DEFENSE EQUAL OPPORTUNITY MANAGEMENT INSTITUTE

DIRECTORATE OF RESEARCH

RESPONSE STYLES AND DIFFERENCES IN VARIATION OF RESPONSES BETWEEN DEMOGRAPHIC GROUPS IN THE MEOCS DATA BASE

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Study 2 involved an examination of variance differences between different demographic groups. The underlying premise was that distributional differences, *irrespective of the existence of response styles,* may have practical imprecations for interpretation of MEOCS results. Results indicated that differences between various demographic groups do exist. Discussion centered on the practical value of considering differences in providing MEOCS feedback to unit commanders.

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Response Styles and Differences in Variation of Responses Between Demographic Groups in the MEOCS Data Base

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Abstract

Two studies are presented in this technical report. Study 1 investigated the differential effects of ethnic subgroup membership on response style, defined in terms of use of midpoint and extreme point scores on the Military Equal Opportunity Climate Survey (MEOCS). Response style differences between ethnic subgroups were found. However, it was difficult to separate out the effect of response style (i.e., use of a certain subset of scale points of the MEOCS) from mean differences on the attitudes and perceptions measured by the MEOCS. Study 2 involved an examination of variance differences between different demographic groups. The underlying premise was that distributional differences, *irrespective of the existence of response styles*, may have practical implications for interpretation of MEOCS results. Results indicated that differences between various demographic groups do exist. Discussion centered on the practical value of considering differences in providing MEOCS feedback to unit commanders.

Summer 1997

[1] I would like to acknowledge Ratchaneewan Wanichtanom, M.S., for her work on several of the analyses that went into Study 1 reported herein.

Introduction

Response style can be defined as the systematic way an individual or group of individuals uses scale values in a self-report survey instrument that has little or nothing to do with respondents' scores on the measured construct. In survey research, the existence of response style within subgroups of a population can interfere with the validity of inferences drawn from the survey data.

Chen, Lee, and Stevenson (1995) found response style differences between samples from four different cultures: Japanese, Chinese, Canadians, and United States citizens. Chen et al. (1995) reported that Japanese and Chinese respondents were more likely to scale midpoints while the Canadian and United States respondents were more likely to use scale extreme points. The authors posited that differences in response style were due to a collectivistic perspective characterizing East Asian samples as opposed to an individualistic perspective characterizing the Western samples. In other words, East Asians are less extreme than Westerners in describing themselves irrespective of their true scores on the construct.

Past research has found differences in response style between ethnic groups within American society. For example, Bachman and O'Malley (1984a, 1984b) found that African-American respondents are more likely than White Americans to use the extreme response categories on Likert-type scales. Ross and Mirowsky (1984) found that respondents from lower socioeconomic status were more likely to give "acquiescent" responses than upper socioeconomic groups. This comparison held for older versus younger and Mexican origin versus non-Mexican origin. Greenleaf (1992) concluded that use of extreme scale categories is related to age, education level, and household income.

The purpose of Study 1 was to test the hypothesis of difference in response styles between different demographic groups comprising the MEOCS database. Specifically, it was hypothesized that the mean number of midpoint and extreme responses differs between different ethnic groups.[2,3]

Study 1

Methods

Participants. A random sample of 5,526 was selected from the MEOCS database, which consisted of 400,359 at the time of the research. Table 1 contains a breakdown of the demographic characteristics of the sample.

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[2] The MEOCS at the time of the research in Study 1 contained more than 400,000 observations.

[3] The MEOCS is discussed elsewhere and will not be described herein. For more information, it is recommended that the Directorate of Research at the Defense Equal Opportunity Management Institute be contacted.

Table 1

Sample Frequencies for Demographic Characteristics

	Ethnic Groups					
Demographic characteristic	American Indian or Alaskan Native	Asian or Pacific Islander	African-American	Hispanic	White	Total
Ethnic Groups	981	1090	1110	1126	1219	5526
Gender						
Women	188	187	241	159	205	980
Men	687	699	759	826	998	3969
Total	875	886	1000	985	1203	4949
Military Status						
Officer	120	137	56	66	189	568
Warrant Officer	102	104	53	50	23	332
Enlisted	624	650	844	830	826	3774
DoD Civilian	76	116	116	122	153	583
Non-DoD Civilian	19	43	23	27	14	126
Other employee	24	28	11	12	7	82
Total	965	1078	1103	1107	1212	5465

Analytic strategy. The number of midpoints that each respondent selected for the items comprising each of the MEOCS scales was computed in addition to the number of extreme points (1 and 5) for the same items. Analysis of Variance (ANOVA) procedures were used to compare different ethnic groups on the use of midpoints and the use of extreme scores.

Table 2 presents mean numbers of midpoints and extreme ratings for the different ethnic groups along with results of ANOVA. ANOVA procedures indicated statistically significant different use of midpoint and extreme ratings by different ethnic groups on all scales except for Scale 8 (Job satisfaction).

Use of midpoint values. ANOVA and *post hoc* procedures indicated that the mean number of uses of midpoint are smallest for the White subgroup and largest for the Asian/Pacific Islander and African-American subgroups. *Post hoc* procedures indicated no statistically significant differences on mean number of midpoints between the latter two groups for the 12 scales and for the total set of items comprising the MEOCS.

Use of extreme values. ANOVA and *post hoc* procedures indicated that Asian/Pacific Islander and African-American groups tend to use fewer extreme responses than other ethnic groups. No statistically significant differences were found on mean number of extreme values between these two subgroups on Scales 1, 2, 3, 6, 8, 9, 12, and the total set of items. Statistically significant differences between Asian/Pacific Islanders and African-Americans were found on Scales 4, 5, 7, 10, and 11. Here, the Asian/Pacific Islander subgroup showed a tendency to use fewer extreme values.

Discussion

Results indicated differences between ethnic groups on the use of the midpoint and extreme scale responses. The White group showed the highest mean number of extreme responses and lowest mean number of midpoint responses. In contrast, African-American and Asian/Pacific Islander groups showed the highest mean number of midpoint responses and the lowest mean number of extreme responses.

In examining these results, an important question arose. Was the differential use of the midpoint and extreme scores reflective of a response style or true differences in attitudes and perceptions of the different ethnic groups? To answer this question, it was necessary to carry out follow-up analyses similar to those reported above. However, before these analyses were carried out, all items comprising the different scales were "reflected" in the same orientation (where 1 = least positive and 5 = most positive)[4]. From these follow-up analyses, it was concluded that ***response style difference*** between different ethnic groups is less parsimonious an explanation than differences in attitude expressed by the respondents comprising different ethnic groups. In the course of this analysis there were noted differences between ethnic groups in the distribution of responses, including variance, skewness, and kurtosis. This led to Study 2 reported below.

[4] The MEOCS contains some items that require recoding so that they range from 1 (low) to 5 (high). Ordinarily, this recoding is done in the computation of scale scores prior to the presentation of feedback. However, the item values comprising the database are not all recoded or reverse scored as they are in the scale composites.

Table 2

Mean number of uses of the midpoint and extreme responses for each Scale and total scale by ethnic groups, with accompanying F-test results

Responses	Ethnic Groups					F	p
	American Indian or Alaskan Native	Asian or Pacific Islander	African-American	Hispanic	White		
Scale 1							
Midpoint (3)	1.69 (1.81)	1.83 (1.84)	1.81 (1.86)	1.70 (1.80)	1.43 (1.72)	9.45	.00
Extremes (1 and 5)	4.32 (2.98)	3.87 (3.00)	4.20 (2.97)	4.27 (3.10)	4.75 (3.06)	12.60	.00
Scale 2							
Midpoint (3)	1.65 (1.90)	1.91 (2.02)	2.01 (1.98)	1.73 (1.90)	1.01 (1.76)	48.95	.00
Extremes (1 and 5)	5.30 (3.38)	4.70 (3.39)	4.68 (3.11)	5.04 (3.33)	6.61 (3.37)	67.50	.00
Scale 3							
Midpoint (3)	.79 (1.01)	.89 (1.04)	.93 (1.02)	.82 (1.01)	.59 (.91)	20.25	.00
Extremes (1 and 5)	1.90 (1.43)	1.63 (1.41)	1.61 (1.36)	1.75 (1.43)	2.23 (1.47)	37.51	.00
Scale 4							
Midpoint (3)	1.39 (1.52)	1.66 (1.68)	1.52 (1.61)	1.48 (1.54)	1.16 (1.48)	15.87	.00
Extremes (1 and 5)	3.99 (2.52)	3.48 (2.54)	3.83 (2.47)	3.85 (2.43)	4.46 (2.55)	23.53	.00
Scale 5							
Midpoint (3)	.74 (.93)	.76 (.95)	.70 (.97)	.71 (.93)	.56 (.86)	8.97	.00
Extremes (1 and 5)	1.97 (1.44)	1.79 (1.46)	2.11 (1.44)	1.98 (1.43)	2.28 (1.43)	18.29	.00
Scale 6							
Midpoint (3)	1.33 (1.30)	1.51 (1.43)	1.50 (1.48)	1.36 (1.35)	1.21 (1.34)	9.55	.00
Extremes (1 and 5)	2.48 (1.90)	2.12 (1.87)	2.27 (1.84)	2.43 (1.88)	2.64 (1.93)	12.45	.00

Table 2 (Continued)

Responses	Ethnic Groups					F	p
	American Indian or Alaskan Native	Asian or Pacific Islander	African-American	Hispanic	White		
Scale 7							
Midpoint (3)	.91 (1.19)	1.09 (1.27)	1.03 (1.32)	.92 (1.23)	.81 (1.25)	8.85	.00
Extremes (1 and 5)	2.16 (1.79)	1.81 (1.74)	2.03 (1.81)	2.06 (1.83)	2.31 (1.91)	11.60	.00
Scale 8							
Midpoint (3)	.93 (1.03)	.96 (1.07)	.93 (1.05)	.87 (1.02)	.88 (1.04)	1.56	.18
Extremes (1 and 5)	1.50 (1.33)	1.34 (1.33)	1.46 (1.34)	1.51 (1.35)	1.55 (1.37)	3.89	.00
Scale 9							
Midpoint (3)	1.88 (1.96)	2.07 (1.89)	2.19 (2.03)	2.08 (1.96)	1.44 (1.86)	27.93	.00
Extremes (1 and 5)	3.46 (2.65)	2.83 (2.55)	2.65 (2.50)	2.96 (2.57)	4.11 (2.82)	58.31	.00
Scale 10							
Midpoint (3)	.91 (1.07)	1.01 (1.08)	.98 (1.14)	.95 (1.06)	.87 (1.03)	3.15	.01
Extremes (1 and 5)	1.61 (1.35)	1.51 (1.32)	1.80 (1.36)	1.60 (1.40)	1.64 (1.37)	6.41	.00
Scale 11							
Midpoint (3)	.80 (1.04)	.85 (1.03)	.84 (1.11)	.73 (1.00)	.57 (.98)	14.86	.00
Extremes (1 and 5)	2.08 (1.47)	1.99 (1.48)	2.33 (1.52)	2.31 (1.52)	2.68 (1.44)	37.66	.00
Scale 12							
Midpoint (3)	.69 (.83)	.71 (.82)	.87 (.88)	.80 (.85)	.71 (.88)	8.75	.00
Extremes (1 and 5)	.53 (.76)	.44 (.70)	.38 (.71)	.44 (.75)	.55 (.84)	10.14	.00
Total							
Midpoint (3)	13.70 (9.41)	15.24 (9.79)	15.31 (9.72)	14.12 (9.00)	11.22 (8.88)	37.12	.00
Extremes (1 and 5)	31.29 (16.34)	27.51 (16.43)	29.36 (14.95)	30.20 (16.00)	35.79 (16.12)	44.19	.00

Study 2

Method

Respondent sample. Random samples consisting of 1000 observations were drawn from the June 1997 database (consisting at the time of the writing of this report of more than 560,000 respondents) for the following ethnic groups: White, African-American, Native American, Hispanic, and Asian-American.

Analytic strategy. For each of the ethnic-based samples, variance was computed for the 12 MEOCS scales. Comparison of variance estimates for the different ethnic groups was carried out by applying confidence interval procedures described by Marascuilo and Serlin (1988).

Finally, graphical presentations of the distributions of scale scores were constructed to show the difference in variance for each scale score between the ethnic groups.

Results

Table 3 presents the distributional characteristics (i.e., mean, variance, skewness, and kurtosis) for each scale for each ethnic subgroup. Standard errors of kurtosis and skewness are also listed which can be used to form confidence intervals around the kurtosis and skewness indices.

Application of the confidence interval procedure indicated that there are variance differences between the ethnic groups on many of the scales. Appendix I contains the results of all of the confidence interval computations.

Figures 4, 5, 6, 7, 8, and 9 are presented to demonstrate the difference between ethnic groups on variance and distributions of certain scales. In each of these figures, one can see how the variance differences correspond to different distributional differences. Please note that only three of the scales were selected for these figures. Similar phenomena can be demonstrated for the other nine scales.

Discussion

Study 2 demonstrated that there are indeed variance differences between the different ethnic groups. The question to the practically minded person is "So What?" What are the practical implications of variance differences between subgroups of a population? Although this question is taken up by McIntyre (1997) in his discussion of psychometrically based suggestions for the next generation of the MEOCS 2000, several implications can be discussed here.

Table 3

Variances, Skewness, and Kurtosis Values for Scales by Subgroup

	White			Afric_Am			Hisp_Am			Asian_Am			Native_Am		
	Var	Skew	Kurt	Var	Skew	Kurt	Var	Skew	Kurt	Var	Skew	Kurt	Var	Skew	Kurt
Scale 1	.68	-.79	-.04	.89	-.37	-.82	.79	-.47	-.55	.85	-.29	-.88	.96	-.24	-.79
Scale 2	.44	-1.44	1.71	.85	-.49	-.38	.70	-.65	-.31	.78	-.47	-.58	.87	-.51	-.58
Scale 3	.66	-.78	.37	.63	-.15	-.36	.71	-.29	-.35	.72	-.30	-.26	.74	-.26	-.59
Scale 4	.66	-.88	.17	.83	-.48	-.61	.82	-.43	-.61	.75	-.35	-.55	.82	-.34	-.57
Scale 5	.66	-.76	.21	.54	-.54	-.20	.60	-.53	-.06	.71	-.47	-.23	.77	-.37	-.42
Scale 6	.81	-.45	-.36	.61	-.12	-.16	.61	-.14	-.09	.52	-.26	.49	.62	-.13	.03
Scale 7	.77	-.90	.37	.90	-.67	-.14	.91	-.51	-.51	.92	-.49	-.34	1.05	-.53	-.47
Scale 8	.79	-.55	-.13	.73	-.43	-.35	.79	-.40	-.35	.84	-.35	-.36	.81	-.29	-.37
Scale 9	.69	-.90	.41	.92	.10	-.39	.89	-.18	-.52	.81	.17	-.65	.93	-.13	-.69
Scale 10	1.13	-.123	-.82	.76	-.39	-.60	.85	-.33	-.30	.89	-.11	-.56	1.04	.08	-.65
Scale 11	.65	-1.23	1.02	.73	-.77	-.42	.79	-.90	.02	.89	-.36	-.78	1.00	-.38	-.74
Scale 12	1.12	-.38	-.34	.99	.04	-.17	1.01	-.09	-.34	1.14	-.08	-.61	1.32	.12	-.74

The first implication requires one to recall that the MEOCS is a climate assessment instrument (in this case EO climate assessment). Climate is a characteristic of an organization that is assessed through the aggregation of responses of individuals comprising the organization. Philosophically and psychometrically, one might ask whether an aggregate score (the arithmetic mean) is an apt representation of climate when there is substantial variation among responses comprising the aggregate. Of course, it has not been demonstrated that there are substantial (i.e., practically important) variances in the responses, just that variance is present. Therefore, it seems reasonable to examine whether the variance observed in the population at large is substantial enough (greater than that attributable to measurement error) to threaten the construct validity of what has been called "EO climate." At the very least, the effect of variation of responses on the construct validity of the EO climate measures should be investigated.

The second implication is related to the first. If there is substantial variance underlying aggregate scores in the MEOCS, then what does a commander do with the scores or with the data? It would seem silly to disregard the scores from a MEOCS assessment simply because the "climate interpretation" is threatened. In effect, the second implication is that some thought should be given to how a commander of a unit can deal with variation in the distribution of responses in a climate survey. Part of the variation is no doubt due to measurement error. As such it is relatively unimportant. But part of it may represent real variation. It would seem highly practical for the commander to examine the real variation in an effort to explain it.

The third implication pertains to the difference in variation between the different ethnic groups. If there is difference in variation between these different ethnic groups and perhaps between other demographic groups[5], then it suggests that there may be practical reasons for understanding these variances. For example, if the White group shows a great deal of agreement in response to a particular MEOCS scale (i.e., very low variation) but the African-American group shows a substantial variation, then it would seem important for the commander of a unit comprising these different subgroups to understand that variance differences exist and to attempt to understand the reasons for them. Furthermore, interventions might be designed on the basis of the variation that is found within a particular subgroup once the sources of the variation can be identified.

General Discussion

The research reported herein began with the idea that there may be differences in response styles between different ethnic groups. After a series of analyses, it was concluded that the response style phenomenon is less parsimonious an explanation of the data than differences in attitudes between the different ethnic groups comprising the MEOCS database.

[5] There is preliminary evidence to suggest that variance differences exist between, for example, rank and sex groups.

A second study was conducted to examine the distributional differences between different subgroups comprising the MEOCS database population. Variance differences were found across different ethnic subgroups. With regard to the differences in variation across subgroups, several questions were posed:

1. What is the effect of variation of responses on the construct validity of the MEOCS itself as a **climate** assessment tool? This is not a new question for organizational climate assessment but one worthy of thought for the Directorate of Research.

2. What constitutes meaningful variance in responses to the MEOCS? Although there is always some variation in climate or attitude assessment, it seems reasonable for researchers to identify practically important levels of variation.

3. Would a report on difference in response variances across different subgroups of a command be useful to commanders receiving MEOCS feedback? To an extent, a report like this is given via the "disparity index" and subgroup comparisons already provided to commanders. There are ways of intelligently and simply providing more information on variability of responses in various units. Selecting the **best way** of doing so would logically follow a review of literature on graphical presentation of quantitative data as well as a small scale study of the potential customers of the information (i.e., unit commanders).

4. How much of the variance in responses iss due to the substantially larger negative skew of the White subgroup and the apparent ceiling effect for most of the scales?

Conclusion

Variation (expressed as "variance") is an often overlooked characteristic of survey data and for that matter, data of all types. Variance is an important characteristic of data—not only variance within entire commands participating in the MEOCS program but also variance within subgroups. Furthermore, ethnic subgroups are only an example of the loci of variation. There are other subgroups (e.g., rank, educational group, gender) that deserve attention with regard to variation differences. Variation of survey responses should be an issue of concern in the survey feedback process and it can be clearly and meaningfully explained so that commanders receiving MEOCS feedback can maximize their use of the results.

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Figure 4. Variance of Scale 1
For Different Racial Groups

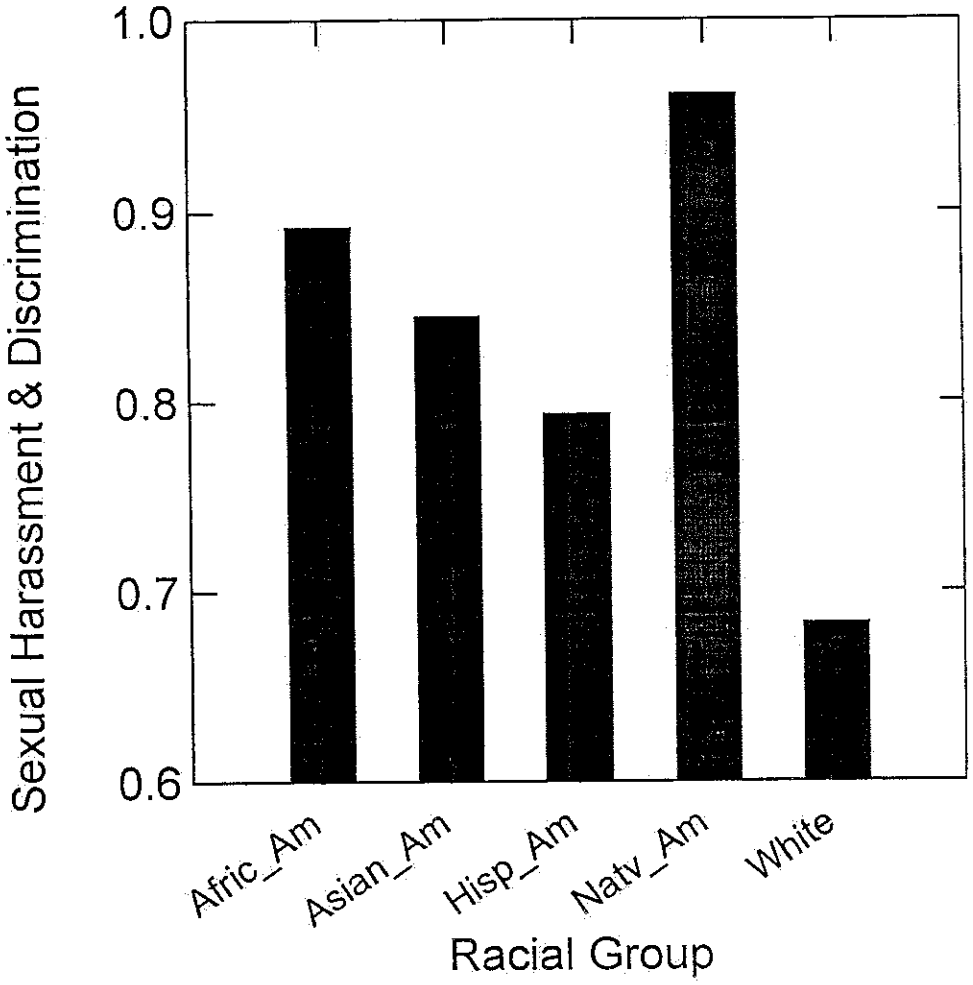


Figure 5. Distributions for Different Racial Groups

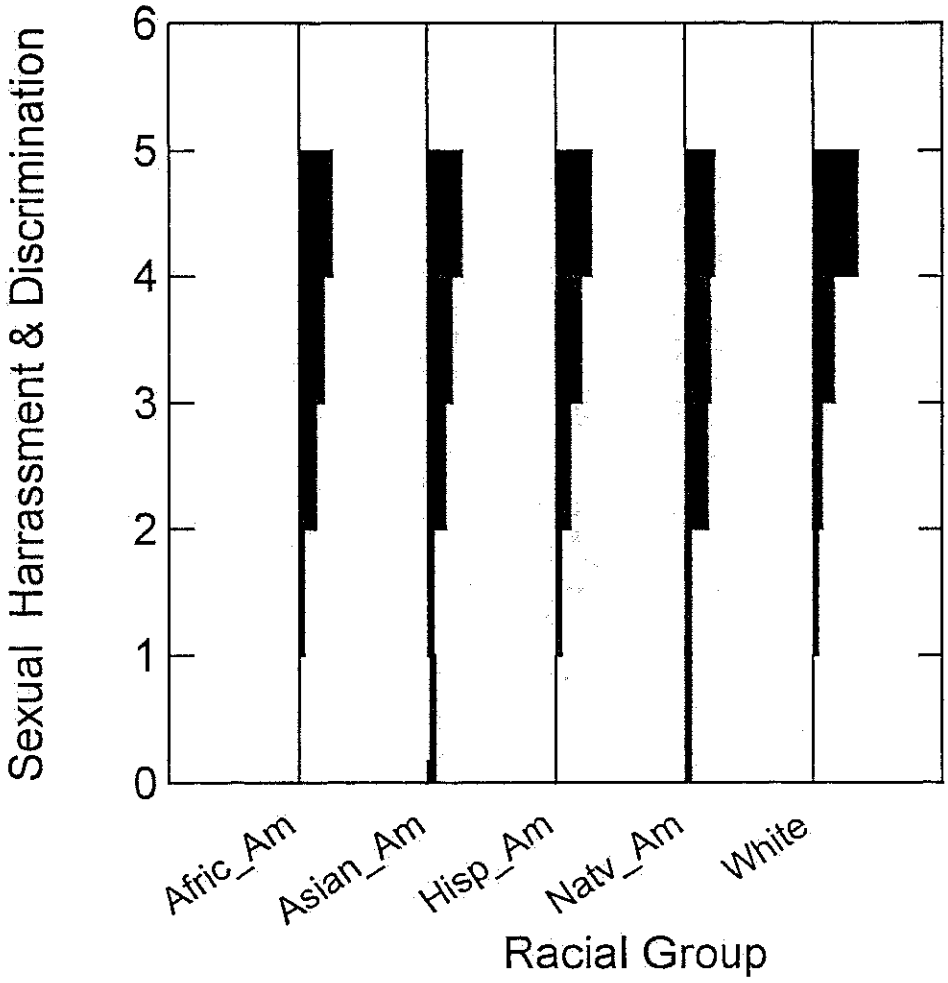


Figure 6. Variance of Scale 8
For Different Racial Groups

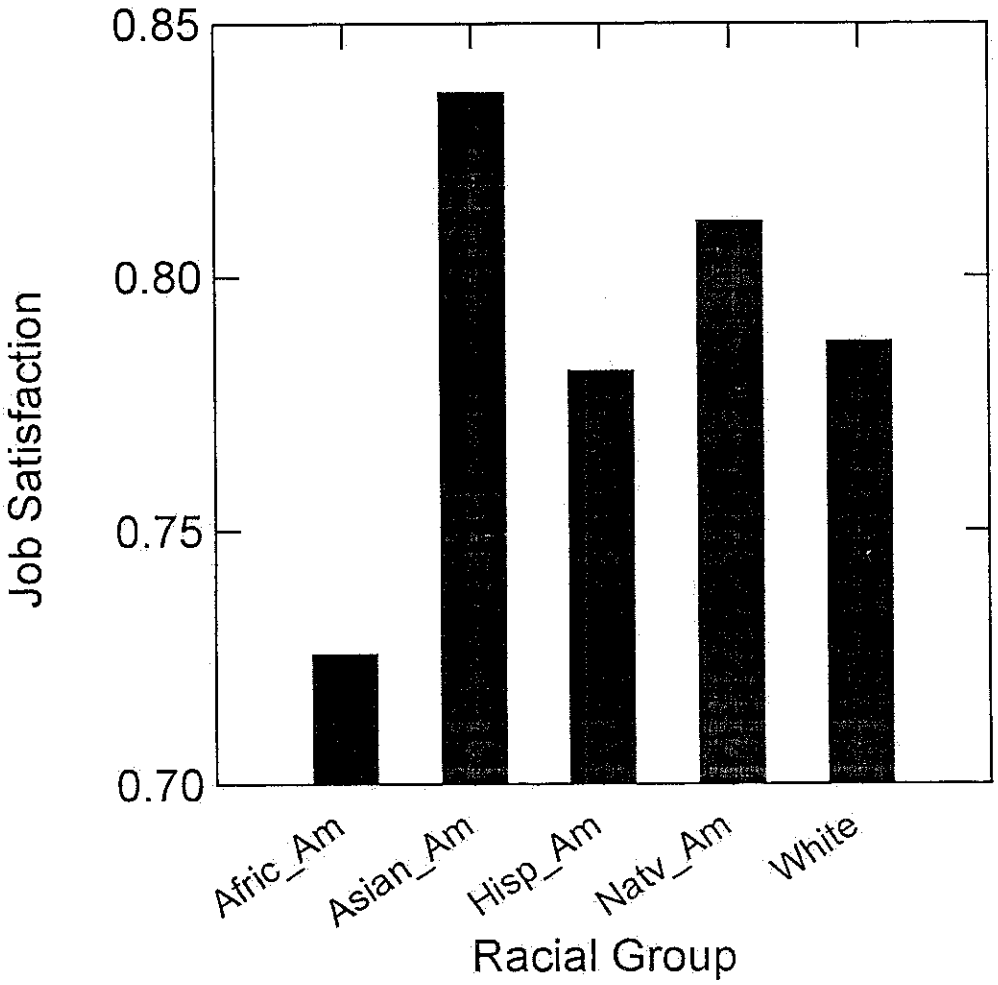


Figure 7. Distribution Differences on Job Satisfaction

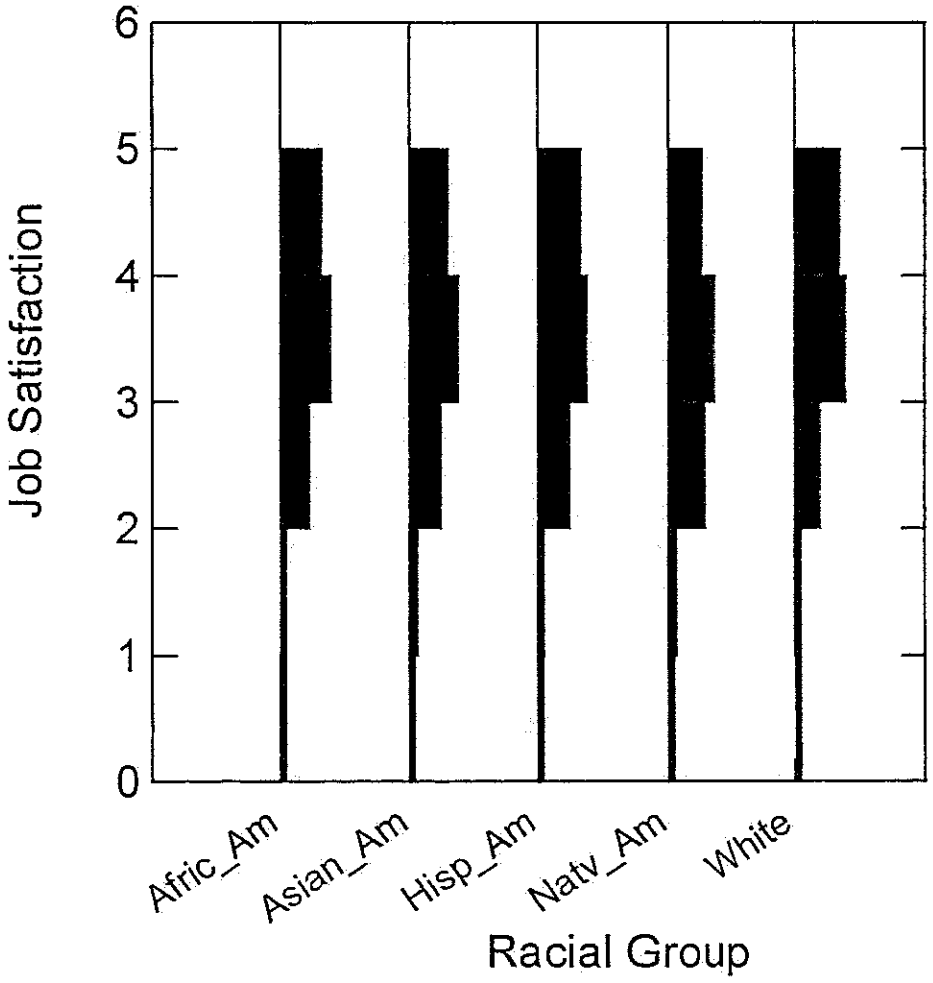


Figure 8. Variance of Scale 12 For Different Racial Groups

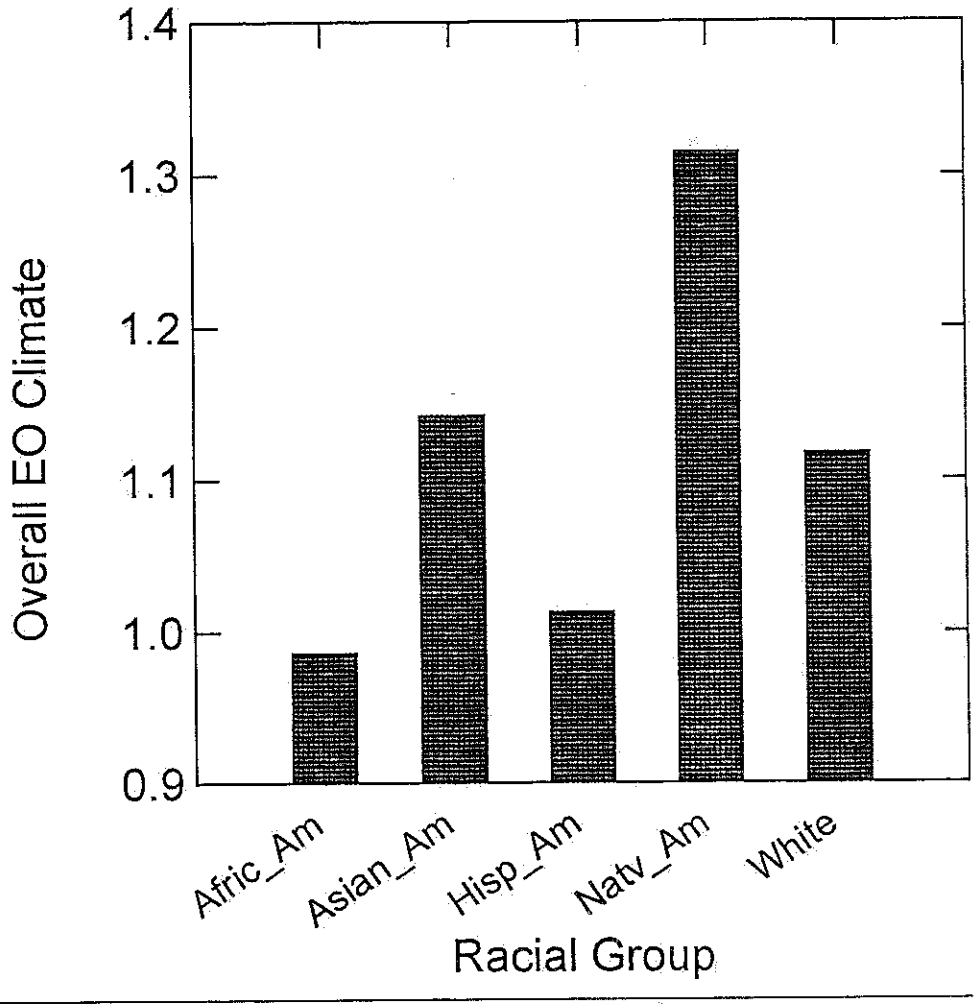
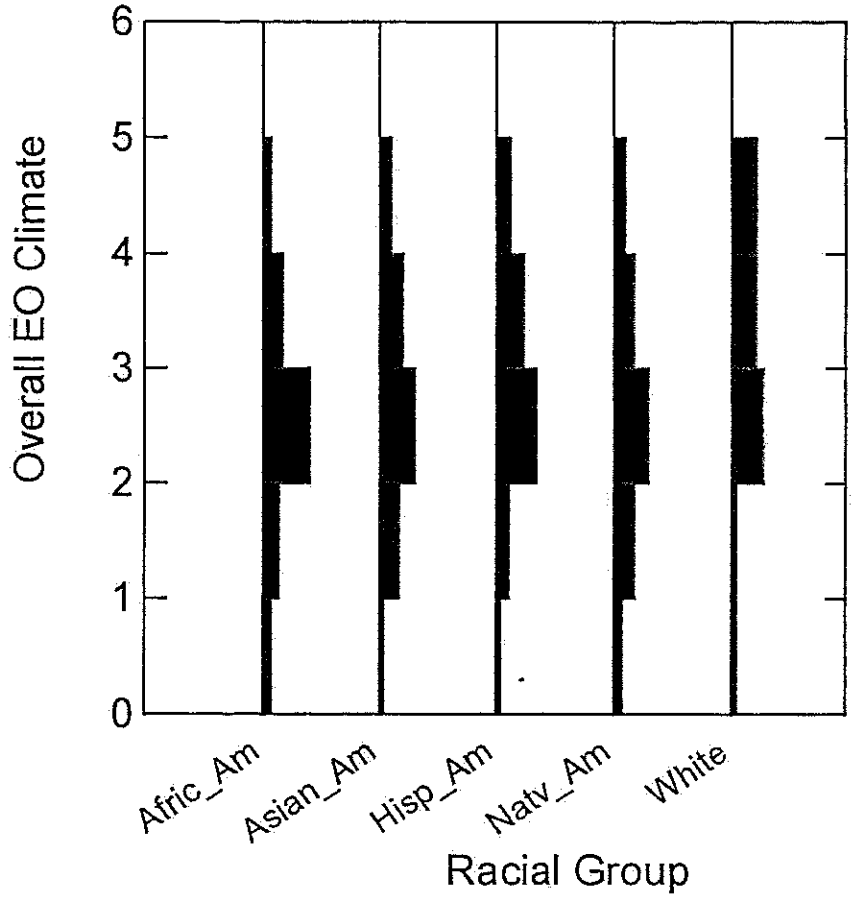


Figure 9. Distribution on Overall EO Climate For Different Racial Groups



Appendix I

F - Ratios for Scales by Subgroups[6]

	F									
	1 & 2	1 & 3	1 & 4	1 & 5	2 & 3	2 & 4	2 & 5	3 & 4	3 & 5	4 & 5
Scale 1	1.31*	1.16*	1.24*	1.41*	1.12	1.06	1.08	1.07	1.21*	1.14*
Scale 2	1.96*	1.59*	1.80*	1.99*	1.23*	1.09	1.02	1.13	1.25*	1.11
Scale 3	1.04	1.09	1.10	1.13	1.13	1.15*	1.18*	1.01	1.04	1.03
Scale 4	1.26*	1.25*	1.15*	1.24*	1.00	1.10	1.01	1.09	.99	1.08
Scale 5	1.22*	1.10	1.08	1.17*	1.11	1.31*	1.42*	1.18*	1.28*	1.08
Scale 6	1.31*	1.32*	1.54*	1.29*	1.01	1.17	1.02	1.16*	1.03	1.19*
Scale 7	1.17*	1.18*	1.19*	1.36*	1.01	1.02	1.16*	1.01	1.15*	1.15*
Scale 8	1.08	1.00	1.06	1.03	1.09	1.15*	1.12*	1.06	1.03	1.03
Scale 9	1.34*	1.30*	1.19*	1.36*	1.03	1.13	1.02	1.09	1.05	1.15*
Scale 10	1.49*	1.34*	1.28*	1.09	1.12	1.17*	1.36*	1.05	1.22*	1.17*
Scale 11	1.12	1.21*	1.37	1.53*	1.08	1.22*	1.37*	1.14*	1.27*	1.12
Scale 12	1.13	1.10	1.02	1.18*	1.03	1.16*	1.33*	1.13	1.30*	1.15*

Note: 1 = White, 2 = African-American, 3= Hispanic, 4 = Asian-American, & 5 = Native American. *$p < .05$

[6] Note that significance values are given for F-ratios in table. In effect, these significance values are treating the F ratios as an F-Max test.

Appendix I (continued)

Confidence Intervals for Ratio of Variances for All Scales by Subgroup[7]

	95% Confidence Intervals for Variance Ratios									
	1 & 2	1 & 3	1 & 4	1 & 5	2 & 3	2 & 4	2 & 5	3 & 4	3 & 5	4 & 5
Scale 1	1.15-1.48	1.02-1.31	1.09-1.40	1.24-1.59	.99-1.27	.93-1.19	.95-1.22	.94-1.20	1.07-1.37	1.00-1.29
Scale 2	2.21-1.72	1.40-1.80	1.58-2.03	1.75-2.25	1.08-1.39	.96-1.23	.89-1.15	.99-1.27	1.10-1.41	.98-1.25
Scale 3	.92-1.18	.96-1.23	.97-1.25	1.00-1.28	1.00-1.28	1.01-1.30	1.04-1.33	.89-1.15	.92-1.18	.90-1.16
Scale 4	1.11-1.42	1.10-1.41	1.01-1.30	1.09-1.40	.88-1.14	.96-1.24	.89-1.14	.96-1.23	.87-1.12	.95-1.22
Scale 5	1.07-1.38	.97-1.24	.95-1.22	1.03-1.32	.98-1.25	1.15-1.48	1.25-1.61	1.04-1.34	1.13-1.45	.95-1.22
Scale 6	1.16-1.48	1.17-1.50	1.35-1.74	1.14-1.46	.89-1.14	1.03-1.32	.90-1.15	1.02-1.31	.90-1.16	1.05-1.35
Scale 7	1.03-1.32	1.04-1.33	1.04-1.34	1.20-1.54	.89-1.14	.89-1.15	1.03-1.32	.88-1.14	1.01-1.30	1.01-1.29
Scale 8	.95-1.22	.88-1.13	.93-1.20	.91-1.16	.96-1.23	1.01-1.30	.98-1.26	.93-1.20	.90-1.16	.91-1.16
Scale 9	1.18-1.51	1.14-1.46	1.04-1.34	1.20-1.54	.91-1.17	.99-1.27	.90-1.15	.96-1.23	.92-1.19	1.01-1.30
Scale 10	1.31-1.69	1.18-1.51	1.12-1.44	.96-1.24	.98-1.26	1.03-1.32	1.20-1.54	.92-1.18	1.07-1.38	1.03-1.32
Scale 11	.99-1.27	1.06-1.36	1.21-1.55	1.35-1.73	.95-1.22	1.08-1.38	1.20-1.54	1.00-1.29	1.12-1.44	.98-1.26
Scale 12	1.00-1.28	.97-1.25	.90-1.16	1.04-1.33	.90-1.16	1.02-1.31	1.17-1.51	.99-1.27	1.14-1.47	1.01-1.30

Note: 1 = White, 2 = African-American, 3= Hispanic, 4 = Asian-American, & 5 = Native American.

[7] If confidence interval includes the value of 1.0, then the ratio of variances is not considered significant