



#### Study 4

### Study on Contraceptive Behavior Using Multitrait-multimethod Data.

#### Source:

Kothandapani, V. (1971). Validation of feeling, belief, and intention to act as three components of attitude and their contribution to prediction of contraceptive behavior. *Journal of Personality and Social Psychology*, 19(2), 321-333.

#### Aim of Kothandapani's study:

The author tries to apply a tripartite model of attitude, consisting of the following components: 'feeling' (affective), 'belief' (cognitive), and 'intention to act' by conventional factor analysis (Principal Axes). The attitudinal objective was the use of contraceptive devices for sexual interactions. A fourth variable was used to assess the behavioral reality (validity) of the attitude ratings, i.e., the participants' acceptance (accept or not accept) of contraceptive devices as remuneration for test participation. The hypothesis that 'intention to act' would reveal the largest correlation with this behavioral variable (index of overt behavior) was tested with different statistical procedures.

#### Method:

The author applied four common procedures of attitude measurement: (1) Thurstone & Chave's method of Equal Appearing Intervals; (2) Likert's Method of Summated Ratings; (3) Guttman's Scalogram Analysis; and (4) Guilford's Self-rating Scales.

These four procedures were used to assess three attitude components: The 'feeling' component was addressed by statements such as "I am happy to learn about the benefits of birth control"; the 'belief' component was aimed at by statements like "Birth control will help me postpone childbirth as long as I want"; and the 'intention to act' component by a statement such as "I would walk a mile to get my birth control supplies." Twelve scales were thus constructed.

Procedure:

The scales were administered to 100 participants. The data collected for testing the first hypothesis (tripartite model of attitude) were analyzed by factor analysis and particular MTMM procedures. The second hypothesis (validity of the attitude components for overt behavior) was tested using a stepwise discriminant analysis.

Table 1

Input for factor analysis:

```
1
.26 1
.19 .43 1
.58 .34 .05 1
.20 .50 .22 .66 1
-.03 .08 .49 .31 .65 1
.49 .06 -.06 .60 .20 .04 1
.20 .28 .09 .41 .44 .24 .48 1
.18 -.05 .42 .05 .07 .47 .28 .32 1
.45 .20 .12 .59 .41 .31 .50 .30 .13 1
.25 .39 .32 .31 .51 .39 .13 .35 .13 .65 1
.17 .12 .49 .15 .34 .60 .14 .24 .50 .55 .61 1
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For names of variables, see Tables 2 and 3

Eigenvalues:

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4.53 1.98 1.40 1.05 1.02 .077
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Varimax results

Kothandapani subjected the correlations of Table 1 to Principal Axis Analysis and the factors subsequently to Varimax rotation. The results of Table 2 are based on my application of Principal Component Analysis of Table 1 data with subsequent Varimax rotation..

Table 2

Varimax loadings of PCA factors:

	F1 Feeling	F2 Intention to Act	F3 Belief	F4 ? Belief	Method	Psychol. Components
1	<b>.768</b>	.122	-.092	.385	Thurstone	Feeling
2	.128	-.083	.268	<b>.865</b>	Thurstone	Belief
3	-.110	<b>.673</b>	.081	.637	Thurstone	Intention to act
4	<b>.724</b>	-.120	.486	.180	Likert	Feeling
5	.191	-.008	<b>.843</b>	.280	Likert	Belief
6	-.099	<b>.563</b>	.689	-.018	Likert	Intention to act
7	<b>.884</b>	.105	.069	-.151	Guttman	Feeling
8	.486	.162	.390	.005	Guttman	Belief
9	.217	<b>.870</b>	-.031	-.105	Guttman	Intention to act
10	<b>.566</b>	.164	.547	.042	Guilford	Feeling
11	.159	.238	<b>.668</b>	.300	Guilford	Belief
12	.073	<b>.715</b>	.484	.058	Guilford	Intention to act
%	21.7	18.3	22.1	12.7	Sum	74.8

Varimax factor interpretation:

The number of 'Eigenvalues >1' might have suggested to rotate only three factors. However, an additional *Varimin* factor (see below) appeared to be interpretable. A fourth factor was, therefore, also Varimax-rotated. Only two Varimax factors revealed meaningful psychological components: 'Feeling' (F1) and 'intention to act' (F2). Loadings for 'belief' were apparently divided up on two factors (F3 and F4).

Criticism

No Varimax factor is manifested for explaining method variance. The author (Kothandapani) also missed a clear factor for 'belief' and rotated, in addition, three factors to oblique simple structure. His orthogonal and oblique factor patterns did not differ much. The author continued to pursue his main aim by using the monotrait-heteromethod comparisons of correlations, which was popular at his time, for MTMM analyses and he concluded that *"the Thurstone and the Guttman methods differentiate the three [psychological] components better than the Likert and Guilford methods"*. He applied the stepwise multiple discriminant analysis on the three variables and found that 'intention to act' contributed most to contraceptive behavior that was operationalized by 1s or 0s for accepting vs. not-wanting contraceptive products offered to participants for free.



Varimin results

Table 3

Varimin loadings:

	F1 g	F2 Intention to Act	F3 Feeling vs. Other	F4 Thurstone's vs. Other	Methods	Psycholog. Components
1	.630	-.411	.379	-.337	Thurstone	Feeling
2	.516	-.378	-.487	-.444	Thurstone	Belief
3	.654	.430	-.265	-.427	Thurstone	Intention to act
4	.590	-.604	.027	.296	Likert	Feeling
5	.551	-.293	-.544	.374	Likert	Belief
6	.535	.407	-.384	.449	Likert	Intention to act
7	.502	-.384	.579	.293	Guttman	Feeling
8	.513	-.198	.075	.326	Guttman	Belief
9	.572	.590	.362	.091	Guttman	Intention to act
10	.635	-.271	.009	.415	Guilford	Feeling
11	.620	-.064	-.415	.240	Guilford	Belief
12	.674	.441	-.154	.285	Guilford	Intention to act
%	34.3	16.0	13.0	11.4	Sum:	74.8

Interpretation of Varimin factors:

Varimin F1 is a general factor (only positive weights with small variance across variables). This result is common with rating data. F1 is most probably due to response set, either acquiescence or social desirability or both.

Varimin F2, bipolar, apparently accentuates 'intention to act' as psychological variable, while 'feeling' and 'belief' tend to be less related to 'intention' of using or not using contraceptive devices for sexual interactions. This result had been hypothesized by Kothandapani.

Varimin F3, bipolar, accentuates 'feeling' as a polar counterpart to 'belief' and 'intention to act.' The fact that the Guttman ratings for 'belief' and 'intention to act' in this study deviate from the three other methods of assessment remains unexplained. The oppositeness of 'feeling' vs. 'belief' fits Kothandapani's model, which states that affective reactions ('feelings') are more distant from 'intentions to act' than cognitive 'beliefs.'

Varimin F4, bipolar, suggests that the Thurstone method, compared with Likert's, Guttman's, and Guilford's method, produces some special variance.

Evaluation:

By the analysis of Kothandapani's data, the prominent role of 'intention to act,' expected by this author, is manifested by the Varimin rotation more clearly than by his two (orthogonal and oblique) simple structure rotations. Two additional sources of variance (Varimin F1 for 'g' or 'response sets') and Varimin F4 for 'methods' were revealed by Varimin rotation only, not by Varimax rotation.

To sum up and generalize:

Multitrait-multimethod data, generally not subjected to factor analysis (except in earlier historical periods to which Kothandapani's study belongs) can be factorized provided factors are rotated by Varimin. Varimin opens doors to variance components whose actual complexity is excluded by Varimax and similar simple structure procedures.

Table 4

Minimal pairs:

Bold numbers represent loadings of pairs of variables for a focal factor. Non-bold numbers are loadings of paired variables for non-focal factors						
Var. No.	F1 g	F2 Intention to Act	F3 Feeling	F4 Method Thurstone's vs. Other	Which Method	Psycholog. Components
9	.572	<b>.590</b>	.362	.091	Guttman	Intention to act
1	.630	<b>-.411</b>	.379	-.337	Thurstone	Feeling
12	.674	<b>.441</b>	-.154	.285	Guilford	Intention to act
4	.590	<b>-.604</b>	.027	.296	Thurstone	Feeling
7	.502	-.384	<b>.579</b>	.293	Guttman	Feeling
5	.551	-.293	<b>-.544</b>	.374	Likert	Belief
9	.472	.590	<b>.362</b>	.091	Guttman	Intention to act
2	.516	-.378	<b>-.487</b>	-.444	Thurstone	Belief
6	.535	.407	-.384	<b>.449</b>	Likert	Intention to act
2	.516	-.378	-.487	<b>-.444</b>	Thurstone	Belief
10	.635	.271	.009	<b>.415</b>	Guilford	Feeling
3	.654	.430	-.265	<b>-.427</b>	Thurstone	Intention to act

In sum:

The Varimin solution outdoes the Varimax solution again regarding interpretable rotated factors.