 1923-1924 group. Then, the 1918-1919 T-scores were subtracted from the 1950 T-scores for each test and the total, yielding D-scores which were the changes in mental abilities. It follows, then, that the mean D-scores were the average changes in mental abilities from 1918-1919 to 1950.

The ten social factors were: field of specilization in college, number of years of college education, area lived in prior to college, area lived in the last 30 years, migrating from one area to another, net income for 1948, and a cluster of four avocational factors.

The appropriate statistical analysis was used to test the null hypothesis concerning the relation of each social factor to the changes in the eight mental abilities and the total. Analysis of variance was used to test if there was a significant difference among the mean D-scores of the categories for the first five mentioned social factors and the avocational factor of 'number of hobbies and recreations'. Whenever a significant F-value was found, the t-test was used in accordance with a previous hypothesis to determine if there was a significant difference between the mean D-scores for the two appropriate categories of the social factor concerned. Rank order correlation was used to show the relationship of net income to D-scores. To test the hypothesis of no difference between the mean D-scores of the two categories for the factors of 'number of social welfare activities' and 'number of social and fraternal organizations', the t-test was used. Product-moment correlation was used to show the relationship of the avocational factor of 'number of magazines

read' to D-scores. The 5% level of significance was adopted for the rejection of the null hypothesis for each social factor.

Results

Since ninety analyses were obtained, viz. one analysis for the relationship of each social factor to each of the eight tests and the total score, the presentation of results in table form would be prohibitive in length. Consequently, only a statement as to the significance of the results obtained, and the number of subjects in each category, will be given. The results will be stated in greater detail in written form at a later date.

The factor of 'field of specialization in college' was separated into the three categories of agriculture ($n = 44$), engineering ($n = 61$), and all other fields of specialization ($n = 22$). There was found a significant difference in mean D-scores on Test 4 (synonym-antonym) among agriculture, engineering, and all other fields of specialization. The hypothesis was not rejected for the other tests and the total.

'Number of years of college education' included number of years of college, and extension courses, refresher courses, etc. which were attended at any time in the last 30 years. This factor was separated into the three categories of less than four years ($n = 25$), four or more years but less than five ($n = 53$), and five or more years of college education ($n = 49$). There was found a significantly greater average increase on Test 7 (analogies) for the group that received five or more years of education than for the group that received less than four years of education. Similar results were found for the total score. The hypothesis was not rejected for the other tests.

The categories of farm ($n = 67$), village ($n = 21$), and urban ($n = 38$) were designated for the factor of 'area lived in prior to college'. A subject was designated as having lived in one of the three areas if he lived more than one-half of the total number of years prior to college in that area. A significantly greater average increase was found on Test 5 (disarranged sentences) for the farm group than for the urban group. The hypothesis was not rejected for the other tests and the total.

The factor of 'area lived in the last 30 years' was separated into the three categories of farm ($n = 24$), village ($n = 10$), and urban ($n = 93$). The hypothesis was not rejected for any of the tests and the total.

The factor of 'migrating from one area to another' was separated into the four categories of migrating from rural to urban ($n = 56$),

migrating from urban to rural (n = 2), remaining in a rural area (n = 32), and remaining in an urban area (n = 36). Migration, if taking place, was defined as living over one-half of the pre-college years in one area, and living over one-half of the last 30 years in another area. The farm and village categories were considered as rural in this factor. A significantly greater average increase was found on Test 5 (disarranged sentences) for the group that migrated from rural to urban than for the group that remained in an urban area. The hypothesis was not rejected for the other tests and the total.

There was found a tendency for ranked D-scores, on Test 6 (number series completion) and Test 7 (analogies), to increase as ranked net income increased. The rank order correlations, in these two cases, were significant at the 5% level. The hypothesis was not rejected for the other tests and the total.

The factor of 'number of hobbies and recreations' was separated into the three categories of none or one hobby or recreation (n = 28), two or three (n = 63), and four or more hobbies and recreations (n = 35). There was found a significant difference in mean D-scores on Test 4 (synonym-antonym) among the three categories. A significantly greater average increase was found on Test 8 (information) for those who had four or more hobbies and recreations than those who had none or one hobby or recreation. The hypothesis was not rejected for the other tests and the total.

The categories of no social welfare activities (n = 39) and one or more social welfare activities (n = 83) were designated for the factor of 'number of social welfare activities'. The hypothesis was not rejected for any of the tests and the total.

The factor of 'number of social and fraternal organizations' was separated into the two categories of no social or fraternal organizations (n = 17) and one or more social and fraternal organizations (n = 110). The hypothesis was not rejected for any of the tests and the total.

No significant relationship was found between 'number of magazines read' and D-scores on any of the tests or the total.

There was a consistent trend for little average increase or little average decrease on Test 1 (following directions), Test 2 (arithmetical problems), and Test 6 (number series completion) over the 31-year age span. There was a consistent trend for an average increase on the other tests and the total over the 31-year age span.

Conclusions

The results obtained seem to indicate the following conclusions. It should be remembered that these conclusions are valid only for the group used in this study or a highly similar one, and for the same or similar mental abilities as those yielded by Army Alpha.

1. The average change over a 31-year age span in the mental ability measured by synonyms-antonyms varied significantly with the groups' field of specialization in college. The average changes in the other mental abilities over a 31-year age period did not vary significantly with the groups' field of specialization in college.

2. There was a significantly greater average increase in the mental abilities measured by analogies and total score in a group who received five or more years of college than in a group who received less than four years of college. The average changes in the other mental abilities did not vary significantly with the groups' number of years in college.

3. There was a significantly greater average increase in the mental ability measured by disarranged sentences for a group who lived on a farm than for an urban group. The average changes in the other mental abilities did not vary significantly with the groups' area lived in prior to college.

4. The average changes in mental abilities did not vary significantly with the groups' area lived in the last 30 years.

5. A significantly greater average increase was found in the mental ability measured by disarranged sentences for a group who migrated from rural to urban areas than for a group who remained in an urban area. The average changes in the other mental abilities did not vary significantly with the groups' migration or non-migration.

6. Those individuals who received a greater net income also had greater increases in the mental abilities measured by number series completion and analogies. There was no significant relationship between net income and the changes in the other mental abilities.

7. The average change in the mental ability measured by synonyms-antonyms varied significantly with the groups' number of hobbies and recreations. A significantly greater average increase was found in the mental ability measured by information for a group who participated in four or more hobbies and recreations than for a group who had none or one hobby or recreation. Average changes in the other mental abilities did not vary significantly with the groups' number of hobbies and recreations.

8. The average changes in the mental abilities did not vary significantly with the groups' number of social welfare activities.

9. The average changes in the mental abilities did not vary significantly with the groups' number of social and fraternal organizations.

10. No significant relationship was found between the number of magazines read and changes in the mental abilities over a 31-year age span.

11. There was a consistent trend for little average increase or little average decrease over the 31-year age span in the mental abilities measured by following directions, arithmetical problems, and number series completion. There was a consistent trend for an average increase over the 31-year age span in the mental abilities measured by practical judgment, synonyms-antonyms, disarranged sentences, analogies, information, and total score.

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