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FACTOR STRUCTURE OF MF SCALES AND ITEMS.

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FACTOR ANALYSES WERE PERFORMED UPON FOUR MASCULINITY-FEMINITY (MF) SCALES AND UPON THE 136-ITEMS COMPRISING THESE SCALES. RESULTS OF THE FIRST ANALYSIS ILLUSTRATED THE DIFFICULTY OF INTERPRETING FACTORS BASED ON HETEROGENEOUS SCALES. THE ITEM FACTORING REVEALED THE MULTIDIMENSIONALITY OF MF. CERTAIN ITEM FACTORS WERE UNCORRELATED WITH SEX STATUS AND IMPAIR THE MEASUREMENT OF MF BY THESE SCALES. IT IS SUGGESTED THAT THESE CONFOUNDING SOURCES OF VARIANCE BE ELIMINATED FROM MF MEASURES AND THAT FUTURE MF SCALES RECOGNIZE THE MULTIDIMENSIONALITY OF PSYCHOLOGICAL SEX DIFFERENCES. (AUTHOR)

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Factor Structure of MF Scales and Items[1]

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Factor analyses were performed upon four masculinity-femininity (MF) scales and secondly upon the 136 items comprising these scales. Results of the first analysis illustrated the difficulty of interpreting factors based on heterogeneous scales, whereas the item factoring revealed the multidimensionality of MF. Certain item factors were uncorrelated with sex status and impair the measurement of MF by these scales. It is suggested that these confounding sources of variance be eliminated from MF measures and that future MF scales recognize the multidimensionality of psychological sex differences.

Multidimensionality of masculinity-femininity (MF) has been indicated by varying correlations both among MF scales and between MF scales and other measures such as aptitude, see e.g., Barrows and Zuckerman (1960). These inconsistent findings are understandable, however, remembering that the typical method of MF scale construction is to select from a pool of items those which individually correlate most highly with sex status. Selecting items from different pools at different times according to this sole criterion could be expected to yield scales poorly intercorrelated and lacking internal consistency. Because MF items have been selected primarily for their ability to discriminate the sexes rather than for their relationships to the scale or to other items in the scale, multidimensionality of MF would appear to be better evaluated at the item level than at the level of arbitrary scale scores.

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Engel (1966) recognized the importance of items in her factor-analytic study of MF. However, probably owing to limited computer capability at the time, she did not work directly with items but rather factor analyzed homogeneous pools of items from five MF tests. Despite this pooling and the elimination of the most unique pools from the final factor analysis, twenty-four orthogonal factors were defined. The current study directly factored MF items, permitting a better comparison of the structure of masculinity-femininity at the item and at the scale level.

Method

Subjects. The subjects were 169 college sophomores (49% female) enrolled in an introductory classics course. The purpose of testing was explained as contributing to prediction of academic performance and accompanied achievement testing.

Procedure. The 136-item MF questionnaire consisted of 54 items from the MMPI Mf scale (eliminating group form items 69, 133, 179, 231, 249, and 297), 36 items from the Guilford-Martin GAMIN M scale (less item 154), the 38-item California Psychological Inventory (CPI) Fe scale, and 19 items from an earlier femininity scale by Gough (1952). Eleven overlapping items, principally between the MMPI and CPI, were only included once. Order of items was random. Keying on the Guilford-Martin was reversed so that high scores on all scales denoted femininity.

Analysis of the resulting data consisted of:

1. Principal axis factor analysis of the correlations among the four scales followed by varimax rotation. All overlapping items scored for all scales. Factor analysis halted when a factor accounted for less variance than any one of the scales.

2. Principal axis factor analysis of all item intercorrelations followed by varimax rotation. Factor analysis halted when a factor accounted for less variance than any one of the items.

3. Correlation over the 169 subjects of scale scores, sex status (female), and rotated item factors following a multiple regression determination of the scores for each factor in the MF items.

Results

There were two principal axis factors among the four MF scales. MMPI Mf, CPI Fe, and GAMIN M loaded very heavily (.77-.93) on the first rotated factor; Gough (1952) loaded heavily (.96) and GAMIN M moderately (.42) on the second rotated factor.

Eleven factors were extracted from the intercorrelations among the items. Varimax rotated item factors were labeled following examination of all item loadings of .25 and higher. Two to six items had factor loadings of .40 and greater on each of the factors, except Factors I and II which were loaded by 22 and 10 such items respectively. These sets of items comprise Table 1 and were the items used in the multiple regression determination of factor scores.

The content of items loading Factor I is well reflected in its label, feminine interests. Key items loading on the second factor, named emotional sensitivity, included "I am inclined to take things hard" (factor loading .54) and "It makes me very nervous when I get blamed for making a mistake" (.48). Factor III, Philistine vs. artistic, was strongly bipolar with item responses expressing a dislike for dramatics, poetry, florist and journalist activity coupled with items expressing distaste for a lack of cleanliness and a fondness for boasting and practical joking. The self-confidence of Factor IV is

Table 1

MF Items with Loadings of .40 or Higher on Eleven Rotated Factors

(Decimal points omitted)

Source	Loading	Item
		Factor I, Feminine interests (22 items)
F	68	When a parent, teacher, or boss scolds me, I sometimes feel like crying.
F	65	I would rather be a dress designer than a forest ranger.
M	64	I have often wished I were a girl. (Or if you are a girl) I have never been sorry that I am a girl.
MF	64	I used to keep a diary.
F	-60	I would rather be a building contractor than a nurse.
M	-59	There never was a time in my life when I liked to play with dolls.
MC	54	I would like to be a nurse.
M	52	I enjoy reading love stories.
F	52	It makes me jittery to handle a loaded gun.
M	51	I would like to be a florist.
C	-50	I like adventure stories better than romantic stories.
F	49	I would rather be a private secretary than an explorer of new geographic territory.
M	48	I like collecting flowers or growing house plants.
M	48	I like to cook.
C	47	I become quite irritated when I see someone spit on the sidewalk.
C	46	I think I would like the work of a clerk in a large department store.
C	44	I think I would like the work of a dress designer.
F	44	I become so emotional sometimes I get to the point of tears.
F	43	I am disgusted at the sound of dirty language.
F	43	The sight of large bugs and spiders gives me a "creepy" feeling.
F	41	I am afraid of burglars.
F	40	The odor of perspiration disgusts me.
		Factor II, Emotional sensitivity (10 items)
C	54	I am inclined to take things hard.
M	-50	I am entirely self-confident.
G	48	It makes me very nervous when I get blamed for making a mistake.
M	-46	My feelings are not easily hurt.
G	46	I often get disgusted with myself.

Note.--Four scale sources of MF items coded: M for MMPI Mf, C for California Psychological Inventory Fe, F for Guilford-Martin Inventory of Factors GAMIN M, and G for items from Gough, H. C., Educational and Psychological Measurement, 1952, 12, 427-439. N = 169.

Table 1 continued

Source	Loading	Item
		Factor II, Emotional sensitivity (continued)
M	-46	I daydream very little.
G	44	I hate to have to rush when working.
F	43	I often wish my appearance were different than it is.
M	42	I have often felt that strangers were looking at me critically.
M	41	At times my thoughts have raced ahead faster than I could speak them.
		Factor III, Philistine vs. artistic (4 items)
MC	43	I like to be with a crowd who play jokes on one another.
M	-42	I like poetry.
F	41	I am strongly against kissing a friend of my own sex and age.
M	40	My table manners are not quite as good at home as when I am out in company.
		Factor IV, Self-confidence (3 items)
C	46	I think I could do better than most of the present politicians if I were in office.
C	43	I'm pretty sure I know how we can settle the international problems we face today.
M	40	I frequently find it necessary to stand up for what I think is right.
		Factor V, Masculine interests (6 items)
M	47	I think I would like the kind of work a forest ranger does.
C	-46	I am somewhat afraid of the dark.
F	42	I can walk past a graveyard alone at night without feeling uneasy.
F	40	I would like to go hunting with a rifle for wild game.
C	40	I think I would like the work of a garage mechanic.
G	-40	I have a certain talent for understanding the other person, and for sympathizing with his problems.
		Factor VI, Rejection of adventure (5 items)
MC	-50	I like to go to parties and other affairs where there is lots of loud fun.
G	-48	I would do almost anything on a dare.
M	-46	I used to like to play post office. (Rewritten)
M	-46	I sometimes tease animals.
C	-40	Sometimes I have the same dream over and over.

Table 1 continued

Source	Loading	Item
		Factor VII, Neurotic symptoms (3 items)
M	49	I was a slow learner in school.
M	-47	My hands have not become clumsy or awkward.
G	45	Sometimes I cross the street just to avoid meeting someone.
		Factor VIII, Indifference (6 items)
F	-47	The odor of perspiration disgusts me.
F	-46	I am afraid of snakes.
F	-45	It annoys me to see a person biting his fingernails.
G	-44	I always like to keep my things neat and tidy and in good order.
G	-41	When I work at something I like to read and study about it.
F	-40	I feel deeply sorry for a bird with a broken wing.
		Factor IX, Social adequacy (3 items)
C	-41	At times I feel like picking a fist fight with someone.
M	41	I have never had any breaking out on my skin that has worried me.
MC	40	If I were a reporter I would very much like to report news of the theater.
		Factor X, Extroversion (2 items)
M	48	I would like to be a singer.
C	43	The average person is not able to appreciate art and music very well.
		Factor XI, Unsociable nonconformity (4 items)
M	-45	I believe in a life hereafter.
G	-43	I like to be in many social activities.
C	-41	I want to be an important person in the community.
F	41	I would rather be an artist than a political organizer.

well represented by the item loading highest on it, "I think I could do better than most of the present politicians if I were in office" (.46). Factor V, masculine interests, was loaded by interest items and ones indicating no fear of snakes, darkness, burglars, etc. Factor VI was labeled rejection of adventure on the basis of strong negative loadings by many items such as, "I would do almost anything on a dare" and "I sometimes tease animals." Feelings of physical and emotional incapacity, e.g., "I was a slow learner in school" (.49) and "My hands have not become clumsy or awkward" (-.47), typified Factor VII, neurotic symptoms. Factor VIII, indifference, was marked by negative responses to items expressing a positive or negative reaction towards a wide variety of topics. Factor IX expressed social adequacy through high loadings by items such as "I have never had any breaking out on my skin that has worried me" (.41) and "I get very tense and anxious when I think other people are disapproving of me" (-.36). Factor X was labeled extroversion because of items denoting attraction to social activities, singing, politics, and decision making. Factor XI, unsociable nonconformity, combined unconventional responses such as "no" to "I believe in a life hereafter" (-.45) with anti-social ones such as "no" to "I want to be an important person in the community" (-.41).

Table 2 presents the correlations among sex, MF scale scores, and MF item factors. The range of intercorrelation among MF scales, .38-.80, was as varied as other investigators have reported. The 19-item Gough scale had the lowest correlations with other scales. A similar range of correlation was observed between the scales and sex status, from .42 for the Gough scale to .82 for GAMIN M.

The eleven factors found among the MF items were evenly divided between those correlated and uncorrelated with sex status. Factors I and IX were substantially associated with female status (.82 and .34); scores on Factors III, V, and VIII correlated with male status .32, .35, and .28, respectively. The remaining factor scores correlated with sex from .01 to .16. The four MF scales described in terms of the factors present in their items are as follows: MMPI Mf and CPI Fe were similar and the most complex of the scales having significant (.01 level) correlations with Factors I, II, III, V, VI, VIII, and IX. CAMIN M was also correlated with I, II, V, VIII, and IX. The Gough scale was correlated with I, II, V, and VIII. The Gough scale correlated only .39 with Factor I while all other scales had r's greater than .60. Thus, Factors IV, VII, X, and XI, while accounting for responses to items contributing to these MF scales, were uncorrelated with the scale scores themselves. These four factors were also among the six factors which were not correlated with sex status.

Discussion

It would appear that future research into the dimensionality of MF should concentrate upon responses to individual MF items rather than upon MF scale scores. Factor analyses of MF scales can be expected to yield little more than a general factor representing the method of test construction the scales share--selection of items for sex discriminability. Where another factor is found, as in the current study, it is difficult to interpret solely on the basis of the scales loading on the factor. Any attempt at interpretation would involve examining the items in each of the scales loading on the factor and making a judgment as to what content is shared by the scales. For example, to understand the second interscale factor in this study, the items

Table 2

Correlations among MF Scales, MF Item Factors, and Sex Status

(Decimal points omitted)

	MMPI Mf	CPI Fe	GAMIN M	Gough	Sex (female)
Factor I Feminine interests	61	70	80	39	82
Factor II Emotional sensitivity	39	31	22	41	16
Factor III Philistine vs. artistic	-47	-40	-16	02	-32
Factor IV Self-confidence	-15	-21	-05	10	-02
Factor V Masculine interests	-37	-46	-49	-30	-35
Factor VI Rejection of adventure	27	23	02	-16	01
Factor VII Neurotic symptoms	-10	01	08	16	-03
Factor VIII Indifference	-22	-30	-16	-32	-28
Factor IX Social adequacy	25	35	29	07	34
Factor X Extroversion	07	-06	-04	06	-03
Factor XI Unsociable nonconformity	18	11	07	-06	06
MMPI Mf		80	62	38	66
CPI Fe			76	40	73
GAMIN M				50	82
Gough					42
$\bar{X}_{Male}$	27.43	16.46	11.79	9.95	
$\bar{X}_{Female}$	34.89	23.98	23.07	11.99	
SD_{Total}	5.65	5.17	6.88	2.45	

in the GAMIN M and Gough 1952 scales would require a content analysis. Only where the scales are homogeneous as in Ford and Tyler's (1952) analysis of Terman and Miles M-F Test are the resulting factors easily interpreted. Because objective MF measures typically are composed of items very heterogeneous in content, the dimensional framework of MF can never be established by scale scores but only by interrelations of items.

The present study supports the multidimensionality of psychological masculinity-femininity. Of the eleven factors extracted from the items, only five can be thought of as MF dimensions--feminine interests, masculine interests, Philistine vs. artistic attitudes, indifference, and social adequacy--because only these five were significantly correlated with sex status. This property is the prime requirement for any MF factor. A first principle in the study of MF certainly has to be that males evidence greater masculinity on the average than females, and vice versa regarding femininity. All five of the factors Engel (1966) discussed met this requirement. Despite only two scales in common between the MF scales in this and in Engel's set of tests, factors based upon interests, occupations, and obvious sex-role activities dominated the factor structure of MF in both studies.

An additional finding was that the MF scales analyzed here contain clusters of items which elicit responses not primarily determined by sex status. There were six factors uncorrelated with sex status--emotional sensitivity, rejection of adventure, neurotic symptoms, self-confidence, extroversion, and unsociable nonconformity. These sets of items correspond to popular, perhaps stereotyped, notions of sex differences in personality--the first three listed being associated with femininity and the last three with masculinity. Each of these factors represents a source of variance which

does not contribute to the discrimination of male and female subjects. While, for each of these factors, the correlation between individual items and sex status may be significant, there were apparently stronger interitem correlations based on some other content not related to sex. Of special importance is Factor II, emotional sensitivity, which was not correlated with sex status but was strongly related to each of the four MF scales. To the extent that emotional sensitivity is not a part of the psychological trait masculinity-femininity, it impedes the ability of these MF scales to discriminate the sexes. Interestingly, Ford and Tyler (1952) found emotional sensitivity the first factor to be extracted within each sex. In summary, sources of variance not contributing to the discrimination of the sexes should be eliminated from MF scales, and separate measures should be developed for each MF dimension to replace existing heterogeneous scales.

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