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RELIABILITY OF THE 16 PF FORM E FOR HEARING IMPAIRED COLLEGE STUDENTS

CARL JENSEMA, Ph.D.

INTRODUCTION

A glance through the catalogues devoted to psychological measuring instruments quickly reveals a multitude of tests purported to measure personality. However, finding tests which have been designed, or at least revised, for application to hearing impaired persons is another matter. Such tests are virtually nonexistent. The standard mode of operation for professionals who work with the hearing impaired has been to simply pick out some personality test which "looks good," more or less disregarding the fact that the test was designed for use with individuals who have normal hearing.

One of the most unfortunate aspects of this practice is that people are often deluded into thinking that since a hearing impaired person had no particular problems in taking the test, the results are as meaningful as they would be for a person with normal hearing. Such an assumption completely overlooks a fundamental concept underlying test theory: Every good test is statistically designed to measure among a particular population. Application to any other population raises important questions concerning reliability and validity. This is not to say that a test is worthless for any population but the one it was designed for. It means that the test's worth must be determined by statistical analysis before it can be used with confidence.

One of the most common paper-and-pencil personality tests used by counselors of the hearing impaired is Form E of the "Sixteen Personality Factor Questionnaire" (16PF). This test was designed by Eber and Cattell in 1967 and is considered appropriate for low-literate adults with a 3rd to 6th grade reading level. As the name implies, the 16 PF Form E is considered as measuring 16 aspects of personality. Each factor has eight binarily second items and the raw score of a factor is simply the sum of these scored items.

For a number of years the 16 PF Form E has been routinely administered to incoming students at Gallaudet College. Norms for the 16 PF

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based on these students were calculated by Trybus (1973) and revised with additional data by Jensema (in press). The norms are now available, but the reliability of these and how this reliability limits interpretation of the scores has not been previously discussed. The following paragraphs will investigate this topic.

METHOD

The data consisted of 128 binarily scored items of the 16 PF Form E from 414 female and 404 male hearing impaired students at Gallaudet College. All students had at least a moderate hearing loss (BEA)90dB ISO). The mean age for both sexes was 19.8, with a standard deviation of 4.5 years for males and 4.3 years for females.

Since each of the 16 scales of the 16 PF is assumed to measure a separate aspect of personality, and since it is known that sex differences play an important role in responses to the items, the data was treated as being 32 short eight-item tests, each having been given to either 414 or 404 subjects. An item analysis was conducted on each of these short tests. Although a wide range of statistics related to item analysis were calculated, only those which are especially pertinent will be presented.

RESULTS

Table 1 gives the proportion of each sex who obtained a score of "1" on each particular item. A careful examination on Table 1 and items in the test booklet raise some intriguing questions about differences in response tendencies for the two sexes. For example, who would 95% of the females but only 36% of the males claim they were critical of other people's work (item 116)? Other items refer to the examinees take this to mean a group of hearing people or a group of deaf people. The proportions obtained for some items are too extreme for the items to have much measuring value. For example, 96% of the females and 92% of the males scored "1" on item 1. Such high proportions automatically lower total score reliability.

The point-biserial corrections between each item and the sum of all other items of the factor are given in Table 2. The higher these correlations, the higher the reliability of the factor. Unfortunately, a glance at Table 2 shows that the correlations are low, the highest being .46 for females on item 85. The items for Factors M and N are dominated by near-zero and negative correlations, indicating little or no relationship.

The raw score mean, standard deviation (S.D.), standard error of the measure (S.E.M.) and the Kuder-Richardson formula-20 (KR-20) reliability coefficient are given in Table 3 for each sex on each factor. The KR-20 reliability coefficients are generally low. Factors with a KR-20 value of .4 or

TABLE 1: Proportion of Subjects Scoring "1" On Each Item of the 16PF Form E

	FEMALE (N = 414) TEST ITEM NUMBER								MALE (N = 404) TEST ITEM NUMBER							
FACTOR	1-16	17-32	33-48	49-64	65-80	81-96	97-112	113-128	1-16	17-32	33-48	49-64	65-80	81-96	97-112	113-128
A	.96	.78	.56	.90	.58	.91	.33	.64	.92	.61	.65	.72	.49	.80	.36	.55
B	.81	.81	.91	.98	.90	.71	.64	.95	.78	.81	.92	.98	.86	.64	.80	.96
C	.76	.50	.33	.77	.72	.78	.36	.72	.75	.50	.35	.77	.69	.75	.36	.70
E	.15	.32	.59	.36	.17	.71	.64	.95	.26	.34	.57	.45	.28	.64	.28	.36
F	.87	.46	.66	.76	.96	.81	.61	.54	.91	.56	.65	.69	.95	.82	.64	.56
G	.28	.80	.37	.79	.70	.52	.88	.63	.23	.70	.36	.68	.65	.46	.79	.60
H	.72	.43	.41	.36	.50	.24	.33	.46	.73	.45	.57	.44	.62	.27	.40	.56
I	.81	.56	.63	.93	.74	.88	.87	.77	.42	.30	.41	.74	.56	.52	.63	.61
L	.18	.65	.23	.64	.17	.46	.37	.53	.24	.67	.38	.65	.30	.48	.33	.57
M	.19	.76	.48	.59	.40	.58	.23	.40	.35	.62	.51	.54	.42	.55	.28	.32
N	.49	.79	.67	.43	.58	.58	.36	.29	.56	.65	.67	.44	.57	.64	.25	.24
O	.65	.59	.50	.43	.70	.66	.64	.34	.68	.53	.39	.31	.58	.47	.54	.26
Q_1	.41	.46	.81	.64	.31	.87	.73	.52	.51	.42	.76	.68	.23	.84	.72	.40
Q_2	.55	.26	.24	.42	.30	.47	.24	.11	.46	.35	.31	.43	.27	.36	.33	.17
Q_3	.31	.52	.75	.84	.73	.58	.87	.77	.26	.54	.74	.68	.71	.64	.64	.83
Q_4	.46	.15	.61	.47	.16	.25	.42	.71	.43	.28	.49	.41	.14	.24	.36	.53

TABLE 2: Point Biserial Correlation of Items With Item-Excluded Subtest Scores for the 16PF Form E

	FEMALE (N = 414) TEST ITEM NUMBER								MALE (N = 404) TEST ITEM NUMBER							
FACTOR	1-16	17-32	33-48	49-64	65-80	81-96	97-112	113-128	1-16	17-32	33-48	49-64	65-80	81-96	97-112	113-128
A	.02	.02	.10	.16	.10	.08	.10	.10	.18	.24	.14	.33	.22	.21	.18	.25
B	.07	.36	.12	.11	.43	.37	.26	.02	.24	.43	.09	.04	.46	.37	.30	.09
C	.18	.21	.12	.21	.30	.05	.16	.21	.18	.21	.16	.20	.21	.04	.11	.21
E	.16	-.02	.05	.13	.15	.14	.04	.04	.15	.12	.08	.06	.14	.00	.16	.18
F	.30	.31	.40	.44	.22	.46	.38	.38	.13	.33	.36	.42	.26	.36	.35	.35
G	.25	.06	.18	.06	.06	.10	.12	.03	.15	.11	.16	.05	.10	.12	.06	-.02
H	.32	.38	.41	.11	.44	.17	.40	.28	.39	.36	.36	.16	.31	.10	.38	.21
I	.28	.23	.22	.13	.18	.32	.09	.19	.33	.25	.15	.22	.26	.36	.20	.29
L	.13	-.05	.10	.12	.18	.02	.21	.14	.07	.06	.16	.15	.15	.05	.16	.12
M	-.02	-.06	.04	-.07	.01	.09	.08	.15	-.01	.03	.03	.04	-.09	.05	.00	.08
N	-.08	.00	-.04	-.05	-.01	-.08	-.08	.01	.07	-.04	-.08	.01	.13	-.05	.00	.11
O	.24	.25	.28	.32	.20	.31	.18	.25	.24	.26	.20	.23	.05	.21	.08	.20
Q_1	.41	.40	.15	.25	.01	.32	.31	.01	.38	.40	.14	.09	.03	.22	.33	.02
Q_2	.22	.43	.29	.20	.23	.27	.34	.36	.17	.43	.44	.15	.22	.36	.38	.45
Q_3	-.03	.14	.23	.16	.27	.01	.30	.09	-.07	.09	.22	.13	.26	.11	.29	.03
Q_4	.23	.20	.23	.16	.34	.31	.25	.20	.18	.28	.29	.24	.34	.33	.33	.30

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TABLE 3:
Test Score Statistics For Each Factor of the 16PF Form E

	FEMALE (N = 414)				MALE (N = 404)			
FACTOR	MEAN	S.D.	S.E.M.	KR-20	MEAN	S.D.	S.E.M.	KR-20
A	5.66	1.28	1.13	.22	5.10	1.68	1.21	.48
B	6.55	1.35	.97	.48	6.74	1.38	.91	.56
C	4.49	1.61	1.22	.42	4.87	1.60	1.25	.39
E	3.89	1.34	1.18	.22	3.18	1.54	1.30	.28
F	5.68	1.86	1.08	.67	5.77	1.78	1.10	.62
G	4.97	1.43	1.22	.27	4.47	1.47	1.29	.24
H	3.45	1.99	1.23	.62	4.03	1.93	1.26	.58
I	6.20	1.47	1.08	.46	4.18	1.88	1.27	.54
L	3.24	1.47	1.26	.26	3.63	1.55	1.30	.30
M	3.62	1.36	1.31	.08	3.58	1.40	1.36	.05
N	4.19	1.27	1.35	.14	4.03	1.26	1.35	-.15
O	4.49	1.87	1.27	.54	3.76	1.71	1.30	.42
Q_1	4.74	1.70	1.21	.49	4.56	1.64	1.22	.45
Q_2	2.59	1.81	1.17	.58	2.67	1.94	1.20	.61
Q_3	5.37	1.46	1.19	.33	5.23	1.48	1.22	.32
Q_4	3.23	1.72	1.20	.51	2.88	1.86	1.21	.58

above might be considered marginally acceptable for some purposes but nearly half of the KR-20 values in Table 3 do not reach even this low criterion.

Factor N has a negative reliability coefficient, an anomaly which is not surprising in view of the negative Factor N item correlations given in Table 2. Both Factor N and Factor M are useless, since they obviously do not measure with any consistency. The other factors have some value but they must be used with considerable caution. Notice that for most of the factors the S.E.M. is almost as large as the raw score S.D.

DISCUSSION

A commonly overlooked limitation of test theory is that a test is designed for a specific population and its use on any other population raises questions of reliability and validity. The 16PF Form E was designed for low-literate adults who have normal hearing. The data show that when this test is used on teenage hearing impaired college freshmen its reliability is very low, especially for factors M and N. If this is not taken into consideration in interpreting the scores the consequences can be serious.

The paper has concentrated on reliability and has not really investigated the validity of the 16PF Form E as applied to hearing impaired people. Although those who use the test obviously consider it to have face validity, its statistical validity remains questionable. A factor analysis would be needed to determine how well the 16 factors hold among a hearing impaired population, but an examination of the item correlations and other statistics strongly suggest that some factors would be quite different from the 16 factors the test proports to measure.

The 16PF Form E is one of the better tests currently used on the hearing impaired. There are worse tests being employed and some are unreliable and invalid to the point of being useless. There is a clear need for tests of all types which are designed or revised specifically for the hearing impaired. Although admittedly difficult to construct, such tests would be well worth the effort.

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