



HHS Public Access

Author manuscript

Pers Individ Dif. Author manuscript; available in PMC 2015 June 30.

Published in final edited form as:

Pers Individ Dif. 1996 August ; 21(2): 283–285. doi:10.1016/0191-8869(96)00042-6.

Relationships between Cloninger's, Zuckerman's, and Eysenck's dimensions of personality

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INTRODUCTION

The personality systems of Cloninger (1987), Cloninger, Svrakic and Przybeck (1993), Eysenck (1967), and Zuckerman (1983, 1984, 1991) are all based on psychobiological models of personality. Cloninger and Zuckerman both focus on monoamine neurotransmitter systems as the bases for fundamental personality traits, although they differ on the relationships between particular monoamines and personality traits and in the relative specificity of the relationships (Zuckerman, 1995). All three theorists developed questionnaires to assess what they regard as the basic dimensions of personality or temperament. The precise relationships between the scales in the inventories is a matter of interest not only to know the comparability of the phenotypical representations or the traits, but also to compare the results of research being done with the various instruments.

Zuckerman, Kuhlman, Joireman, Teta and Kraft (1993) compared three structural models for personality, Costa and McCrae's (1992) big five, Eysenck's (1967) big three, and their own "alternative five". Extraversion and neuroticism factors were very highly related across all three systems. Zuckerman *et al.*'s Impulsive Sensation Seeking and Aggression-Hostility factors showed moderately high relationships with Conscientiousness and Agreeableness in Costa and McCrae's big five and with Eysenck's P dimension. Some dimensions such as Zuckerman *et al.*'s Activity and Costa and McCrae's Openness to Experience were unique to their particular system or subsumed as facets of major dimensions in other systems.

Cloninger (1987) started with a tridimensional model of temperament, which included dimensions of novelty seeking, harm avoidance and reward dependence, but later added a fourth factor of temperament, persistence, in the Temperament Personality Questionnaire (TPQ). More recently, he and his colleagues expanded the TPQ in the Temperament and Character Inventory (TCI, Cloninger, Przybeck, Svrakic & Wetzel, 1994) which adds three scales of "character" (self-directedness, cooperativeness, and self-transcendence) to the four temperament scales. The TCI manual (Cloninger *et al.*, 1994) describes correlations between TPQ and TCI scales and other personality scales as well as a wealth of clinical data and biological correlates of the new scales.

The purpose of the present study is to compare Cloninger's 7 factor model with Eysenck's 3 and Zuckerman's 5 factor models by correlating the scales developed to measure the traits.

Factor analysis will not be used in this study because many previous analyses have already been done across other systems (e.g., Avia, Sanz, Sánchez-Bernardos, Martínez-Arias, Silva & Grana, 1995; Costa & McCrae, 1995; Zuckerman *et al.*, 1993) and our primary concern is the direct equivalence of Cloninger's scales with Zuckerman's 5 and Eysenck's 3.

METHOD

Subjects

Subjects were 207 male and female students from a large section of personality psychology who took various personality tests as part of their self-study. The tests were taken over a 10 week period.

Questionnaires

Eysenck and Eysenck's (1985) Eysenck Personality Questionnaire-Revised (EPQ-R) was used. The EPQ-R contains four scales: Extraversion (E), Neuroticism (N), Psychoticism (P), and Lie (L). Zuckerman and Kuhlman's Personality Questionnaire (ZKPQ, Zuckerman *et al.*, 1993) contains five scales: Sociability (Sy), Neuroticism–Anxiety (N–Anx), Impulsive Sensation Seeking (ImpSS), Aggression–Hostility (Agg–Host), and Activity (Act). Cloninger's 125-item TCI (Cloninger *et al.*, 1994) has four temperament scales and three character scales: Novelty Seeking (NS), Harm Avoidance (HA), Reward Dependence (RD), Persistence (P), Self-Directedness (SD), Cooperativeness (C), and Self Transcendence (ST). Reliability and details of scale development for all of these test scales are described in the articles or manual for each of the questionnaires. Other more specific kinds of tests were given to the subjects but results from these will not be presented here, with a few exceptions, because of the focus on the relationships between the three personality models.

RESULTS

Table 1 shows the correlations between the TCI and the ZKPQ and EPQ-R scales. Only correlations at or below the 0.01 level are indicated as significant. Three of the scales in the TCI and ZKPQ correlate at or above 0.60, indicating near-equivalence: TCI NS and ZKPQ ImpSS ($r = 0.68$); TCI HA and ZKPQ N–Anx ($r = 0.66$); and TCI C and ZKPQ Agg–Host ($r = -0.60$). The TCI P scale shows a moderate correlation ($r = 0.46$) with only one ZKPQ scale. Activity Some of the other TCI scales have secondary correlations with ZKPQ scales but these are considerably lower than the convergent correlations already mentioned. TCI RD shows low negative correlations with ZKPQ ImpSS and Agg–Host. TCI SD correlated low to moderately with ZKPQ activity, N–Anx, and Agg–Host. TCI ST showed little correlation with ZKPQ scales.

In contrast to correlations between TCI and ZKPQ scales, among which some outstanding convergent one-to-one scale correlations were found, most of the TCI scale correlations were about the same for two of the three EPQ-R scales. For instance, TCI NS correlated with both P and E, TCI HA correlated with both E (negative r), and N, and TCI SD correlated negatively with both P and N. Only the negative correlation between TCI C and EPQ P shows some evidence of clear convergent validity (if we ignore the correlation with the Lie scale).

DISCUSSION

The high correlation between Zuckerman's impulsive sensation seeking scale and Cloninger's novelty seeking scale was not surprising given the similarity in content. The correlation of NS with ImpSS (0.68) was even higher than that found with the form V Sensation Seeking Scale Total score (0.55) in this study, perhaps because the new ImpSS scale includes impulsivity which is also a facet in NS. The finding of a high relationship between the two dimensions will be useful in interpreting research results using both methods. A vast amount of personality and psychobiological research has been done on sensation seeking (Zuckerman, 1979, 1994), but research with the TPQ and TCI have extended further in the area of psychopathology. Both novelty seeking and sensation seeking measures have shown strong relationships with antisocial behavior, antisocial personality, and substance abuse, but little or no relationship to neurotic or anxious personality disorders. Both scales correlate negatively with the enzyme monoamine oxidase (MAO) suggesting a common biological basis. Zuckerman and Cloninger have defined novelty or sensation seeking as a fundamental dimension of temperament, unlike the big five system where sensation seeking is regarded as a facet of extraversion and impulsivity as a facet of neuroticism. The important biological basis demonstrated for this trait and its high heritability (see Zuckerman, 1994) alone should qualify it as a major personality dimension.

Harm avoidance correlates more specifically with the ZKPQ neuroticism scale than with the EPQ N scale. Harm avoidance seems to define a dimension running from neurotic introversion to stable extraversion in Eysenck's dimensions, corresponding more closely to Gray's (1982) factor locus for an anxiety dimension.

Persistence correlated moderately and specifically with the ZKPQ Activity scale, reflecting the preference for hard or challenging work in the latter scale. However, Activity also includes a high energy level, and restlessness and difficulty in just relaxing and doing nothing. Cooperativeness shows a strong negative correlation with the ZKPQ Agg-Host scale and a moderate negative relationship with Eysenck's P scale.

The remaining TCI scales show only weaker and less specific relationships with ZKPQ and EPQ scales. Reward Dependence did correlate positively with Succorance ($r = 0.53$) and negatively with Autonomy ($r = -0.54$) in the Jackson (1974) Personality Research Form. RD seems to assess dependency, a trait not directly measured in the ZKPQ or EPQ. The strongest relationship with the EPQ is a negative one with P, perhaps reflecting the egocentricity of the high P scorer.

Self-Directiveness correlated negatively with anxiety, aggression-hostility and neuroticism scales in the other tests, reflecting the self-confidence and goal directness in this scale. Self-Transcendence was not related to the basic traits in either ZKPQ or EPQ. It probably would be related to Absorption in Tellegen's (Waller, Lilienfeld, Tellegen & Lykken, 1991) MPQ, Magical Ideation in Eckblad and Chapman's (1983) psychosis proneness scales, and possibly Openness to Experience in Costa and McCrae's (1992) big-five model. However, self-transcendence is not included in either Zuckerman's or Eysenck's models.

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Table 1
 Correlations between the Temperament and Character Inventory (TCI) Scales and the Zuckerman–Kuhlman Personality Questionnaire (ZKPQ) and Eysenck Personality Questionnaire—Revised (EPQ-R) Scales ($n = 207$)

	TCI Scales						
	Novelty Seeking	Harm Avoidance	Reward Dependence	Persistence	Cooperativeness	Self-Directiveness	Self-Transcendence
ZKPQ: Impulsive Sensation	0.68*	-0.39*	-0.20*	-0.15	-0.11	0.17	0.28*
ZKPQ: N-Anxiety	-0.12	0.66*	0.16	-0.11	-0.08	-0.49*	0.04
ZKPQ: Aggression–Hostility	0.13	0.05	-0.27*	-0.03	-0.60*	-0.32**	-0.18
ZKPQ: Activity	0.00	-0.29*	0.00	0.46*	0.12	0.36*	0.06
ZKPQ: Sociability	0.37*	-0.38*	0.31*	0.01	0.09	0.10	0.11
EPQ: Psychoticism	0.41*	-0.14	-0.45*	-0.29*	-0.42*	-0.31*	0.15
EPQ: Extraversion	0.44*	-0.53*	0.23*	0.17	0.10	0.18*	0.16
EPQ: Neuroticism	-0.14	0.59*	0.10	-0.06	-0.17	-0.45*	0.02
EPQ: Lie	-0.21*	-0.08	0.12	0.13	0.34*	0.25*	0.08