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Developmental Trends In Anadrogyny: Implications for Measurement

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ABSTRACT

The present study was conducted to investigate differences in item performance, reliability, and scale means of the Bem Sex-Role Inventory when comparisons are made across developmentally different groups. Analyses were conducted comparing results for adolescents with results for adults, and further analyses were conducted comparing results for the adolescents across various adolescent gender and age groups. The results tend to support the a conclusion that the BSRI has reasonable measurement integrity when used with adolescents, and thus indicate that the measure may be useful in exploring developmental changes in sex-role perceptions as they occur during adolescence.

In a seminal article in the literature on personality, Constantinople (1973) argued that persons could possess both characteristics that are stereotypically male as well as characteristics that are stereotypically female. Personality researchers have come to call such persons androgynous. Bem (1975, p. 634) has argued that "a non-androgynous sex role can seriously restrict the range of behaviors available to an individual as he or she moves from situation to situation." Kelly and Worrell (1977) summarize studies that have empirically tested the proposition that androgyny is an adaptive personality characteristic. Generally studies support Bem's position, though some studies (Heilburn, 1984) suggest that the trait may be more advantageous to females than to males.

Although several measures of androgyny have been developed, the Bem Sex-Role Inventory (BSRI) (Bem, 1974) "has been the most frequently used of the recent sex role instruments" (Koenigsberg, 1982, p. 2). However, the BSRI and the methods used to measure the androgyny construct have both been topics of heated academic discussion (e.g., Bem, 1979; Pedhazur & Tetenbaum, 1979).

Studies of the BSRI measure have been extraordinarily diverse in their methods and designs. Sample sizes have ranged from 44 (Bledsoe, 1983) to 894 (Sassenrath & Yonge, 1979). Powell (1979) employed 15 samples to cross-validate his results. Although many studies have used variations of common factor analysis to evaluate the measure, researchers have also employed multidimensional scaling (Koenigsberg, 1982), smallest space analysis (Ruch, 1984), confirmatory factor analysis (Marsh, 1985), analysis of the variance/covariance matrix (Belcher,

Crocker & Algina, 1984), and extraction of second-order factors (Edwards, Gaa & Liberman, 1978). Thompson (1986) presented a meta-analytic integration of the various factor analytic studies and concluded that the theoretically expected structure underlies BSRI data. Even seemingly contradictory results are generally supportive of the measure's validity once solutions are rotated into a common factor space.

Virtually all of these myriad studies have examined statistics that are a function of covariations (e.g., covariances, correlations) among item responses. However, these statistics are insensitive to the influence of central tendency. For example, two sets of scores can be perfectly correlated when: (1) both sets each have a mean of 5.0; or (2) both sets each have a mean of 1.0; or (3) one score set has a mean of 1.0 and the other score set has a mean of 5.0.

Since structure is a function of the relationships among items, a test may have a similar structure in diverse populations, but the populations may differ with respect to other aspects of item performance. For example, item means could be markedly different across populations even if the structures across the populations were identical. As Gorsuch (1983, p. 335) notes,

> To the extent that invariance can be found across systematic changes in either variables or the individuals, then the factors have a wider range of applicability as generalized constructs. The subpopulations over which the factor occurs could--

> and probably would--differ in their mean scores or variances across the groups, but the pattern of relationships among the variables would be the same.

Knowledge regarding such a dynamic would be important from a measurement perspective because the process of summing item scores within a scale also assumes that all the items are reasonably homogeneous with respect to their mean values. This assumption is made with respect to both item characteristics within a given population and item performance across populations, if the test is to be employed in various populations.

A concrete example may clarify the essential character of this assumption. If the item means on a two item test in a population were both four on a seven-point scale, then a person who scored five on both scales is deviating from the expected item means by the same amount, and the scale score of 10 for the person represents a meaningful deviation from the known total score mean of eight. But say the population mean responses to items one and two were, respectively, six and two. The person who scores, respectively, six and two on the items is assigned a scale score of eight. The person who scores two and six is also assigned a scale score of eight, even though the two sets of item scores represent very different responses when compared with expected or average population responses.

It is unfortunate that central tendency has not been considered a noteworthy issue in most of the previous research on androgyny measures. The instruments that measure androgyny

typically produce Masculine and Feminine scale scores by summing relevant item scores. If means are not comparable across items within a given sample, then scores on items deviate about different means and adding item scores without considering these variations may distort total scores--the scores may lack measurement validity and studies using the measures may therefore be invalid. The process of adding item scores without considering variations in item means requires the critical assumption that the items are deviating about the same or at least comparable means so that one is not adding "apples and oranges", i.e., so that the addition process is itself valid.

Even if item means are comparable across items within given sample types, it is important to ascertain whether the item means are also comparable across sample types, e.g., developmentally active adolescent groups versus adult samples. If differences in scale means across developmental groups are due to a few items, the content of those items may have substantive implications or may raise questions about the validity of those items when used with certain types of samples.

However, most of the studies in this area have employed college students as subjects. The similar character of most of the samples limits ability to generalize about the validity of the BSRI. As Worell (1978, p. 783) notes, "restricting all of the sex-role research to college students, unfortunately, leaves us with many unanswered questions about the generality of results and the applicability to constrast populations." It is especially surprising that so few studies have employed adolescents as

subjects. Bem (1979, p. 1052) argues that even young children are aware of sex-roles. Marsh and Myers (1984) tested adolescent girls but school officials allowed the use of only a subset of BSRI items. Mills (1980) employed a sample of 418 adolescents, but primarily was concerned with the structure underlying BSRI responses rather than with central tendency of item responses.

The present study was conducted to investigate differences in BSRI results involving developmentally different subject groups. Three research questions were considered in the study. First, how comparable are item means across different developmental and sex groups? The influence of sex was considered since there are developmental differences across gender groups and since the BSRI measures sex-role perceptions that may also differ across groups as an interactive function of both developmental group and gender. Second, within a sample of adolescents, what are the influences of age and sex on BSRI reliability coefficients? If the test is reliable when used with younger subjects, the measure may be an important vehicle for investigating changes in adolescents' sex-role perceptions. Finally, what differences in the two BSRI scale means are there across adolescent age and sex groupings? The analysis of scale score means may provide some such insight regarding these changes.

Results

Several of the many BSRI validity studies in the literature report item means for biologically male subjects as against female subjects. Thus, five sets of item means from adult samples

were available from previous research. In order to provide a developmentally different comparison group, the present authors collected data from 256 adolescents (25% girls) ranging in age (mean = 12.9; SD = 1.86) from 9 to 17. These data were analyzed in several ways in order to address the study's first research question.

Figure 1 presents the item means reported in each of the previous studies. In order to facilitate comparisons, the means are graphically presented along the one to seven response scale employed on the instrument. Bem (1981) has proposed that a "short form" of her instrument can be constructed by only scoring 20 of the items on the BSRI. These items are underlined in Figure 1. Letters "A" through "E", respectively, represent: a) the means reported by Bledsoe (1983) in a study involving 44 female teachers; b) Hoferek's (1981) means from a nationwide survey of physical educators involving 189 women; c) Pedhazur and Tetenbaum's (1979) means for 489 female graduate education students; d) Hoferek's (1981) means for 102 men; and e) Pedhazur and Tetenbaum's (1979) means for 171 men. The means for the male adolescents in the study are repesented by pound signs ("#"); the means for female adolescents are represented by asterisks ("*"). The means for the two adolescent gender groups are presented within their 95% confidence intervals, represented by hyphens. The items are sorted first by scale; the 20 BSRI Feminine scale items follow the 20 Masculine scale items. For each item, the mean of the two means for adolescents and the mean of the five means for adults were computed, as was the deviation of these two statistics. This difference score is presented in parentheses for

each BSRI item. Within each scale, the items presented in Figure 1 have been arranged in order of descending differences across the two subject groups.

INSERT FIGURE 1 ABOUT HERE.

In order to compare the variability of item means across items and across the seven subject groups, on each of the 40 items a classical sex-by-age-group two-way analysis of variance was conducted using the item means as the dependent variable. Table 1 presents the 40 BSRI items in descending order of variability of the mean scores. Thus, for example, means on the item, "Feminine", tended to vary most across the seven subject samples. For each item, Table 1 also presents the sum of squares attributable to each effect and the percentage of each item's sum of squares that is attributable to each source of variance in the analysis.

INSERT TABLE 1 ABOUT HERE.

The reliability coefficients presented in Table 2 were computed in order to address the study's second research question. The table reports the alpha reliability coefficients for the two BSRI scales across various age and gender groups.

INSERT TABLE 2 ABOUT HERE.

Total scale scores within the various age and gender groups represented in the adolescents' data set were compared in order to address the study's third research questions. Table 3 presents

the cell means across the subject groups. Table 4 reports the results of a two-way analysis of variance for both the BSRI scales.

INSERT TABLES 3 AND 4 ABOUT HERE.

Discussion

The analyses reported in Figure 1 compared means of means in order to minimize the influence of disproportionate sample sizes in the various groups. The Figure 1 results indicate that adolescents tend to score lower across almost all of the BSRI items. In particular, with respect to Masculine items, the adolescent subjects perceived themselves to be less analytical, self-sufficient, self-reliant, forceful, independent, and forceful. The finding is not surprising, and primarily reflects perception of the reality that adolescents are dependent on others. The finding that adoloscents consider themselves less analytical may reflect a perceived obligation to be carefree.

With respect to the Feminine items, the adolescents perceived themselves to be less sensitive, compassionate, sympathetic, tender, warm and gentle. These results suggest a self-orientation that may be an adaptive effort to work through issues involving identity and role expectations.

These findings do not contradict a view that adolescence is a time of role exploration (Erikson, 1963, pp. 247-269), but suggest that this exploration may primarily be achieved by the "doing" of trying on roles rather than through the "thinking" of reflection. In fact, psychoanalytic theory (A. Frued, 1972, pp.

317-318) suggests that this doing may be an important component of adjustment:

> The character structure of a child at the end of the latency period... has to be abandoned to allow adult sexuality to be integrated into the individual personality. The so-called adolescent upheavels are no more than the external indications that such internal adjustments are in progress... We all know individual children who as late as the age of fourteen, fifteen, or sixteen show no such outer evidence of inner unrest... They are, perhaps more than any others, in need of therapeutic help.

The results presented in Table 1 provide further insight regarding the measurement characteristics of individual BSRI items--the magnitudes and the sources of variance in the mean scores from the various subject groups are presented. The variablitity (SOS=25.93; V=25.93/6=1.11; SD=1.05) of the seven means on the item, atheletic, was an artifact generated by including data from Hoferek's (1981) physical educators, who perceived themselves to be more atheletic than other subject groups. However, it is clear that there was disproportionate variability on two other items, feminine (SD=2.08) and masculine (SD=2.01). These standard deviations are especially noteworthy since the response format only ranges from one to seven.

It is disturbing that the vast preponderance of the variability on these items was associated with gender, as indicated by the effect sizes of sex for these items. Bem (1981, p. 14) has not included these items in the "short form" portion

of her measure:

> Note that the terms "feminine" and "masculine" have themselves been eliminated from the Short Form of the BSRI. These terms actually reflect "higher-order" traits and are constructs denoting clusters of traits themselves rather than behaviors.

However, a more parsimonious and thus more likely interpretation would argue that the these two items merely measure physical gender, as suggested by the present analyses. If so, the inclusion of these items seriously undermines the validity of the measure, since the measures purportedly evaluates psychological orientation regarding sex-roles and not physical gender. Thus the use of these items has been criticized previously on both theoretical and empirical grounds (Pedhazur & Tetenbaum, 1979).

Bem (1981, p. 5) notes that "the test is arranged so that the thirty short-form items appear first and, where time is limited, subjects may be instructed to stop after the item 'conventional.'" However, the savings in time from using the short form is very minimal. Many researchers will be tempted to employ the original "long form" so that their results will be more comparable with previous research and because they may presume that the long form will be more reliable since it is longer. However, the two forms are highly correlated (Bem, 1981, p. 15), and the "short form" Masculine scale is at least as reliable as the "long form" M scale and the "short form" Feminine scale is noticeably more reliable (Bem, 1981, p. 14) and may well be more valid. The use of the "short form" or of

the "long form" minus these two items is therefore strongly recommended for most research applications.

The remaining analyses presented in Table 1 support the previous interpretation of Figure 1. For example, large effect sizes for age were found for the items, sensitive, compassionate, analytical, and other variables noted previously. Nevertheless, the variability in item means across developmental groups was relatively small, was systematic rather than random, and involved theoretically interpretable differences. The analysis suggests that item means are reasonably comparable across subject groups, so that measurement concerns regarding this aspect of test performance are not appreciably warranted.

The analyses reported in Table 2 suggest that the BSRI has reasonable reliability even when used by younger subject groups. The Masculine scale reliability coefficient of .82 compares favorably with values of about .86 reported by Bem (1981, p. 14). The Feminine scale reliability coefficient of .78 compares favorably with values of about .78 reported by Bem (1981, p. 14) for several studies with adults. The Table 2 results also suggest that the measure can be reasonably employed even with younger age groups within the adolescent age range. The results must be interpreted with some caution, since some age groups included few subjects, but the pattern is consistent across the ages represented in the study.

The results presented in Tables 3 and 4 suggest that both gender groups tend to score somewhat higher on both scales as individuals grow older. However, the most noteworthy pattern is that males tend systematically to become more Masculine while

females tend to become systematically more Feminine as they age during adolescence. The tabled results also indicate that males and females are more comparable with respect to their Masculine scores than with respect to their Feminine scale scores. This suggests that females may be more likely to become androgynous than are their male peers. Males may find androgyny less advantageous during adolescence, just as some research suggests that androgyny may generally be more functionally advantageous for adult females (Heilburn, 1984).

In summary, the results of the present study generally support the conclusion that scores on the Bem Sex-Role Inventory (Bem, 1974) are reasonably reliable and valid even when subjects are young adolescents. Although the present results corroborate previous findings that the two items, masculine and feminine, do not have desirable measurement characteristics, variations in item performance across developmentally different groups generally were relatively small and were predictable. Thus, the BSRI measure may be helpful in exploring the development of sex-role perceptions during adolescence, or in tracking the effects of culture changes on the sex-role development process as societal expectations and norms change.

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Table 1
Classical SOS Decomposition

Variable	SOS Tot	SOS Sex	Effect Size	SOS Age	Effect Size	Inter	Effect Size
Feminine	25.93	25.183	97.12%	0.002	0.01%	0.055	0.21%
Masculine	24.36	23.989	98.48%	0.235	0.96%	0.175	0.72%
Atheletic	6.64	0.922	13.89%	0.138	2.08%	0.204	3.07%
Sensitive*	2.58	0.068	2.64%	2.224	86.20%	0.156	6.05%
Competitive	2.18	0.843	38.67%	0.012	0.55%	0.013	0.60%
Compassionate*	2.10	0.044	2.10%	1.773	84.43%	0.051	2.43%
Analytical	1.97	0.076	3.86%	1.910	96.95%	0.021	1.07%
Sympathetic*	1.84	0.137	7.45%	1.354	73.59%	0.161	8.75%
Childlike	1.79	0.253	14.13%	0.014	0.78%	0.058	3.24%
Self-sufficient	1.76	0.010	0.57%	1.537	87.33%	0.011	0.63%
Forceful#	1.68	0.163	9.70%	1.417	84.35%	0.150	8.93%
Tender*	1.61	0.136	8.45%	1.238	76.89%	0.030	1.86%
Self-reliant	1.53	0.000	0.00%	1.382	90.33%	0.005	0.33%
Eager soothe*	1.48	0.259	17.50%	0.803	54.26%	0.199	13.45%
Loves children*	1.46	0.287	19.66%	0.282	19.32%	0.679	46.51%
Affectionate*	1.42	0.228	16.06%	0.823	57.96%	0.152	10.70%
Acts as leader	1.36	0.311	22.87%	0.496	36.47%	0.001	0.07%
Independent#	1.33	0.003	0.23%	1.048	78.80%	0.000	0.00%
Gentle*	1.32	0.057	4.32%	0.934	70.76%	0.220	16.67%
Warm*	1.25	0.067	5.36%	0.979	78.32%	0.032	2.56%
Loyal	1.22	0.083	6.80%	0.913	74.84%	0.097	7.95%
Has Leadership#	0.90	0.233	25.89%	0.383	42.56%	0.007	0.78%
Take stand#	0.85	0.177	20.82%	0.633	74.47%	0.001	0.12%
Willing risk#	0.78	0.412	52.82%	0.000	0.00%	0.013	1.67%
Makes decisions	0.66	0.274	41.52%	0.356	53.94%	0.009	1.36%
Understanding*	0.65	0.060	9.23%	0.524	80.62%	0.019	2.92%
Soft-spoken	0.64	0.179	27.97%	0.274	42.81%	0.099	15.47%
Assertive#	0.63	0.002	0.32%	0.580	92.06%	0.018	2.86%
No harsh lang	0.62	0.062	10.00%	0.481	77.58%	0.001	0.16%
Aggresive#	0.62	0.271	43.71%	0.001	0.16%	0.001	0.16%
Individualist	0.53	0.001	0.19%	0.326	61.51%	0.177	33.40%
Defends belief#	0.50	0.004	0.80%	0.309	61.80%	0.038	7.60%
Dominant#	0.48	0.270	56.25%	0.110	22.92%	0.038	7.92%
Ambitious	0.43	0.063	14.65%	0.032	7.44%	0.088	20.47%
Gullible	0.36	0.216	60.00%	0.058	16.11%	0.033	9.17%
Cheerful	0.29	0.035	12.07%	0.123	42.41%	0.030	10.34%
Strong person#	0.23	0.007	3.04%	0.146	63.48%	0.000	0.00%
Flatterable	0.23	0.018	7.83%	0.021	9.13%	0.148	64.35%
Shy	0.19	0.013	6.84%	0.015	7.89%	0.023	12.11%
Yielding	0.04	0.001	2.50%	0.007	17.50%	0.012	30.00%

* Scored as a Masculine item as part of the "short form."

\# Scored as a Feminine item as part of the "short form."

Table 2
Alpha Reliability Coefficients for Adolescents

	Both Sexes			Males			Females	
Age	n	M	F	n	M	F	n	M	F
9	8	.62	.85	8	.62	.85	--	--	--
10	16	.85	.07	13	.82	.04	3	.93	.58
11	30	.85	.78	22	.83	.78	8	.88	.37
12	54	.81	.59	46	.76	.49	8	.86	.82
13	64	.74	.81	50	.74	.79	14	.80	.88
14	37	.84	.84	23	.84	.84	14	.88	.80
15	20	.90	.81	12	.90	.80	8	.90	.54
16	16	.86	.87	10	.85	.84	6	.67	.87
17	11	.85	.86	8	.88	.84	3	.59	.29
All	256	.82	.78	192	.79	.74	64	.88	.82

Table 3
Cells Means for Two-Way Analysis

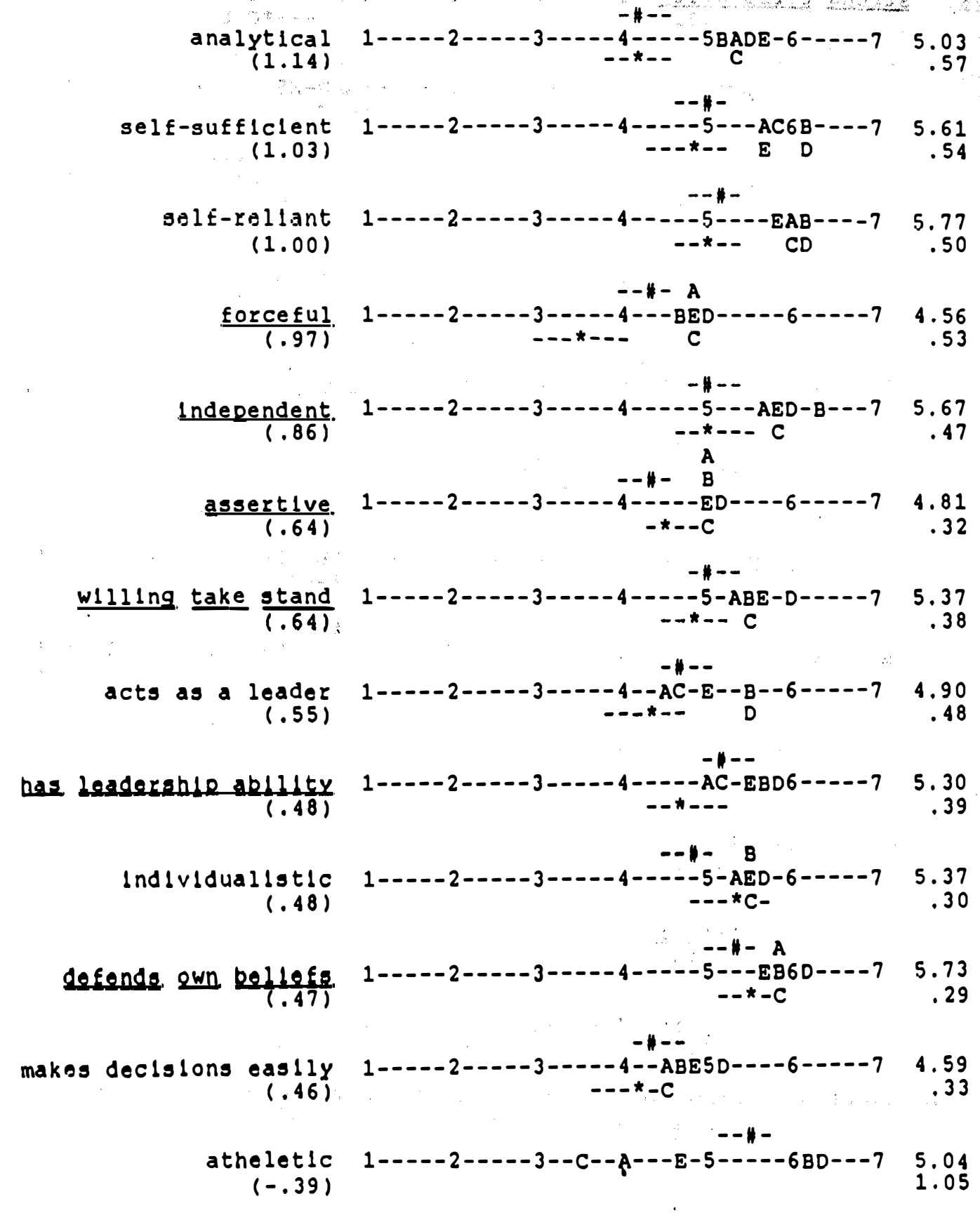
	Masculine			Feminine		
Age	Males	Females	Total	Males	Females	Total
9	94.5	--	94.5	83.6	--	83.6
10	93.0	81.0	90.8	79.5	81.7	79.9
11	98.7	87.1	95.6	82.2	98.2	86.5
12	99.0	78.5	95.9	81.9	88.4	82.8
13	96.1	97.6	96.4	83.4	92.2	85.4
14	100.6	98.6	99.8	82.0	97.2	87.7
15	102.9	91.4	98.3	76.0	93.0	82.8
16	103.3	85.5	96.6	89.9	106.8	96.2
17	103.5	94.7	101.1	91.0	111.7	96.6
Total	98.5	91.3	96.7	82.7	95.5	85.9

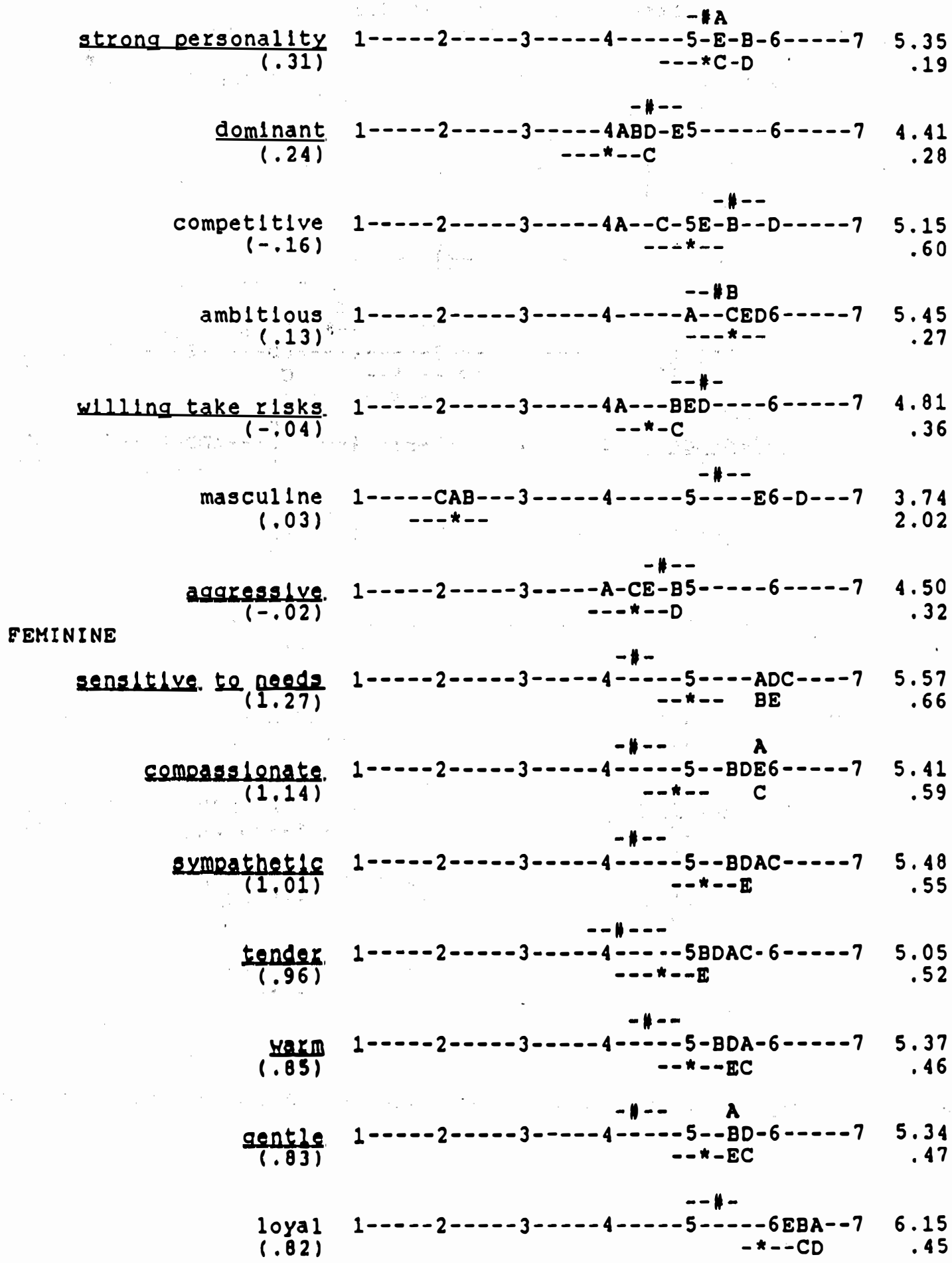
Table 4
Classic SOS Decomposition Across Scales

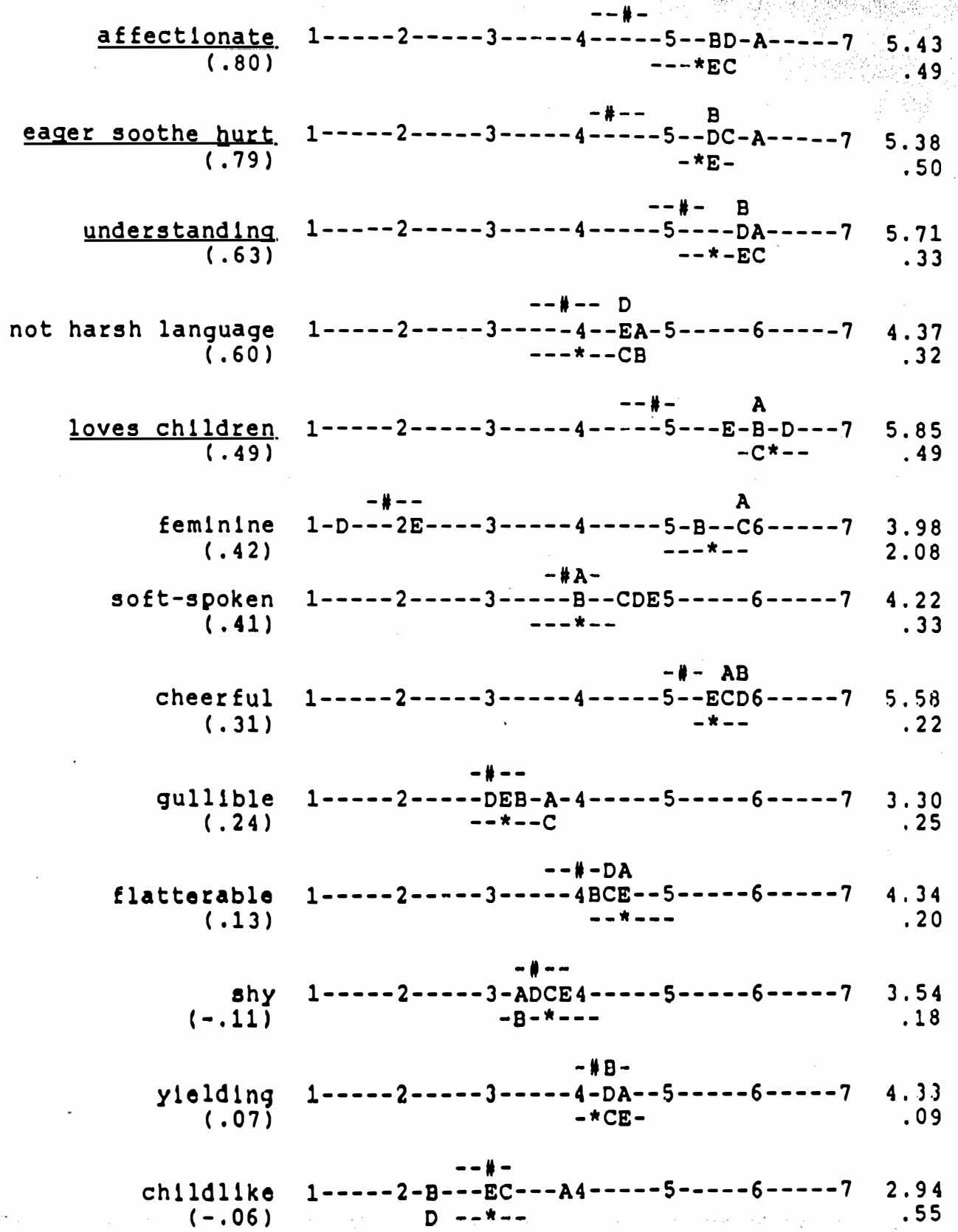
Masculine Source	SOS	df	MS	Fcalc	Effect Size
Age	1996.2	8	249.5	.99	3.0%
Sex	3177.2	1	3177.2	12.70	4.7%
Age*Sex	2875.4	7	410.8	1.64	4.3%
Residual	59772.4	239	250.1		
Total	67123.8	255	263.2		

Feminine Source	SOS	df	MS	Fcalc	Effect Size
Age	3542.0	8	442.7	2.47	6.4%
Sex	6969.6	1	6969.6	38.90	12.6%
Age*Sex	1114.3	7	159.2	.89	2.0%
Residual	42823.0	239	179.2		
Total	55347.5	255	217.0		

Figure 1
Item Means Across Studies




strong personality (.31)
1-----2-----3-----4-----5-E-B-6-----7 5.35
---*C-D .19
dominant (.24)
1-----2-----3-----4ABD-E5-----6-----7 4.41
---*--C .28
competitive (-.16)
1-----2-----3-----4A--C-5E-B--D-----7 5.15
---*-- .60
ambitious (.13)
1-----2-----3-----4-----A--CED6-----7 5.45
---*-- .27
willing take risks (-.04)
1-----2-----3-----4A---BED----6-----7 4.81
--*-C .36
masculine (.03)
1-----CAB---3-----4-----5----E6-D---7 3.74
---*-- 2.02
aggressive (-.02)
1-----2-----3-----A-CE-B5-----6-----7 4.50
---*--D .32
FEMININE
sensitive to needs (1.27)
1-----2-----3-----4-----5----ADC----7 5.57
--*-- BE .66
compassionate (1.14)
1-----2-----3-----4-----5--BDE6-----7 5.41
--*-- C .59
sympathetic (1.01)
1-----2-----3-----4-----5--BDAC-----7 5.48
--*--E .55
tender (.96)
1-----2-----3-----4-----5BDAC-6-----7 5.05
---*--E .52
warm (.85)
1-----2-----3-----4-----5-BDA-6-----7 5.37
--*--EC .46
gentle (.83)
1-----2-----3-----4-----5--BD-6-----7 5.34
--*-EC .47
loyal (.82)
1-----2-----3-----4-----5-----6EBA--7 6.15
-*--CD .45



Note. The confidence intervals for biologically male adolescents bound "#"; comparable values for females bound "*". The mean of the seven means is presented at the end of each scale; the SD is presented below the mean of the seven means.