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CENTRAL DYNAMIC TRAITS MEASURED IN THE SCHOOL MOTIVATION ANALYSIS TEST

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ABSTRACT

The School Motivation Analysis Test (SMAT) is an objective instrument which is purported to measure 10 of the major motivational dynamic structures evident in adolescents. Using the matrices of subscale intercorrelations for males and females reported in the SMAT Handbook, quasi-higher-order scale factor analyses of the instrument were undertaken. In addition, a cross-validational analysis was undertaken using a sample of Australian-born Greek adolescents. Results indicated that at least five higher-order SMAT factors accounted for most of the common factor variance. Noteworthy was the finding that both Superego and Self-Sentiment emerged as "master sentiments" among the central dynamic traits. Nevertheless, the degree of variation in higher-order factor pattern solutions across both studies and samples suggested that further refinement of the SMAT is required in order to improve its reliability and robustness.

INTRODUCTION

The School Motivation Analysis Test (SMAT — Krug, Cattell & Sweney, 1976) is a downward extension of the adult Motivation Analysis Test (MAT — Cattell, Horn, Sweney & Radcliffe, 1964), which along with the Children's Motivation Analysis Test (cf. Boyle & Start, 1989), provide a uniquely conceptualized and constructed series of objective (T-data) measures of human motivational structure. The SMAT is intended for use with adolescents aged from 12 through 17 years and is therefore suitable for use at both junior high and seniorhigh school levels. Together, this series of instruments provide an important advance in the measurement of human motivational structure (Child, 1984). Prior to their development, motivational measurement was confined to the simpler, but less satisfactory self-report method, whereby readily discernible item transparency resulted in easy fakeability of the subject's responses, and provided therein a major hurdle to obtaining accurate information regarding motivational interests and attributes. As Boyle (1988) stated in regard to the MAT (and which is equally

applicable to the SMAT) this is an instrument "which rather than asking the respondent to give self-ratings as in a questionnaire, instead requires the subject to respond to performance (T-data) items in written format (sometimes referred to as Q-data items). There is no way in which the nature of what each item measures can be ascertained by the respondent. This is a critical requirement in the field of motivation measurement. Other interest measures such as the Strong Vocational Interest Blank (Strong et al., 1971), the Kuder Occupational Interest Survey (Kuder, 1970), and the Brook Reaction Test (Heim et al., 1969) are deficient in this crucial aspect . . . . "

Given that human motivation may be largely at the level of unconscious awareness ("tip of the iceberg" phenomenon) as psychoanalysis has suggested (cf. Kline, 1972), it follows that the face-valid self-report approach to motivation measurement could not suffice. Cattell's own studies (Cattell, 1985; Cattell & Child, 1975) have indicated the existence of several, factorially discrete motivational components (cf. Boyle, 1988, pp. 745-753) which necessarily preclude accurate motivation measurement through self-report methods alone (some of the motivational components involve unconscious attitudes/interests). In the equally sensitive area of intelligence testing, objective (T-data) measures have long been regarded as essential by mainstream psychology in order to avoid the obvious pitfalls of self-ratings. So too, in the complex area of human motivation, objective instruments such as the MAT, SMAT and CMAT are clearly preferable.

The SMAT as currently constructed, provides measures for 10 separate dynamic traits labelled: Assertiveness, Mating, Fear, Narcism, Pugnacity, Protectiveness, Self-Sentiment, Superego, School, and Home. These motivational dynamic factors are measured at both the integrated/conscious level (I-dynamic traits) as well as at the unintegrated/unconscious level (U-dynamic traits), so that the total number of subscales is twenty (the U- and I-dimensions represent second-order motivational components). Six of the dynamic traits are considered to be biologically based, primary drives (ergs) — (Assertiveness through Protectiveness), while four are recognized as culturally learned interest patterns (sentiments/sems) — (Self-Sentiment through Home). Each dynamic trait is measured through four separate modalities/devices labelled: Utilities, Word Association, Autism, and Information, respectively (cf. Krug et al., 1976, p. 7). Psychometric issues such as reliability and validity have been addressed and the evidence to date is supportive of the instrument (e.g., Krug et al., pp. 27-31; Boyle, Start & Hall, 1989b). It is however, recognized that future revisions of the SMAT will inevitably result in an instrument which is enhanced with respect to its psychometric adequacy, as compared with the actual version currently available.

Studies of the higher-order factor structure of the MAT have been reported in the literature (e.g., Boyle, 1983, 1985a; Burdsal, 1975; Cooper & Kline, 1982) suggesting the likelihood of up to seven separate motivational dynamic structures at the second-order factor level (cf. Boyle, 1985b). Apart from the work of Boyle, Start and Hall (1989a), corresponding analyses of the higher-order factor structure of the SMAT have been lacking. It is important as Cattell and Kline (1977, p. 184) pointed out, that further research into higher-order motivational structure be undertaken given that the structuring of dynamic traits at this level is still uncertain. Kline (1979, p. 185) had called for further investigation "utilizing factorial procedures in accord with the technical demands . . . so that

one can have confidence in the attainment of simple structure and the consequent psychological import of the results."

Accordingly, Boyle et al. (1989a) administered the SMAT to 277 Australian high school students (Year 10 level) and submitted the resulting 20 x 20 intercorrelation matrix to an iterative principal factor analysis (see below as to factor methodology). Results indicated six higher-order factors which were essentially orthogonal (since none of the factor correlations were statistically significant). Factor 1 exhibited salient loadings only on a number of the U-components (Mating, Narcism versus Superego, School, Home), suggesting an adolescent conflict (predominance of U- over I-dynamics) between emerging sexual awareness on the one hand (ergic expression), and the social control exerted through home and school (culturally developed sentiments). Factor 2 loaded significantly only on the I dynamics Fear and Pugnacity, suggesting the the extreme emotional sensitivity of the often turbulant adolescent period. Factor 3 contrasted U-Pugnacity with I School, indicating the obvious incompatibility of hostility and academic orientation. Factor 4 contrasted (U + I) Pugnacity with I Protectiveness and I-Home. This factor again suggests the incompatibility of uncontrolled aggressiveness with a caring attitude toward family and loved ones. Factors 5 and 6 accounted for the least amount of variance and their interpretation is less certain.

While the Boyle et al. (1989a) study attempted to elucidate the higher-order structure of the ergs and sentiments measured in the SMAT, it is evident that the results obtained were rather tentative and required cross-validation. The present paper reports the findings of such cross-validational investigations.

METHOD

Subjects and Procedure

STUDY 1: In this study, the correlation matrices reported in the SMAT Handbook (Krug et al., 1976, pp. 28-29) were used as the starting point for performing higher-order factor analyses of the SMAT primary subscales. The demographic characteristics of the standardization sample are provided on pp. 35-36. The sample of American adolescents clearly comprised 1188 males and 1241 females. However, it is unclear which correlation matrix relates to the males and which to the females. In the event, separate factor analyses were carried out for each intercorrelation matrix and the results were compared.

STUDY 2: This study utilized a sample of 109 (63 females; 46 males) high school students enrolled in Greek language classes. The students were from a predominantly industrial area of Melbourne (Australia). In most instances, the students were Australian-born while their parents had come from Greece. The SMAT was administered during Saturday morning Greek school classes across Year levels 7 through 12. Pearson product-moment correlations were computed between Total (U + I) score subscales as well as across Sex. Although considerably smaller than the samples on which Study 1 was based, the results from this sample are reported purely for cross-validational purposes, especially in regard to possible sex differences.

Factor Analytic Methodology.

An iterative principal factoring procedure was employed in each instance. This methodology has been recommended by Cureton and D'Agostino (1983) as suitable for initial exploratory factor analysis of a new domain. The appropriate number of factors was estimated by means of the Scree test (Cattell & Vogelmann 1977; Hakstian, Rogers & Cattell, 1982), in conjunction with the Kaiser-Guttman (K-G) criterion of only extracting factors with eigenvalues greater than unity (cf. Yeomans & Golder, 1981). According to Child (1970), the two criteria should provide similar estimates of the number of factors when the number of variables ranges between 20 to 50, whereas below or above this range, the K-G criterion is likely to indicate too few and too many factors respectively (cf. Boyle, 1987, p. 346). Accordingly, the number of factors extracted in each analysis varied somewhat depending on the latent roots. However in all instances, initial communality estimates were squared multiple correlations (SMC's) which were refined through iteration until convergence occurred at the fifth decimal place, in order to avoid spurious common factor variance being entered into the factor pattern solutions (cf. Lee & Comrey, 1979, p. 301). While not particularly problematic with large factor matrices (Harman, 1976; Gorsuch, 1983), failure to iterate may become a serious distorting influence with small matrices, such as in certain higher-order factor analytic studies. The SPSS statistical package (Nie et al., 1975) was employed in each instance to extract the factors and to rotate them to simple structure via the direct Oblimin procedure.

RESULTS AND DISCUSSION

STUDY 1 (Top matrix):

Examination of the Scree test indicated that seven factors should be extracted and rotated to simple structure, whereas the K-G criterion suggested that six factors were required to account for the common factor variance. However, in accord with the rationale advocated by Cattell (1978) that it is better to over-estimate rather than to underestimate the appropriate number of factors, all seven factors were extracted. The Scree test results are presented in Figure 1, while Table 1 presents the oblique factor pattern solution for this analysis. A total of 282 iterations of the initial factor matrix were required in order to achieve convergence of communalities at the fifth decimal place. The resulting solution exhibited a ±.10 hyperplane count of 65% suggesting reasonable approximation to oblique simple structure.

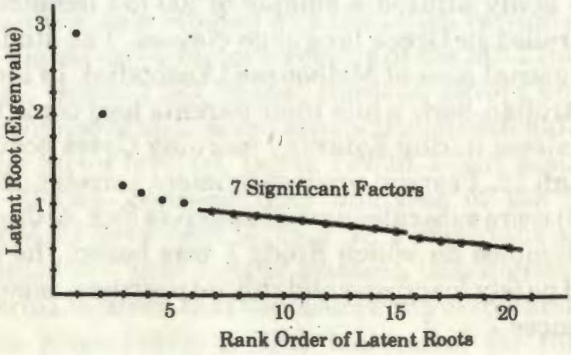

FIGURE 1. Scree plot of latent roots on SMAT data.

Table 1

Oblique Factor Pattern Solution for SMAT Variables

(Upper Matrix)

	Factor Number							
Variable	1	2	3	4	5	6	7	h^2
U-As	.21	.01	-.06	-.22	-.02	.01	-.18	.19
U-Ma	.00	-.03	.00	.08	*.54*	.06	.01	.35
U-Fr	*-.32*	.10	-.10	.15	.01	.10	-.11	.20
U-Na	.03	-.22	-.02	-.01	.07	.01	-.01	.07
U-Pg	.01	.00	.00	.08	.05	*.44*	.02	.23
U-Pr	-.05	.20	.03	.06	-.03	*-.31*	.01	.17
U-Ss	-.03	.06	*1.00*	.00	.01	.01	-.04	1.00
U-Se	*-.30*	.24	-.02	-.03	-.21	*-.26*	.15	.37
U-Sc	.06	*.56*	-.01	-.08	.05	-.06	.01	.34
U-Ho	.08	.03	-.04	.04	-.12	-.08	*.53*	.32
I-As	.22	.10	.03	-.19	-.04	.12	-.12	.15
I-Ma	*.34*	-.06	-.04	-.04	*.37*	-.19	-.12	.37
I-Fr	.09	-.02	.01	.05	-.13	-.14	*-.30*	.15
I-Na	*.45*	.01	.04	.03	.11	-.03	-.04	.23
I-Pg	*.68*	-.02	-.03	.05	-.11	.20	-.13	.52
I-Pr	-.04	.09	-.05	-.08	.01	-.17	.03	.06
I-Ss	*.31*	-.14	.05	*-.30*	.10	-.17	.04	.35
I-Se	.10	*-.29*	.01	*-.33*	-.17	*-.30*	-.17	.46
I-Sc	.07	.00	.01	*-.44*	.04	-.04	-.05	.24
I-Ho	-.10	.06	.01	*-.47*	-.07	.00	.03	.22
Hyperplane Count (±10)	12	14	19	13	12	10	11	Total = 65%
Eigenvalue:	2.92	2.00	1.18	1.13	1.08	1.04	0.97	

Notes. Loadings shown to two decimal places only. Loadings ≥ .30 are italicized. Hyperplane counts for the 6 Factor solution and the 8 Factor solution were 53.33% and 70% respectively. The intercorrelations of the seven factors above were also subjected to an iterative principal factoring, resulting in three third-order SMAT factors which contrasted various U-and I-components. Of especial interest was the finding that (U + I) Ma contrasted with (U + I)Se on the first tertiary factor extracted (which accounted for 43% of the variance). This finding suggests the motivational investment of adolescents regarding the approach-avoidance conflict surrounding emerging sexual awareness.

Complete labels for the variables in the above table are provided in the SMAT Handbook p. 7).

Factor 1 (accounting for 14.6% of the unrotated principal components variance) was a general factor with positive loadings on I-pugnacity, I-Narcism, I-Mating and I-Self-Sentiment, and negative loadings on U-Superego and U-Fear. This factor suggests the adolescent need for self-assertion, rebelliousness and independence. Of especial note was the high loading on I-Pugnacity. Accordingly, Factor 1 might be labelled *Self-Aggrandizement versus Self-Restraint.*

Factor 2 (10.0% of the total variance in the 20 x 20 intercorrelation matrix) was loaded significantly by U-School and (negatively) by I-Superego. The high loading on U-School clearly indicates the importance of motivational dynamics pertaining to the area of schooling, which so preoccupies the typical adolescent due to his/her situation in life. Schooling is a compulsory and central feature of most teenager's lives and as such undoubtedly requires the investment of considerable psychological energy on the part of the adolescent. The need to achieve well at school has extremely important implications and consequences in Western societies, since schooling is used as a means of selecting students for various occupational openings. This factor might be labelled *Schooling.*

Factor 3 (5.9% of the variance) was a specific factor and loaded significantly only on U-Self-Sentiment. Nevertheless, U-Self-Sentiment (one of the two "master sentiments" — Kline, 1979) exhibited a maximal loading of unity. Under these circumstances, and given that the communality for U-Self-Sentiment was also unity, it seems that extraction of this factor was entirely justified, despite its being a specific factor. Evidently, U-Self-Sentiment is a central motivational structure in the adolescent's intrapersonal psychological constitution. In terms of the psychosocial theory proposed by Erikson (1968), the adolescent's search for an identity clearly preoccupies much of his/her psychological life. On the present evidence, much of this investment of the self and search for self-identity is at the unconscious psychological level. This factor might be labelled *Self-Integrity.*

Factor 4 (5.7% of variance) was clearly an integrated (conscious) level factor of motivation with significant loadings on I-Self-Sentiment, I-Superego, I-School and I-Home respectively. The predominant flavor of this factor is identification at the conscious level of awareness with the family and parental authority, the need to achieve well at school, as well as conscientious and responsible attitudes consistent with parental and teachers recommendations. This factor might therefore be labelled *Respect for Authority* or perhaps simply *Conscientiousness.*

Factor 5 (5.4% of variance) loaded primarily on U- and I-Mating, clearly reflecting the adolescent's preoccupation with his/her emerging interest in the opposite sex, as well as a concomitant redefinition of the self as a sexual being. Dating and courtship behaviors are plainly important aspects of development during the adolescent years (e.g., "going steady") and in terms of Erikson's psychosocial theory, provide the groundwork for mature relationships and marriages in adulthood. This factor might be labelled *Sexual Interest.* It is clearly one of the two "instincts" which Freud discussed (Libido). The other was aggression (Thanatos) represented by the highly significant loading on I-Pugnacity for Factor 1 above. Clearly, given the present empirical findings of seven factors of motivational dynamics, it is evident that Freud's two-factor theory of motivation (sex and aggression) was unrealistic and simplistic.

Factor 6 (5.2% of variance) contrasted U-Pugnacity (one of Freud's two motivational factors) with U-Protectiveness, U- and I-Superego (the second of the "master sentiments"). This strongly bipolar factor suggests the incompatibility between the hostility and aggressiveness of the Pugnacity-Sadism dynamic trait (defined in the SMAT Handbook as "I want to smash people who have caused me trouble", and so exemplified in the criminal violence of industrialized societies), with the moral uprightness and non-rebelliouness of the adolescent with a keenly developed conscience. Clearly, family, school and religious institutions can play a critical role in promoting strong conscience development in the young person. This factor might therefore be labelled *Hostility versus Self-Control.*

Factor 7 (4.8% of variance) contrasted the security of the parental home with the fear associated with rejection of parents and rejection of their support. At the completion of high school education, students cometimes comment on the trepidation and uncertainty in their lives in the immediate future. Developing independence from one's parental environment is only achieved by degrees for most individuals. Evidently, this conflict is a central issue in the motivational characteristics of the adolescent. Accordingly, this factor might be labelled *Security.*

In order to assess the extent to which the derived factors were independent from each other, the matrix of factor pattern intercorrelations is presented in Table 2. As is evident, Factor 3 (U-Self-Sentiment) exhibited only trivial non-significant correlations with the remaining factors. Accordingly, while this factor was a specific one, it nevertheless appears to be a separate one. Even so, it would seem desirable to take out a six-factor solution so that the variance associated with this variable might be distributed among the other common factors. It may well have been the case that too much iteration was undertaken, given that U-Self-Sentiment exhibited a factor loading of 1.00, using the SMC's as initial communality estimates. When the six-factor solution was extracted

Table 2

Intercorrelations of Higher-Order Factors
(Seven-Factor Solution)

(Upper Matrix)

Factor	1	2	3	4	5	6	7
1							
2	-.13						
3	.11	-.04					
4	*-.38*	-.04	-.05				
5	.03	-.29	-.05	.13			
6	-.17	-.21	.03	*.32*	.21		
7	*-.36*	.24	-.04	.17	-.02	-.10	

Note. Correlations are reported to two decimal places only. Correlations ≥.30 are italicized.

(accounting for 53.3% of the variables within the ±.10 hyperplane band), the sixth factor emerged as a specific one, loading predominantly on U-Fear (.30). Under these circumstances, it was decided to reduce the number of extracted factors by one more, and to take out a five-factor solution (see Table 3). This solution required only 57 iterations of the unrotated factor matrix, suggesting therefore, that the resulting factor pattern solution was not affected by excessive iteration.

Table 3

Five-Factor Oblique Solution for SMAT Variables (Upper Matrix)

	Factor Number					
Variable	1	2	3	4	5	h^2
U-As	.22	-.04	.09	-.09	.21	.18
U-Ma	.23	-.16	-.01	*.53*	-.03	.35
U-Fr	*-.30*	-.03	.06	.10	-.11	.17
U-Na	.07	-.24	-.06	.03	-.01	.07
U-Pg	-.08	-.13	*.32*	.15	-.12	.21
U-Pr	-.01	.28	-.18	-.06	-.01	.14
U-Ss	.03	.01	.10	-.08	.04	.02
U-Se	.23	*.50*	-.13	-.23	-.02	.40
U-Sc	.06	*.51*	.08	.08	.10	.26
U-Ho	-.09	*.30*	-.16	.03	.09	.17
I-As	.18	.05	.23	-.07	.19	.16
I-Ma	*.57*	-.10	-.12	.18	.06	.36
I-Fr	.12	-.06	.02	-.24	.01	.10
I-Na	*.49*	.04	.07	.00	-.04	.23
I-Pg	*.55*	-.02	.27	-.21	-.14	.48
I-Pr	.01	.14	-.14	.02	.09	.06
I-Ss	*.37*	-.06	-.13	-.05	.26	.33
I-Se	.13	-.26	-.26	*-.40*	*.33*	.50
I-Sc	.11	-.01	.01	.01	*.45*	.24
I-Ho	-.13	.07	.00	.00	*.48*	.22
Hyperplane Count (±.10)	7	11	10	13	12	Total = 53%
Eigenvalue:	2.92	2.00	1.18	1.13	1.08	

Notes. Loadings shown to two decimal places only. Loadings ≥ .30 are italicized. Complete labels for all variables are provided in the SMAT Handbook.

Factor 1 (14.6% of variance) contrasted U-Fear with l-Mating/Pugnacity/Narcism/Self-Sentiment, clearly representing the first factor above. Factor 2 (10.0% of variance) loaded significantly on U-Superego/School/Home suggesting some degree of contiguity between these three sentiments at the unintegrated level. No corresponding factor emerged in the previous solution. Factor 3 (5.9% of variance) represented (U + I) Pugnacity, although the loading on I-Pugnacity was somewhat small (.27). Essentially, this factor might be regarded as a specific with only one significant loading. Factor 4 (5.7% of variance) contrasted U-Mating with I-Superego. No corresponding factor emerged from the seven-factor solution above. Factor 5 (5.4% of variance) exhibited significant loadings on I-Superego/School/Home and therefore relates to the fourth factor from the larger solution.

Examination of the factor pattern intercorrelations (Table 4) indicates that, in the main, the resulting factors were only trivially correlated among themselves. However, Factors 4 and 5 exhibited sizeable correlations (-.26 and .38 respectively) with Factor 1. Given that the final rotated solution gave a ±.10 hyperplane count of 53.0%, it was deemed inappropriate to reduce the number of factors extracted still further.

Table 4

Intercorrelations of Higher-Order Factors
(Five-Factor Solution)

(Upper Matrix)

Factor	1	2	3	4	5	6	7
1							
2	-.20						
3	.08	-.21					
4	-.27	-.16	-.05				
5	*.38*	.14	-.08	*-.38*			

Note. Correlations are reported to two decimal places only. Correlations ≥.30 are italicized.

STUDY 1 (Bottom Matrix):

Examination of the Scree plot for this analysis indicated that six factors should be extracted. However, as in the seven-factor solution above, Factor 3 in this instance emerged as a specific one with a strong loading in this instance only on I-Assertiveness (.99). Moreover, over 550 iterations of the unrotated factor matrix were required in order to achieve convergence of communality estimates. Accordingly, as in the analysis for the top matrix, a five-factor solution was settled on, thereby avoiding the occurrence in this instance at least of a specific factor in the final rotated solution. The ±.10 hyperplane count for the five-factor solution was 55.0% as compared with 60.8% for the six-factor solution. Given that the hyperplane count decreases with extraction of fewer factors, and since the decrease was only marginal in the present context, the five-factor solution was deemed appropriate (see Table 5).

Table 5

Five-Factor Oblique Solution for SMAT Variables (Lower Matrix)

Variable	Factor Number 1	2	3	4	5	h^2
U-As	.02	-.04	-.03	*.35*	-.07	.15
U-Ma	.09	*-.46*	.24	-.04	.01	.27
U-Fr	*-.40*	.01	.11	-.03	.09	.22
U-Na	.07	*-.31*	-.03	.03	-.04	.11
U-Pg	.17	-.04	.02	-.29	*.43*	.29
U-Pr	.15	.22	.11	.01	-.06	.09
U-Ss	*.37*	.02	.00	-.07	.08	.12
U-Se	.08	*.50*	.03	*.32*	-.12	.40
U-Sc	.09	*.43*	.08	.04	-.03	.21
U-Ho	.00	*.42*	.08	-.13	-.06	.22
I-As	-.05	.11	-.02	*.31*	.10	.10
I-Ma	.26	*-.39*	.21	.27	-.18	.39
I-Fr	-.02	-.06	*-.44*	.04	-.06	.22
I-Na	.03	-.14	-.05	*.44*	-.01	.24
I-Pg	.20	-.09	*-.30*	.25	.11	.24
I-Pr	.00	-.03	-.01	-.06	*-.35*	.11
I-Ss	*.43*	-.07	.04	.25	-.19	.39
I-Se	.26	.02	-.42	-.04	-.29	.41
I-Sc	.17	.17	.12	.07	-.25	.18
I-Ho	.03	.09	-.03	-.06	*-.45*	.22
Hyperplane Count (±.10)	11	10	12	11	11	Total = 55%
Eigenvalue:	2.60	2.02	1.36	1.22	1.16	

Notes. Loadings shown to two decimal places only. Loadings ≥ .30 are italicized. Complete labels for all variables are provided in the SMAT Handbook.

Factor 1 (13.0% of variance) contrasted U-Fear with (U + I) Self-Sentiment. No comparable factor emerged from the analyses of the top matrix in the SMAT Handbook. Clearly though, this dimension highlights the central role of the sentiment toward the self (Kline, 1979, referred to it as a "master sentiment"). Factor 2 (10.1% of variance) contrasted U-Superego/School/Home with (U + I) Mating and U-Narcism. This factor evidently incorporates Factor 2 from Table 3 and as well, suggests the incompatibility of self-gratification of instinctive urges (in the Freudian sense) and orientation toward home, family and society. Factor 3 (6.8% of variance) loaded significantly on I-Fear/Pugnacity/Superego. This dimension did not emerge from the previous analysis. Factor 4 (6.1% of variance)

exhibited significant loadings on (U + I) Assertiveness, U-Superego and I-Narcism. Again, this dimension did not emerge previously. Factor 5 (5.8% of variance) contrasted U-Pugnacity with I-Protectiveness and I-Home. As in the earlier SMAT analyses, the factors which emerged were generally negligibly correlated (see Table 6). The main correlation (.30) was between Factors 1 and 5, indicating a small amount of covariation.

Table 6

Intercorrelations of Higher-Order Factors (Five-Factor Solution)

(Lower Matrix)

Factor	1	2	3	4	5
1					
2	-.04				
3	-.05	.06			
4	.16	-.04	-.22		
5	*-.30*	-.11	.11	-.20	

Note. Correlations are reported to two decimal places only. Correlations ≥.30 are italicized.

STUDY 2:

In order to keep the number of subjects to number of variables ratio as high as possible, only the combined (U + I) SMAT total score correlations (including the variable Sex) served as the starting point for the present analysis. The Scree test suggested clearly that four factors should be extracted (raw scores had been converted to sten scores as per the SMAT Handbook — Boyle et al., 1988, had previously demonstrated the validity of these sten transformations for the Australian context). Altogether, 156 iterations were required to reach stability of communalities. The resultant factor pattern solution exhibited a ±.10 hyperplane count of 56.8%. The final rotated solution is presented in Table 7.

Table 7

Four-Factor Oblique Solution for SMAT Total Variables (Study 2)

Variable	Factor Number 1	2	3	4	h^2
Sex	-.07	-.02	-.27	*.61*	.44
T-As	.00	*1.00*	-.06	.00	1.00
T-Ma	-.06	-.23	*.92*	.14	.84
T-Fr	-.02	-.06	-.28	.10	.10
T-Na	.01	.04	.09	*.31*	.11
T-Pg	-.02	.13	.26	.11	.11
T-Pr	-.12	.04	-.07	*-.46*	.23
T-Ss	*-.30*	-.01	.00	*.31*	.21
T-Se	*.92*	-.02	-.03	.11	.83
T-Sc	*.96*	.00	-.05	.06	.90
T-Ho	*.95*	.02	.03	.01	.90
Hyperplane Count (±.10)	6	8	7	4	Total = 56.8%
Eigenvalue:	2.94	1.58	1.44	1.06	

Notes. Loadings shown to two decimal places only. Loadings ≥ .30 are italicized. Loadings are for Total (U + I) SMAT variables. Complete labels for all variables are provided in the SMAT Handbook.

Factor 1 (26.7% of variance) loaded very highly on the motivational dynamic traits labelled Superego, School and Home, with a considerably smaller loading on Self-Sentiment. Both of the previous analyses of data from the SMAT Handbook indicated a strong association of these three sentiments. Factor 2 (14.4% of variance) was a specific dimension involving Assertiveness. Neither of these first two factors exhibited any relationship with Sex. Both emerged in the analysis of the bottom matrix (Table 5), while the factor relating to Superego, School and Home emerged in both sets of analyses (Tables 3 and 5). Factor 3 (13.1% of variance) contrasted Mating and Pugnacity drives with Sex (femininity) and Fear. This dimension did not emerge from the factorings of the SMAT Handbook data, however. It is interesting that psychoanalytic theory gives predominance to sex and aggression as the two major instincts (drives). On the present results, it would seem that these two dynamic traits are more characteristic of males than females, in general, which supports the view sometimes expressed that Freudian theory is "male-oriented." Factor 4 (9.6% of variance) contrasted Sex (femininity), Narcism and Self-Sentiment with Protectiveness. Evidently, there are important differences between central dynamic traits for males and females. From these results, it would seem likely that the top matrix in the SMAT Handbook reported the intercorrelation data for the 1188 males (since

it resulted in a factor devoted solely to Pugnacity — Factor 3), and that the bottom data matrix was derived from the sample of 1241 females (since it resulted in a factor loading on both (U + I) Self-Sentiment). Again, the intercorrelations between the derived factors were only rather trivial (Table 8).

Table 8

Intercorrelations of Higher-Order Factors (Four-Factor Solution)

(Study 2)

Factor	1	2	3	4
1				
2	.03			
3	.07	.24		
4	-.13	-.05	.10	

Notes. Correlations are reported to two decimal places only. None of the correlations is ≥ .30, indicating that the four higher-order SMAT factors are essentially independent.

CONCLUSIONS

It is readily apparent that while there is some degree of similarity between the higher-order factor pattern solutions derived from the various analyses, there is also considerable variation in the factor solutions which have emerged. Part of the difficulty would seem to reside in the use of exploratory factor analytic methodology in the present instance, whereby any number of equally applicable factor solutions might emerge. On the other hand, the degree of discrepancy between the factor pattern solutions reported in Tables 1, 3, 5 and 7 above, as well as that obtained by Boyle et al. (1989a) might suggest that the SMAT is not a particularly robust instrument with respect to variations in samples, particularly at the cross-cultural level.

Nevertheless, comparison with the higher-order structures derived from the MAT (e.g., Boyle, 1983, 1985a) does suggest a number of similarities in central dynamic traits across the two instruments. Taking just the seven-factor solution in Table 1, for example, a number of similarities in obtained factors are evident. Thus, the first higher-order SMAT factor (labelled Self-Aggrandizement versus Self-Restraint) with its predominant emphasis on hostility, exhibited a somewhat similar pattern of salient loadings to those of the second higher-order MAT factor (labelled Caution versus Hostility) in the earlier studies. The integrated components of Narcism and Self-Sentiment contrasted with Pugnacity in each instance. SMAT Factor 3 (Self-Integrity) was partially represented in the seventh

higher-order MAT dimension (Self-Sensitivity) in Boyle's (1983) study. The remaining higher-order SMAT factors were partially represented in the earlier MAT studies, although tending to split into separate factors in those analyses. For example, U and I Mating (SMAT Factor 5) split into the fourth and fifth higher-order MAT factors respectively.

Comparison of the presently obtained factor pattern results with those reported by Boyle et al. (1989b) also suggests a number of similarities across studies. Considering only the SMAT factor solutions reported in Tables 3, 5 and 7, it is evident that Factor 2 (Tables 3 and 5), and Factor 1 (Table 7) correspond closely with Factor 1 in the Boyle et al. study. In all instances, there are salient loadings on the dynamic traits labelled Superego, Home and School. Factor 3 (Table 3) corresponds partially with Factor 4 in the study by Boyle et al., wherein both (U + I) components of Pugnacity are represented by salient loadings. Factor 1 (Table 5) involving (U + I) Self-Sentiment is partially represented by Factor 6 in the Boyle et al. study, and so on. While these similarities are recognized, it also remains evident however, that a greater degree of convergence of factor pattern solutions across studies and samples might have been expected, if the SMAT instrument is reliable.

Taken overall, it is clear that at the higher-order factor level, central dynamic traits as measured within the SMAT are essentially uncorrelated and independent dimensions. What is less certain is the exact nature of these central dynamic trait dimensions. Clearly, the present findings are prefatory and the specific interpretations of the SMAT higher-order factors emerging from the various analyses remain tentative. Nevertheless, this issue is an important one if objective motivation measurement is to be improved. Further studies of the higher-order factor structure of the SMAT instrument are now needed, based on large samples of males and females from various cultural and socioeconomic backgrounds. Only then will it be possible to refine the SMAT and to enable more precise and more straightforward measurement of central dynamic motivational traits.

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