In the early 1970s A. Constantinople wrote a seminal article that led to the development of the construct of psychological androgyny. The Bem Sex-Role Inventory is a popular measure of the construct, but the measure remains controversial. The construct validity of scores from the measure was explored using confirmatory factor analysis on data from 791 college students. Neither a model positing zero factors nor a model positing a single factor fit the data. The correlation between the two factors identified was negligible, suggesting that the two constructs may be orthogonal. Fit statistics presented do not make one optimistic about the validity of scores from the measure, at least when computed with conventional scoring keys. More favorable results might be obtained from the short form of the measure. Two tables are provided. One appendix presents the analysis of the correlation matrix, and the other gives parameter estimates. (Contains 23 references.) (SLD)
THE FACTOR STRUCTURE OF THE BEM SEX-ROLE INVENTORY (BSRI):
A CONFIRMATORY ANALYSIS

Todd Campbell    Art Gillaspy    Bruce Thompson
Texas A&M University  77843-4225

ABSTRACT

In the early 70's Constantinople wrote a seminal article that subsequently led to the elaboration of the development of the construct of psychological androgyny. The Bem Sex-Role Inventory is a popular measure of the construct, but the measure remains controversial. We explored construct validity of scores from the measure using confirmatory factor analytic methods on data from 791 subjects.
Many researchers acknowledge the prominent role that factor analysis can play in efforts to establish construct validity. For example, Nunnally (1978, p. 111) noted that, historically, "construct validity has been spoken of as [both] 'trait validity' and 'factorial validity.'"

Similarly, Gorsuch (1983, p. 350) noted, "A prime use of factor analysis has been in the development of both the operational constructs for an area and the operational representatives for the theoretical constructs." In short, "factor analysis is intimately involved with questions of validity.... Factor analysis is at the heart of the measurement of psychological constructs" (Nunnally, 1978, pp. 112-113).

In the present study we employed confirmatory factor analytic methods (Jöreskog & Sörbom, 1989) to explore the construct validity of scores from a popular measure of psychological androgyny, the Bem Sex-Role Inventory (BSRI) (Bem, 1981). The measure has been controversial, as explained by Thompson (1989). For example, Pedhazur and Tetenbaum (1979) presented a stinging critique of the measure, to which Bem (1979) responded.

The development of the Bem Sex-Role Inventory can be traced to Constantinople (1973), who argued that persons could possess stereotypically masculine and stereotypically feminine
psychological traits in any combination, regardless of physical gender. For example, persons who are both masculine and feminine in their psychological outlook are termed "androgynous".

The structure underlying responses to the Bem Sex-Role Inventory has been investigated using various analytic methods across diverse samples (see Thompson, 1989). Thompson and Melancon (1986) provide an example of the use of exploratory methods with scores from the measure. Confirmatory methods have been applied to BSRI data from adolescents (Thompson & Melancon, 1988). Second-order confirmatory methods have also been used (Marsh, 1985).

It is important to employ confirmatory methods in such validity studies, when possible, because such methods test models that are potentially "falsifiable" (Mulaik, 1987, 1988). Furthermore, if properly used, the methods reward the development of more parsimonious models (Mulaik, James, van Alstine, Bennett, Lind & Stilwell, 1989).

Method

Subjects

In the present study we used confirmatory factor analytic methods to investigate structure associated with BSRI data provided by 791 graduate and undergraduate students enrolled at a large university. The sample was predominantly white (82.9%), though the sample also included Hispanics (9.5%), and African-Americans (4.2%). There were slightly more women (50.9%) in the sample. The mean age was 20.23 (SD=4.04).

Results
Confirmatory factor analyses were conducted using LISREL covariance structure analyses (Jöreskog & Sörbom, 1989). Bivariate correlation matrices were used as the basis for each analysis, to produce "scale-free" parameters. We could use correlation matrices, because all our models involved variables correlating with only one factor, and each factor had factor variance fixed to one (Cudeck, 1989).

Models

Each model freed (a) one factor parameter per variable, (b) the factor correlation coefficients, and (c) the measurement error variance for each variable. All other parameters were fixed.

Model #1 \((v=40; n=791)\). This model posited a single bipolar factor defined by the 40 variables--20 per scale.

Model #2 \((v=40; n=791)\). This model posited two uncorrelated factors defined by the 40 variables.

Model #3 \((v=40; n=791)\). This model posited two correlated factors defined by the 40 variables.

Table 1 presents the fit statistics (Bentler, 1990, 1994) for the three models. Table 2 presents the maximum-likelihood parameter estimates for Model #3. The analyzed correlation matrix and the other parameter estimates are appended.

**INSERT TABLES 1 AND 2 ABOUT HERE.**

**Discussion**

At the outset it must be emphasized that our data and our results do not alone determine our constructs (Mulaik, 1994). As
Mulaik (1987, p. 301) emphasized, "It is we who create meanings for things in deciding how they are to be used. Thus we should see the folly of supposing that exploratory factor analysis will teach us what intelligence is, or what personality is." We can not avoid the existential responsibility for defining our constructs. Of course, as Huberty (1994, p. 265) explains, our data can be used to guide our decisions as to what constructs are, i.e., theory development and theory testing are "joint bootstrap operations" (Hendrick & Hendrick, 1986, p. 393).

Several features of the results are noteworthy. First, neither a model positing no factors nor a model positing a single bipolar factor fit the data, as indicated by the various fit statistics reported in Table 1. The failure to fit a bipolar single factor supports Constantinople's (1973) original theory as regards these constructs.

Second, the correlation \( r = -0.022 \) between the two factors was negligible, as reported in Table 2. This last result suggests that the two constructs may be orthogonal, as implied by a classification scheme presented as the 2x2 contingency table typically employed by researchers using the Bem Sex-Role Inventory.

Third, the fit statistics presented in Table 1 would not make one sanguine about the validity of scores from the measure, or at least of scores computed using conventional scoring keys. Models #2 and #3 fit the data equally well, but neither provided a particularly good fit. These results are generally consistent with related work reported by others (cf. Marsh & Myers, 1984).
However, it must be remembered that the characteristics of reliability and validity inure to scores and not to tests (Thompson, 1994), and that sometimes scores from shorter tests are more reliable than scores from longer tests (Thompson, 1990, p. 586). The 20-item short-form of the Bem generally yields more reliable scores than does the 40-item long-form, especially on the Feminine scale (Bem, 1981, p. 14). Thus, it is possible that more favorable results would be achieved by analyzing only the 20 short-form items. This possibility remains to be explored in future research.
References


application of confirmatory factor analysis to higher-order factor structures and factorial invariance. Multivariate Behavioral Research, 20, 427-449.


Pedhazur, E. J., & Tetenbaum, T. J. (1979). Bem Sex-Role Inventory: 7

10


Table 1
Fit Statistics for Three Models
(n = 791; ν = 40)

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*Noncentrality = $\chi^2$ - df

*Noncentrality / df

*Parsimony Ratio = Model df / [(variables * (variables + 1)) / 2]

*GFI * Parsimony Ratio

*CFI = [(Null $\chi^2$ - Null df) - (Model $\chi^2$ - Model df)]
      (Null $\chi^2$ - Null df)

*Parsimony Ratio = Model df / [(variables * (variables - 1)) / 2]

*CFI * Parsimony Ratio

Note. These fit statistics are described by Bentler (1990, 1994) and by Mulaik, James, van Alstine, Bennett, Lind, and Stilwell (1989).
Table 2
Correlated Two-Factor Model
Maximum Likelihood Parameter Estimates

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# Appendix A: Correlation Matrix Analyzed

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Appendix B.1  
One-Factor Model Maximum Likelihood Parameter Estimates

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### Appendix B.1

**Uncorrelated Two-Factor Model**

Maximum Likelihood Parameter Estimates

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