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The Occupational Aspiration Scale: An Evaluation and Alternate Form for Females[1]

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ABSTRACT This paper presents an empirical comparison of the Occupational Aspiration Scale (OAS) among four subgroups—black females, white females, black males, and white males. For females, an alternate form of the OAS intended to eliminate male-stereotyped occupational titles is presented and compared to the original OAS. At the time of data collection, respondents were high school sophomores in a large midwestern city; the combined samples contain 473 observations divided approximately equally among the four subgroups. Several observations in the data are noteworthy: (1) As in past research, reliability coefficients were of moderate size for all four subgroups. (2) Several tests to determine the number of factors in the OAS failed to support the hypothesis drawn from the literature that the OAS is unidimensional. (3) The OAS correlates as hypothesized with most variables in a set of nine criterion variables such as educational expectation, parental status, and an open-ended realistic occupational aspiration measure, but most correlations were not exceptionally large. (4) The alternate-form OAS revealed larger reliability and communalities than the original form for white females but not for black females. It is concluded that the OAS is a usable instrument for measuring the occupational aspirations of high-school age youth, but that a program of measurement research is needed before one can be confident in a highly accurate measurement of youth's occupational aspirations.

The Occupational Aspiration Scale (OAS) is intended to provide a short instrument to measure levels of occupational aspirations (LOA) in an occupational prestige hierarchy (Hodge *et al.,* 1966) among teenage youth (Haller and Miller, 1971). It is designed to be easy for youth to answer, easy to administer, and easy to score. The OAS was developed for, and tested on, white male junior and senior high school students (Haller and Miller, 1971). As a result of these tests, Haller and Miller concluded that the instrument is reliable and prac-

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tical, and that it correlates in a predictable manner with other measures of occupational aspiration and with variables such as family status, high school grade-point average, and achievement tests. The validity of the OAS has been further substantiated in more recent research; in 1972 Otto and Haller (1978) restudied the original Haller-Miller sample 15 years after the initial survey. They found occupational status attainment at the time of the follow-up survey to be highly correlated with the earlier OAS scores (r = .57). As noted by Haller and Miller, however, additional work is needed to assess the applicability of the OAS to females (Haller and Miller, 1971:105). In addition, the OAS has not been systematically tested on other subgroups such as blacks.

The results of the original work with the OAS by Haller and Miller have subsequently been supported and extended (Westbrook 1966; Haller *et al.,* 1974; Otto *et al.,* 1974). Westbrook checked the OAS on a small sample of 11th grade males and females for internal consistency, test-retest stability, and factor structure. He found moderately high coefficients of internal consistency and stability (r's $\cong$ .78). While five factors were extracted by principle axis method and rotated according to both quartimax and varimax criteria, it was concluded that one factor, level of occupational aspiration, dominated the factor matrix.

Otto *et al.* (1974) checked the OAS for reliability and factor structure on a large national sample (N = 34,118) of mixed sex. Respondents ranged from freshman to senior level in high school. It was concluded that the OAS is sufficiently general to be used with girls as well as boys, that the OAS may apply to all four levels of high school students and all SES levels, and that the OAS approximates a single-factor scale. The authors did, however, express mild reservations about applying the OAS to female populations since the reliability for females was found to be somewhat lower than for males (coefficient alpha = .681 for females, .756 for males) (Otto *et al.,* 1974:7).

The record of validation research of the OAS to date suggests that at least two additional types of work are in order: (1) further exploration of the use of the OAS with females and (2) checks of reliability and factor structure of the OAS for minority populations such as blacks. Both of these efforts are of particular currency. Study of the OAS in relationship to females is important because of the increasing participation of women in the labor force (Dicesare, 1975) and the apparent importance of the status of the wife's job in determining overall family status (Haug, 1973). Also, study of the status attainment process of blacks has developed into an important issue in social research (Porter, 1974; Curry *et al.,* 1976, 1978). Consequently, a reliable, valid, and efficient method of assessing LOA for black youth is of paramount importance.

The purpose of this study is to extend previous evaluations of the Occupational Aspiration Scale by checking the reliability, factor structure, and correlates of the OAS for four subgroups—black females, white females, black males, and white males. As part of the evaluation, the original OAS is compared to an alternate form designed to be more appropriate than the original scale for use with females. Based on past research, four general outcomes can be expected: (1) The OAS is moderately reliable, with alpha coefficients centering on about .70. (2) The OAS approximates a one-factor scale. (3) The OAS correlates positively with a number of variables such as educational expectation, family status, and school grade-point average. (4) The reliability, factor structure, and correlates of the OAS hold for all four subgroups.

Alternate form of the OAS for females

One of the most pervasive features of work specialization has been the assignment of different tasks to women than are assigned to men. Albrecht expressed this observation in the following terms:

> Historically, divisions of labor and the assignment of statuses on the basis of sex have been present in all societies. It has generally been accepted that these traditional sex-role assignments have been transmitted from generation to generation through the socialization process (Albrecht, 1976:321).

Despite the fact that at least a few women are employed in most occupations, there is little doubt that sex segregation of the labor force persists; the concentration of women in a narrow band of occupations is easily documented (U.S. Department of Labor, 1975a, 1975b).

Segregation of work by sex is closely related to attitudes that define some occupations as more appropriate for men and other occupations as more appropriate for women. Such attitudes undoubtedly reflect the sex-specific socialization regarding occupations alluded to by Albrecht (1976). There is evidence that these attitudes develop early and persist into later life. Siegel (1973) found clear differences between occupational preferences of second grade girls and boys. Others report evidence that college students retain these attitudes (Albrecht, 1976) and that males and females agree about which occupations are most appropriate for males and which for females (Shinar, 1975).

When completing the OAS, respondents are asked to express preferences among 80 occupational titles. The purpose of the scale is to assess the prestige level of respondents' occupational aspiration. As noted by Westbrook (1966), however, the original OAS contains sev-

eral occupational titles that are stereotyped as male occupations. Examples include corporal in the army, night watchman, policeman, filling station attendant, railroad engineer, barber, coal miner, and plumber. If the evidence regarding sex stereotyping of occupations is accurate, then one would expect that many female respondents of the OAS might avoid choosing certain occupations, not for any reason concerning occupational prestige, but because they view the occupations as fit only for men.[2] The presence of male-stereotyped occupations on the OAS probably accounts for the somewhat lower reliability coefficients observed when it is applied to females. Consequently, an alternate form of the OAS was constructed applying the exact format of the original OAS to alternative occupational titles. The alternative list of occupations avoids titles commonly viewed as inappropriate for women.

The format of the OAS consists of eight closed-ended items, each with 10 occupational titles presented as response alternative. The following four stimulus questions are spread across the eight items:

> Of the jobs listed in this question which is the BEST ONE you are REALLY SURE YOU CAN GET when your SCHOOLING IS OVER?
>
> Of the jobs listed in this questions, which ONE would you choose if you were FREE TO CHOOSE ANY of them you wished when your SCHOOLING IS OVER?
>
> Of the jobs listed in this question, which is the BEST ONE you are REALLY SURE YOU CAN HAVE by the time you are 30 YEARS OLD?
>
> Of the jobs listed in this question, which ONE would you choose to have when you are 30 YEARS OLD, if you were FREE TO HAVE ANY of them you wished? (Haller and Miller, 1971:60, capitalizations in the original.)

Each question is presented twice, but each of the eight items contains a distinct set of occupational titles. Two dimensions structure the wording of the questions. Timeframe defines one dimension, consisting of two levels—occupational choice immediately after schooling is complete, and at age 30. The other dimension is realism and also consists of two levels—realistic occupational choice and ideal occupational choice. The occupational titles are assigned numerical values according to the rank order of the prestige score associated with the

[2] In the experience of one of the authors of this paper, women do feel uneasy with many of the response alternatives on the original OAS. During the collection of data used in this report, female respondents frequently expressed dismay that all the listed occupations were "men's jobs."

Table 1. Comparison of original items to alternate-form OAS items[1]

1.	Of the jobs listed in this question, which is the BEST ONE you are REALLY SURE YOU CAN GET when your SCHOOLING IS OVER?		
	86	Lawyer	89 Psychiatrist
	73	Welfare worker for a city government	71 Computer Programmer
	89	United States representative in Congress	90 Justice of a Municipal Court
	60	Corporal in the Army	58 Custom Seamstress
	96	U.S. Supreme Court Justice	95 Federal Court Judge
	47	Night watchman	49 Packer in a wholesale vegetable market
	82	Sociologist	82 Social Scientist
	67	Policeman	72 Dietician in a hospital
	77	County agricultural agent	71 Musician
	52	Filling station attendant	51 Professional Babysitter
		AVG. = 72.9 SD = 15.4 r = .98	
2.	Of the jobs listed in this question, which is the BEST ONE you are REALLY SURE YOU CAN GET when your SCHOOLING IS OVER?		
	86	Nuclear physicist	91 Department Head in a state government
	71	Reporter for a daily newspaper	68 Airline Stewardess
	87	County judge	87 Dentist
	59	Barber	60 Hospital Attendant
	93	State Governor	91 Government Scientist
	45	Soda fountain clerk	48 Waitress in a restaurant
	81	Biologist	82 Geologist
	66	Mail carrier	63 Telephone operator
	75	Official of an international labor union	73 TV Announcer
	50	Farm hand	50 Salad maker in a hotel kitchen
		AVG. = 71.3 SD = 15.4 r = .99	
3.	Of the jobs listed in this question, which is the BEST ONE you are REALLY SURE YOU CAN HAVE by the time you are 30 YEARS OLD?		
	84	Civil Engineer	88 Head of a department in a state government
	68	Bookkeeper	68 Stenographer
	87	Minister or Priest	87 Biologist
	58	Streetcar motorman or city bus driver	55 Knitting machine operator
	92	Diplomat in the United States Foreign Service	93 Chemist
	40	Sharecropper (one who owns no livestock or farm machinery and does not manage the farm)	43 Hotel chambermaid
	80	Author of novels	77 Accountant
	63	Plumber	63 Receptionist
	74	Newspaper columnist	72 Bank teller
	49	Taxi driver	50 Faith healer
		AVG. = 69.5 SD = 16.2 r = .99	

Table 1. Continued

4. Of the jobs listed in this question, which is the BEST ONE you are REALLY SURE YOU CAN HAVE by the time you are 30 YEARS OLD?

83 Artist who paints pictures that are exhibited in galleries	77 Sculptor
68 Traveling salesman for a wholesale concern	63 Typist
86 Chemist	93 Lawyer
54 Truck driver	54 Clerk for a city bus company
89 College Professor	93 Diplomat in the U.S. Foreign Service
34 Street sweeper	38 Office Cleaner
79 Building contractor	80 Medical or Dental Technician
62 Local official of a labor union	58 Clerk in an office
73 Electrician	69 Office nurse in a dentist's office
48 Restaurant waiter	52 Loom operator

AVG. = 67.6 SD = 17.1 r = .97

5. Of the jobs listed in this question, which ONE would you choose if you were FREE TO CHOOSE ANY of them you wished when your SCHOOLING IS OVER?

86 Member of the board of directors of a large corporation	88 Psychologist
72 Undertaker	74 Job Counselor
88 Banker	85 School Superintendent
60 Machine operator in a factory	60 Quality checker in a manufacturing plant
93 Physician (doctor)	96 College or University President
46 Clothes presser in a laundry	47 Worker in a dry cleaning or laundry plant
81 Accountant for a large business	79 Public grade school teacher
67 Railroad conductor	66 Ballet dancer
77 Railroad engineer	75 Professionally trained librarian
52 Singer in a night club	53 Cook in a restaurant

AVG. = 72.2 SD = 15.0 r = .99

6. Of the jobs listed in this question, which ONE would you choose if you were FREE TO CHOOSE ANY of them you wished when your SCHOOLING IS OVER?

85 Psychologist	88 Chiropractor
69 Manager of a small store in a city	66 Library Assistant
87 Head of a department in state government	88 Department head in a city government
58 Clerk in a store	55 Assembly line worker
92 Cabinet member in the federal government	94 College Professor
44 Janitor	46 Laundress
81 Musician in a symphony orchestra	78 Artist who paints pictures that are exhibited in galleries
65 Carpenter	69 Secretary
75 Radio announcer	68 Real Estate Agent
49 Coal miner	53 Housekeeper in a private home

AVG. = 70.5 SD = 15.6 r = .97

Table 1. Continued

7. Of the jobs listed in this question, which ONE would you choose to have when you are 30 YEARS OLD, if you were FREE TO HAVE ANY of them you wished?	
83 Airline pilot	88 Mayor of a large city
68 Insurance agent	66 IBM Keypunch operator
86 Architect	97 Physician
54 Milk route man	53 Shipping Clerk
90 Mayor of a large city	80 Registered nurse
35 Garbage collector	40 Cleaning woman in private houses
80 Captain in the army	70 Social worker
62 Garage mechanic	57 Beauty operator
74 Owner-operator of a printing shop	77 Designer
48 Railroad section hand	51 Sewing machine operator
AVG. = 68.0 SD = 17.2 r = .93	
8. Of the jobs listed in this question, which ONE would you choose to have when you are 30 YEARS OLD, if you were FREE TO HAVE ANY of them you wished?	
82 Owner of a factory that employs about 100 people	77 Psychiatric Social Worker
67 Playground director	54 Cashier in a supermarket
86 Dentist	82 High school teacher
53 Lumberjack	54 File clerk
89 Scientist	96 Scientist
33 Shoe shiner	41 Hat check girl
78 Public school teacher	82 TV star
62 Owner-operator of a lunch stand	59 Machine operator
73 Trained machinist	78 Journalist
47 Dock worker	47 Elevator operator
AVG. = 67.0 SD = 17.4 r = .94	

[1] Original response alternatives are on the left under each question; alternate items on the right. AVG. = average; SD = standard deviation. The scores for each pair of item sets were normalized so that the average and standard deviation of the alternate-form OAS match those for the original OAS.

title by the NORC study of occupational prestige (Reiss, 1961). The sum of the rank scores over the eight items defines the level of occupational aspiration for each respondent. (See Haller and Miller [1971] for complete details.)

The occupational titles associated with each question on the original OAS and the corresponding titles appearing on the alternate form for females are listed in Table 1. Column 1 lists the original titles, and column 2 shows the new titles.

The prestige scores for the new sets of titles were developed from Siegel's (1971) study of occupational prestige. These prestige scores were adjusted to the same mean and variance as the NORC scores, within each question. An effort to match the prestige level of each original title with a corresponding substitute title was made. The reader can judge the success of this effort by observing the product

moment correlations between the NORC scores of the two forms, listed below the occupational titles for each question. The lowest correlation is .93; three correlations are .99, and the remaining four range in between. Thus, a reasonably close match of the prestige of the titles was achieved. As can be judged by inspecting the titles in the revised form, the sterotyped male titles have been removed and replaced with titles generally thought more appropriate for women, such as custom seamstress, packer in a wholesale vegetable market, dietician in a hospital, professional babysitter, professionally trained librarian, hospital attendant, housekeeper in a private home, and receptionist. It should be noted, however, that our efforts to exclude male-typed occupations were not as successful at the upper end of the prestige hierarchy as they were at the lower end.

When administered to females, the alternate-form OAS should (1) exhibit higher reliability than the original OAS and (2) approximate a one-factor structure more closely than the original OAS. The improved reliability is expected because removal of male-typed occupations from the lists of response alternatives should reduce the ambiguity felt by women when they are asked to select from among male-typed occupations; reduced amibiguity should remove an element of randomness from the choices. The factor structure should be simplified because removal of male-typed occupations should reduce the likelihood that a sex factor will be found in women's responses.

Data and methodology

A sample of 247 male sophomores and a second sample of 226 female sophmores provide the data for this paper. The two samples were drawn using as similar methodology as practical. The sample of females, however, was taken about a year and a half following the administration of questionnaires to males. Each sample was drawn from the same public high schools in a medium-sized midwestern city and was stratified by race and school. As a consequence, the number of blacks in each sample is approximately the same as the number of whites (47 percent black males, 47 percent black females). Checks of the data against census reports for several variables showed a close correpondence between the samples and the census data, except that the female sample is somewhat overbalanced with girls from broken homes (Curry *et al.,* 1978).

In all, six sets of OAS items are used in the analyses, one for each of the following categories: (1) black females, original OAS, (2) black females, alternate-form OAS, (3) white females, original OAS, (4) white females, alternate-form OAS, (5) black males, original OAS, and (6) white males, original OAS. For each set of items a correlation matrix, the mean and standard deviation of each item, and of the

summed total score are presented in Table 2. A null hypothesis that the population correlation matrix is the identity matrix was carried out for each set of items using a chi-square test developed by Bartlett (1950). In every test the null hypothesis was rejected with a level of significance smaller than .001. The internal consistency of each of the six sets of items is summarized by coefficient alpha (Cronbach, 1951). Several methods for evaluating the one-factor hypothesis are reported, and correlations between the OAS and a number of related variables are reported. Discussion of methods for assessing the dimensionality of a set of items and a list of correlates follow.

Based on past research, it is hypothesized that a single prestige factor accounts for most of the intercorrelations among the eight OAS items; this hypothesis should hold for all six sets of items. Determination of the number of factors in a set of items, however, is ambiguous in practical research settings (see the discussion by Harman, 1967:68–92; or Gorsuch, 1974:130–60, for example). A large number of rules for determining the number of factors has been suggested; these rules frequently give conflicting answers when applied to the same data. Guttman (1954, 1956) derived three lower bounds for the number of common factors in data collected from the entire population. Guttman's strongest bound is determined by counting the number of positive eigenvalues in the correlation matrix containing the squares of the multiple correlation (SMC) as communality estimates, and his weakest lower bound is given by counting the number of eigenvalues exceeding unity in the correlation matrix itself. The little-used middle lower bound coincides with the number of positive eigenvalues in the correlation matrix with diagonal cells containing the square of the largest correlation in the row/column. Being based on the total population, Guttman's bounds do not account for sampling error. Statistical tests for the number of factors are available for principle components (Bartlett, 1950) and for maximum likelihood estimates (Lawley, 1940) of the pattern coefficients for the common factor model.

Simulation studies using input data that approximate the factor model, but do not conform exactly to it, tend to show that various rules of thumb more accurately identify the number of major common factors than do the formal rules (Linn, 1968; Tucker *et al.*, 1969; Humphreys and Montanelli, 1975). Based on experience, Cattell (1966) proposed the "scree" test whereby the common factors coincide with eigenvalues above the break on a curve defined by plotting eigenvalues against their rank order. While the scree test may give more satisfactory results than some of the formal methods (Linn, 1968), it is not based on firm statistical theory, and determining the break in the eigenvalue curve depends on subjective judgment. Further, some data produce multiple breaks in the eigenvalue curve. Horn (1965) proposed that the eigenvalue curve from the observed

Table 2. Means, standard deviations, and correlation matrices[1]

Original OAS for black females above the diagonal, $\chi^2 = 130.44$, $p(\alpha) \rightarrow 0^*$
Alternate-form OAS for black females below the diagonal, $\chi^2 = 124.16$, $p(\alpha) \rightarrow 0^*$

	1	2	3	4	5	6	7	8	Total	Means	SDs
1	—	.3672	.2036	.3998	.2864	.2878	.2612	.3228	.6543	6.0190	1.7973
2	.3260	—	.2670	.2824	.2187	.3664	.0615	.1816	.6393	5.1682	2.9508
3	.1679	.1639	—	.4284	.0815	.2470	.1179	.1408	.5209	6.1132	1.8222
4	.4492	.1336	.2715	—	.1557	.3309	.1959	.2016	.6947	6.0374	3.2532
5	.3791	.3374	.2686	.3968	—	.2707	.2117	.3034	.5170	7.7944	2.6412
6	.2901	.2752	.1459	.3407	.3532	—	.2450	.3011	.6642	6.4860	2.3848
8	.2306	.1896	.1483	.2938	.2457	.2397	—	.1103	.3999	7.1682	1.9738
8	.1117	.0789	.2013	.2138	.1929	.0697	.0333	—	.4972	7.6792	1.6009
Total	.6590	.5537	.5227	.6641	.6634	.5701	.5123	.4245	—	52.4619	10.8119
Means	5.3178	5.1589	6.1776	6.3302	7.5140	7.0337	6.8113	6.6355	50.9559		
SDs	2.4595	2.2660	2.2605	2.0318	2.0391	1.9514	2.1297	2.2795	9.9691		

Original OAS for white females above the diagonal, $\chi^2 = 122.79$, $p(\alpha) \rightarrow 0^*$
Alternate-form OAS for white females below the diagonal, $\chi^2 = 157.95$, $p(\alpha) \rightarrow 0^*$

	1	2	3	4	5	6	7	8	Total	Means	SDs
1	—	.4079	.1119	.3329	.0923	.1411	−.0110	−.0127	.4758	5.0756	1.7953
2	.3680	—	.1545	.4491	.2955	.2174	−.0348	.0664	.6603	3.8319	2.5522
3	.3234	.2928	—	.2106	−.0880	.2467	.0203	.0818	.3499	5.2773	1.6668
4	.3418	.2791	.2113	—	.0609	.2674	−.0217	.0931	.6266	5.4370	3.0074
5	.2923	.1956	.1500	.0370	—	.3134	.0938	.1262	.5390	7.5966	3.1009
6	.2654	.1084	.2514	.3566	.3188	—	.2714	.3247	.6624	6.3025	2.1845
7	.2481	.2000	.1851	.2365	.3399	.3431	—	.2041	.3189	7.4958	1.9172
8	.1280	.0851	.0841	.1808	.3197	.3410	.4277	—	.4277	7.1525	2.0698
Total	.6530	.5383	.5261	.5543	.5790	.6489	.6216	.5424	—	48.1609	9.6174
Means	4.6050	4.0420	5.5470	5.8235	6.9328	6.6154	6.9412	6.6807	47.1681		
SDs	2.5050	2.1605	2.1029	2.0363	2.3113	2.4560	1.9671	2.1937	10.7454		

Table 2. Continued

OAS for black males above the diagonal, $\chi^2 = 132.52$, $p(\alpha) \rightarrow 0$*
OAS for white males below the diagonal, $\chi^2 = 224.45$, $p(\alpha) \rightarrow 0$*

	1	2	3	4	5	6	7	8	Total	Means	SDs
1	—	.2407	.2144	.1934	.1267	.2629	.1851	.1468	.5566	5.1810	2.7046
2	.4219	—	.3153	.2392	.0620	.2572	.1689	.2584	.5438	5.1638	2.2915
3	.3573	.3760	—	.3638	.0592	.0948	.2029	.1302	.5445	5.3913	2.7232
4	.4456	.4125	.4249	—	−.0086	.0404	.1851	.2766	.4972	5.4828	2.4063
5	.2235	.1316	.1097	.1280	—	.3240	.2248	.2897	.4972	6.8103	3.0953
6	.3108	.2423	.3465	.2371	.2238	—	.2971	.3823	.5999	6.1466	2.4821
7	.1499	.1454	.2217	.4058	.0661	.2859	—	.4430	.5789	6.8190	2.3242
8	.3704	.3634	.4557	.4210	.2104	.4805	.2611	—	.6229	7.2500	2.2062
Total	.6691	.6217	.6666	.7036	.4586	.6163	.4843	.7185	—	48.3276	11.1150
Means	4.3969	4.8397	5.1450	5.7176	6.8321	6.0840	7.2443	7.0763	47.3359		
SDs	2.3751	2.2285	2.4151	2.4691	2.7933	2.0904	1.9733	2.3521	11.5370		

[1] The order in which the items are listed matches the order of presentation in Table 1. The column/row entitled "Total" refers to the unweighted summed score of all eight items.

* Bartlett's chi-square test of the null hypothesis that the population correlation matrix among the eight items is the identity matrix was carried out. The test uses 28 degrees of freedom.

data be superimposed on an eigenvalue curve taken from randomly generated, uncorrelated variables using the same sample size and number of variables contained in the observed data. The point at which the two curves cross defines the number of common factors. Horn's method is called parallel analysis. Simulation studies and related experiments with the parallel analysis criterion show promising results (Horn, 1965; Humphreys and Ilgen, 1969; Humphreys and Montanelli, 1975). Unlike the scree test, parallel analysis is tied to a rough statistical theory. The idea behind parallel analysis is to subtract sampling bias from the observed eigenvalues (Horn, 1965).

In addition, if a single factor predominates in determining responses to a set of items, then it is reasonable to expect that a variable can be found which can be combined with appropriate weights to accurately estimate all the item scores. Principal components analysis (eigenvectors from the correlation matrix with ones in the diagonal) finds factor scores and pattern coefficients that do produce a least squares fit between factor scores and item scores. Eigenvalues indicate the amount of variance in the item scores determined by the factor scores associated with the eigenvalue. Therefore, a large eigenvalue should be associated with the largest principal component in a one-factor scale.

In view of the ambiguity surrounding determination of the number of factors in a set of data, several evaluations of the hypothesis that the OAS contains one factor are presented. First, the factor loadings, eigenvalues, and proportion of total variance associated with the largest principal component in each set of OAS items is reported. In addition, several discrete checks of the number of factors are presented for each set of items. These checks are (1) Guttman's strongest lower bound (the number of non-negative eigenvalues in the correlation matrix containing SMC communality estimates), (2) Guttman's weakest lower bound (the number of eigenvalues exceeding one in the correlation matrix), (3) Bartlett's statistical test for the number of principal components, (4) the maximum likelihood test for the number of common factors, (5) the scree test using SMC's for communality estimates, (6) the scree test using unities in the diagonal, (7) parallel analysis using SMC communality estimates, and (8) parallel analysis using ones in the diagonal.

To carry out the parallel analyses, eigenvalues associated with correlation matrices calculated from random samples of eight independently, normally distributed variables were found. For the parallel analyses based on SMC's, 40 samples were drawn for each of the four samples sizes—109 black females, 119 white females, 116 black males, and 131 white males—and average eigenvalues for each rank order were computed across the 40 samples. Upon inspection it was observed that the small variation in sample sizes had virtually no systematic impact on the average eigenvalues. A two-way ANOVA with

eigenvalue rank order as a fixed factor and sample size as a random factor confirmed this observation (subcell N = 40). Therefore, eigenvalues for each rank order were averaged across the four sample sizes. Eigenvalues from all six sets of OAS items using SMC's were compared to eigenvalues from the random data averaged across the four sample sizes. Since the variation among the sample sizes is too small to effect perceptible differences among the average eigenvalues, only one set of 40 samples was generated for the parallel analyses using ones in the diagonal of the correlation matrix. The average of the four sample sizes, rounded to the nearest integer, was used as a sample size of the random data. Eigenvalues from all six sets of OAS items using ones in the diagonals of the correlation matrices were compared to eigenvalues from this single set of random samples.

In order to test the hypothesis that the factor structure of the OAS is the same in all four subgroups contained in the sample, Jöreskog's (1971) program for maximum-likelihood comparisons of factors between populations was applied. The Jöreskog methodology is extremely flexible, permitting tests for a common number of factors across subpopulations and tests for a common factor structure. Additionally, the user may specify the numerical values of any number of parameters, for example to reflect hypotheses about simple structure; the program produces estimates of the unspecified parameters and a statistical test assessing the probablity of the complete model (Jöreskog, 1969, 1971).

Correlations between the total score (unweighted sum) on the OAS and selected variables that should exhibit moderate to high correlations with the prestige of youths' occupational aspirations are reported for each set of OAS questions. The nine correlates are (1) an open-ended measure of realistic occupational aspiration (ROA), coded by the Duncan SEI scores (Duncan, 1961); (2) realistic educational aspiration (REA), based on the number of years of schooling the student expected to complete; (3) high school freshman grade-point average (GPA), calculated from school records omitting nonacademic courses; (4) measured intelligence (MIQ), taken from the Henman-Nelson Test of Mental Ability (Henman and Nelson, 1942); (5) father's occupational status (FO), measured by transforming to Duncan SEI scores the father's responses to an open-ended question asking for current occupation; (6) father's educational achievement (FE), based on the number of years of schooling that fathers reported having completed; (7) mother's educational achievement (ME), based on the number of years of schooling that mothers reported having completed; (8) father's occupational expectation for his son or daughter (FOE), based on the father's completion of a version of the OAS in which each stimulus referred to the son or daughter; and (9) mother's occupational expectation for her son or daughter (MOE), based on the mother's responses to a version of the OAS in which each

Table 3. Largest principal components and alphas for OAS scales[1]

Item	Black females, original OAS	Black females, alternate-form OAS	White females, original OAS	White females, alternate-form OAS	Black males	White males
1	.699	.680	.556	.642	.507	.676
2	.615	.536	.714	.517	.569	.640
3	.533	.473	.384	.513	.503	.691
4	.672	.705	.667	.562	.489	.723
5	.485	.723	.442	.569	.437	.339
6	.675	.610	.667	.658	.616	.625
7	.376	.504	.221	.655	.635	.481
8	.543	.326	.365	.548	.696	.742
Proportion of variance	.341	.341	.279	.343	.316	.394
α	.703	.705	.600	.722	.664	.764

[1] The item numbers match the order of presentation in Table 1.

stimulus referred to the son or daughter. (See Curry *et al.* [1976, 1978] for details of measurement of these variables.

Results

Alpha coefficients and statistics associated with the largest principal components are displayed in Table 3 for each of the six sets of items. Reliabilities as indicated by coefficient alpha do approximate .70 as has been observed in past evaluations of the OAS, except for the original version of the OAS administered to white females where α = .60. The highest alpha coefficient is observed for white males (.764). For all groups, except white males and the original OAS administered to white females, approximately one-third of the variance in the item scores is associated with the largest principal component. For the original OAS administered to white females only 27.9 percent of the variance is associated with the largest principal component, but for white males almost two-fifths of the variance is associated with the largest principal component. Thus the reliability coefficients and the component analyses reveal consistent outcomes. Both suggest that the OAS works best for white males and that the original OAS for white females exhibits the least satisfactory results. The alternate form of the OAS, however, has substantially improved the performance for white females. On the other hand, the alternate form and the original OAS exhibit similar characteristics when administered to black females.

Table 4, Figure 1, and Figure 2 present the data necessary to determine the number of factors by each of the eight methods indicated earlier. The figures show eigenvalue plots for the scree test; data for

Table 4. Data for determining the number of factors[1]

Eigenvalue rank order	Eigenvalues: SMC communality estimates							Eigenvalues: Unities in the diagonal						
	BFO	BFA	WFO	WFA	BM	WM	Random data	BFO	BFA	WFO	WFA	BM	WM	Random data
1	1.985	1.980	1.496	2.006	1.770	2.482	.467	2.730	2.727	2.231	2.747	2.531	3.154	1.393
2	.314	.213	.638	.513	.550	.241	.310	1.109	1.075	1.439	1.269	1.335	1.011	1.259
3	.142	.109	.293	.189	.154	.216	.182	.978	.886	1.115	.931	.932	.954	1.137
4	.026	.001	−.026	.011	−.026	.045	.075	.779	.816	.827	.775	.776	.800	1.026
5	.006	−.057	−.070	−.065	−.076	−.113	−.016	.727	.746	.773	.706	.749	.607	.937
6	−.142	−.132	−.149	−.160	−.101	−.129	−.099	.670	.718	.636	.578	.668	.570	.843
7	−.189	−.140	−.177	−.191	−.209	−.148	−.182	.568	.581	.558	.543	.561	.505	.749
8	−.295	−.262	−.310	−.289	−.287	−.261	−.275	.439	.452	.421	452	.450	.398	.656

Number of factors	Probability of Type I error: Maximum likelihood χ^2 test						Principal components χ^2 test					
	BFO	BFA	WFO	WFA	BM	WM	BFO	BFA	WFO	WFA	BM	WM
1	.267	.827	.001	.004	.012	.075	.336	.652	.0003	.024	.033	.022
2	.511	.982	.333	.270	.407	.424	.543	.798	.045	.487	.605	.054
3	.420	.992	.965	.691	.913	.834	.758	.704	.329	.933	.711	.301
4	.520	.886	.755	.591	.674	.765	.621	.566	.304	.994	.549	.724

[1] BFO = black females, original OAS. BFA = black females, alternate-form OAS. WFO = white females, original OAS. WFA = white females, alternate-form OAS. BM = black males. WM = white males.

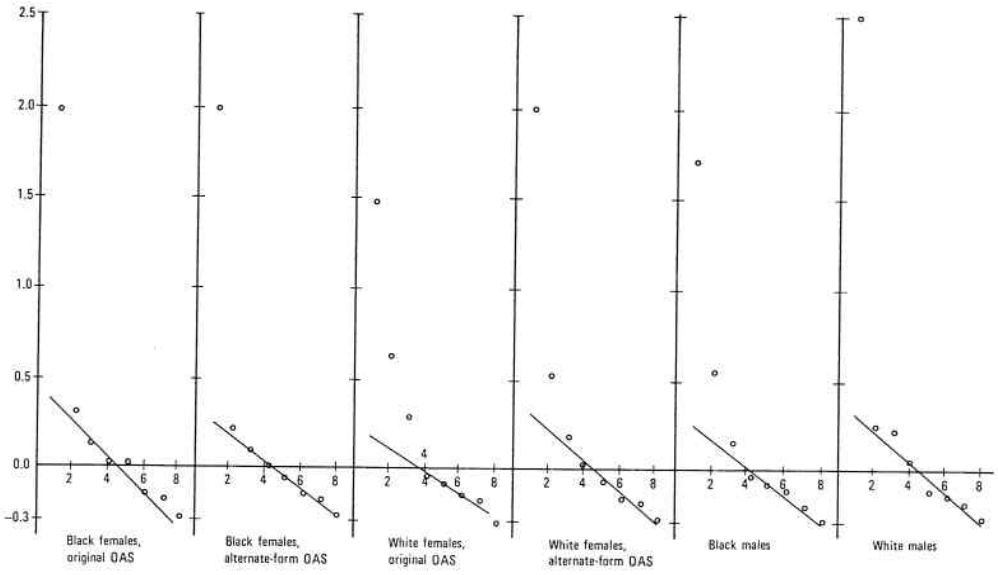

Figure 1. Eigenvalue plots using SMC communality estimates.

the plots are taken from Table 4. For each plot a straight line is superimposed on the data. The line was calculated by regression to fit eigenvalues falling below those associated with factors that the scree test indicated should be kept. The sharpness of the break in the eigenvalue curves is indicated by the degree to which the eigenvalue associated with the smallest retained factor departs from the regression line.

The data presented in Table 4 are summarized in Table 5. Table 5 shows the number of factors for each set of OAS items as determined by each of the eight methods. For the statistical tests associated with principal components and maximum likelihood factor analysis, a 25 percent level of significance was selected. The rather large level of significance was chosen because the null hypothesis and the research hypothesis coincide. By selecting a large level of significance, the probability of falsely "accepting" the null hypothesis, and thereby substantiating the research hypothesis, is rendered relatively small.[3]

The most striking features of the tests for the number of factors in the OAS are the inconsistencies among the eight methods. In none of the six sets of OAS items do all methods indicate the same number of factors. With the possible exception of the alternate-form OAS for

[3] One might argue that a level of significance of .95 or higher is required whenever the null hypothesis and the research hypothesis coincide. For the purpose at hand, however, we are not interested in every trivial factor. Furthermore, the probabilities listed in Table 4 decline rather than increase after three factors, suggesting that six or seven factors would be necessary to achieve a .95 probability. Thus, such a rigid criterion effectively removes any chance to achieve parsimony with the OAS.

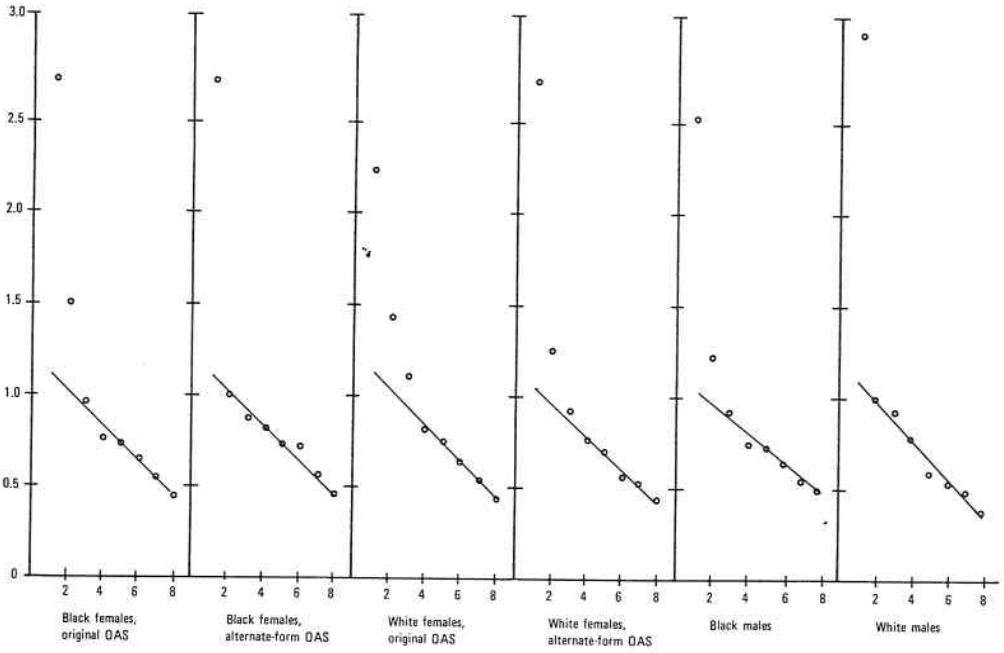

Figure 2. Eigenvalue plots unities in the diagonal of the correlation matrices.

black females, it appears that the OAS does contain more than one factor, but the data in Table 5 are too inconclusive to permit a specific conclusion regarding the number of factors. It seems likely, however, that a prestige factor does dominate responses to the OAS items, but that item scores are also affected by additional common factors. Substantive dimensions that might affect respondents' selections of occupational titles are numerous. (See discussions by Goldthorpe and

Table 5. Summary of the number of factors found by the seven criteria for six sets of responses to the OAS[1]

Method	Number of factors					
	BFO	BFA	WFO	WFA	BM	WM
Guttman's strongest lower bound	5	4	3	4	3	4
Guttman's weakest lower bound	2	2	3	2	2	2
Statistical test for number of principal components, $p(\alpha) \geq .25$	1	1	3	2	2	3
Maximum likelihood test, $p(\alpha) \geq .25$	1	1	2	2	2	2
Scree test using SMC's	1	1	3	2	2	1
Scree test using unities	2	1	3	2	2	1
Parallel analysis with SMC's	2	1	3	3	2	1
Parallel analysis with unities	1	1	2	2	2	1

[1] BFO = black females, original OAS. BFA = black females, alternate-form OAS. WFO = white females, original OAS. WFA = white females, alternate-form OAS. BM = black males. WM = white males.

Hope [1972] or Hatt [1961] and classification schemes developed and tested by Roe [1957], Roe and Hutchinson [1969], or Holland [1959, 1966, 1973] as examples.) Also, it is possible that reliable factors correspond to variations in the wording of the OAS item stems. Recall that four item stems are used for the eight questions; one refers to short-term realistic aspiration; one refers to long-term realistic aspiration; one refers to short-term idealistic aspiration; and, one refers to long-term idealistic aspiration. If these four different item stems trigger different criteria on the part of respondents for evaluating occupations, then the resulting patterns of responses might generate separate factors, although research has rarely found factors that correspond to the four item stems (see Westbrook [1966] and the discussion by Haller *et al.* [1974], however). Since there are only two items for each specific stem, however, it would be difficult to detect a distinct factor for each stem. In simulation studies Linn (1968) and Tucker *et al.* (1969), for example, found that input factors are more readily retrieved from factor analyses when each factor is measured by a large number of items. The fairly small correlations among the items may also be the source of some ambiguity. Monte Carlo studies (Linn, 1968) have also found that low communalities make it difficult to retrieve input factors by use of factor analyses.

The Jöreskog procedures were used to compare factor structures among the four subgroups. A two-factor structure was hypothesized for these tests. Our results reported earlier suggest that one factor is insufficient to account for variation in the eight OAS items. On the other hand, data reported in Table 5 indicate that three factors are more than enough. The original OAS for both sexes was tested first against the null hypothesis that all four populations exhibit a two-factor structure; no constraints were placed on the pattern coefficients for this test. The maximum likelihood test rejected the hypothesis with a probability of a Type I error of less than .001. Thus it is tentatively concluded that the original OAS does not contain a two-factor structure that is common to black females, white females, black males, and white males.

Next, the same test was run with the alternate-form OAS substituted for the original version for female respondents; the probability of an alpha error for this test was .098. This probability exceeds the conventional .05 dividing line, but is still fairly small in view of the fact that, unlike most hypothesis tests, the null hypothesis and research hypothesis coincide for the present tests. Nevertheless, it was decided to rerun the test under the constraint that the pattern coefficients are the same in all four groups. This revision produced an "acceptable" solution by conventional levels of significance [$p(\alpha) \leq .130$], but the two factors were so highly correlated for black females ($r \rightarrow 1.0$) that one additional test was made.

The final test was carried out under the hypothesis that there is

Table 6. Comparison of maximum likelihood factors among subgroups, using Jöreskog's method[1]

Item	Black females	All other subgroups	
	Factor I[2]	Factor I	Factor II
1	.577	.577	0
2	.530	.530	0
3	.513	.513	0
4	.607	.607	0
5	.411	0	.499
6	.502	0	.609
7	.452	0	.550
8	.528	0	.642
Correlations between factors:		White females—.575	
		Black males —.549	
		White males —.813	

[1] The probability of a Type I error for the entire factor structure is .123, $\chi^2 = 107.94$, d.f. = 92.

[2] Scaling for Factor I was based on all four subgroups and scaling for Factor II was based on all groups except black females. The pattern coefficients for the last four items on Factor I of black females vary only by a constant multiplier from the same coefficients for other groups on Factor II.

one factor for black females and two factors for all other groups. The hypothesis was specified such that the factor patterns for all but black females are identical. Further, the hypothesis stipulated that, except for a scaling factor, the pattern coefficients on the single factor for black females match the corresponding nonzero coefficient on one of the two factors that are common to the other subgroups. This hypothesis produced a probability level of .123. Again, the result falls above the conventional .05 cutoff, but still leaves a substantial probability that the population exhibits some factor structure other than that stated in the hypothesis (see footnote 3). The results of this test are reported in Table 6. Two aspects of these data are noteworthy. First, the structure of the coefficients for all groups except black females is consistent with the view that a realistic and an ideal factor help determine responses on the OAS; this structure was built into the *a priori* constraints. Factor I reflects realism, and Factor II corresponds to the ideal element in occupational choice. Second, the correlation between the two factors for white females and black males is not exceptionally high (.575, .549); whereas, the correlation for white males is substantial (.813). Even for white males, however, a sizeable portion of the variance for one factor is not shared by the other.

Table 7 presents correlations between the six OAS variables and nine other variables expected to correlate positively with occupational aspiration. Most of the correlations are positive, as expected. Forty-

Table 7. Correlates of the OAS[1]

Correlates	Black females, original OAS	Black females, alternate-form OAS	White females, Original OAS	White females, alternate-form OAS	Black males	White males
ROA	.316(101)	.425(101)	.149*(105)	.190(105)	.404(109)	.592(123)
REA	.460(107)	.514(107)	.376(119)	.490(119)	.424(116)	.686(131)
GPA	.345(102)	.263(102)	.182(114)	.207(114)	.299(112)	.262(131)
MIQ	.203(107)	.214(107)	.315(119)	.365(119)	.252(113)	.390(130)
FO	−.015*(51)	−.034*(51)	.021*(98)	.114*(98)	.062*(79)	.386(107)
FE	.068*(54)	.129*(54)	.034*(97)	.152*(97)	.221(81)	.305(109)
ME	.195(83)	.219(83)	— *(109)	.155*(109)	.205(109)	.255(124)
FOE	.454(53)	.392(55)	.434(95)	.381(95)	.331(80)	.506(109)
MOE	.381(83)	.240(83)	.413(108)	.468(108)	.411(107)	.536(124)
Average correlation	.267	.262	.241	.280	.290	.435

[1] Numbers in parentheses indicate pairwise sample sizes. The row titles are defined as follows: ROA = realistic occupational aspiration. REA = realistic educational aspiration. GPA = high school grade point average. MIQ = measured intelligence quotient. FO = father's occupational status. FE = father's educational level. ME = mother's educational level. FOE = father's occupational status expectation for his child. MOE = mother's occupational status expectation for her child.

* Indicates lack of statistical significance for a one-tailed test at $p(\alpha) = .05$. None of the correlations with negative signs would be significant using a two-tailed test at $p(\alpha) = .05$.

two of the 54 correlations reported are statistically significant using a one-tailed alternative hypothesis that $r > 0$ [$p(\alpha) \geq .05$]. The average correlation for white males far exceeds the average for any of the other groups, irrespective of the form of the OAS in question. For females, the average correlation for blacks is approximately equal to the average for whites, whether the original or alternate-form OAS is considered. In the authors' experience it is unusual to observe relationships among blacks as strong as the same relationships among whites. It therefore seems worth recalling that Table 3 reveals reliabilities and proportions of variance due to the largest principal component for black females being as high as, or higher than, the same coefficients for white females. On the other hand, among males the more usual pattern holds, *viz,* the reliability and proportion of variance due to the largest principal component being larger for whites than for blacks.

Summary and conclusions

The Occupational Aspiration Scale (OAS) is designed to measure the prestige of occupations to which young people aspire. This study has compared the performance of the OAS among race and sex subgroups. Samples of slightly more than 100 high school sophomores for each race-sex group were drawn from a medium-sized midwestern city. An alternate form of the OAS designed to be more appropriate for use with females was presented and compared to the original version. Results showed that the OAS is moderately reliable and that about one-third of the variance in the items can be attributed to a dominant prestige factor. For white females the alternate-form OAS revealed high reliability and a larger proportion of the variance associated with the first principal component than did the original version, but no such improvement was observed for black females. For black females both the original and the alternate-form OAS performed about as well as did the alternate-form OAS for white females. The highest reliability and proportion of variance associated with the largest principal component occurred in the sample of white males. For black males the reliability and proportion of variance associated with the largest principal component were somewhat greater than for the original OAS administered to white females, but were slightly lower than all the other results.

Past research has suggested that the OAS item scores are mainly determined by a single prestige factor. Eight checks on the one-factor hypothesis were carried out for each set of OAS items. The checks revealed inconsistent conclusions, but, as previous publications have shown, the OAS is not a one-factor test, although a single LOA factor appears to dominate. Two possible reasons were proposed to account for the ambiguity. First, when youths make occupational choices they

undoubtedly base their decisions not only on prestige but also on other aspects of occupations. Several nonprestige dimensions may appear as secondary factors, but the number of OAS items is probably too small to permit accurate recovery of more than two or three factors. Secondly, the intercorrelations among the OAS items, and therefore the communalities of the items, are moderate. Monte Carlo studies indicate that accurate recovery of the factor structure of a set of variables is more difficult when communalities are low.

The hypothesis that the four subpopulations contain the same two-factor structure was tested with Jöreskog's methodology. Of the several tests that were carried out, one containing a single factor for black females and two factors for all other groups appeared preferable. However, the probability of a Type I error associated with this hypothesis is .123, thus leaving a substantial probability that there are more than two factors.

Finally, correlations between the OAS and several related variables such as educational expectation, family status, and grade-point average were presented. It was found that the OAS correlates positively with most of these variables, as postulated, but that the correlations were of moderate to small magnitude.

The data reported here suggest that the OAS is a usable instrument for measuring the prestige of youth's occupational aspiration, and that race and sex differences are relatively inconsequential. The alternate form of the OAS is apparently more appropriate for white females than is the original version, however. Nevertheless, much work remains before one can be highly confident of the accuracy of measurement of youth's occupational aspirations. A program of measurement research is needed; efforts to improve the reliability and clarify the factor structure of the scale should be emphasized. Alternative measurement procedures need to be tried and compared with results for the present form of the OAS.

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