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THE TRIDIMENSIONAL PERSONALITY QUESTIONNAIRE: U.S. NORMATIVE DATA[1,2]

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Summary.—The Tridimensional Personality Questionnaire is a self-report personality inventory measuring three major personality dimensions: Novelty Seeking, Harm Avoidance, and Reward Dependence. Normative data, based on a U.S. national probability sample of 1,019 adults, are presented and the psychometric properties of the questionnaire are discussed.

The Tridimensional Personality Questionnaire is a 100-item, self-administered, paper-and-pencil, true/false instrument which takes about 15 minutes to complete (Cloninger, 1987b). The questionnaire measures the three higher-order personality dimensions (Table 1) as defined by Cloninger's (1986, 1987a) unified biosocial theory of personality. The personality dimensions are novelty seeking (NS), harm avoidance (HA), and reward dependence (RD), each of which is composed of four lower-order dimensions.

The majority of psychometric models of personality propose that individual differences occur along three to five dimensions (Eysenck, 1967; Gray, 1982; Cloninger, 1987a; Tellegen, 1985; McCrae & Costa, 1989); other models can be reduced to a similar number of dimensions (Digman, 1990). Most of these competing models can be reconciled in the specification of their first two dimensions; their major differences lie in the structure and content of additional variability. While two dimensions can be shown to be reliable, stable, and (sometimes) heritable, the other dimension or dimensions in each of the models and their measurement is subject to controversy (Digman, 1990).

Cloninger's (1986, 1987a) model integrates concepts of the neuroanatomical and neurophysiological underpinnings of behavioral tendencies, styles of learning, and the adaptive interaction of the three personality dimensions into a testable and comprehensive theoretical scheme (Liebowitz, 1988). The fundamental difference between Cloninger's model and other tridimensional personality models (e.g., Eysenck & Eysenck, 1985; Tellegen, 1985; Gray,

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[2]The Tridimensional Personality Questionnaire and detailed normative data are available for research use on request. See Footnote 1 for address.

TABLE 1
TRIDIMENSIONAL PERSONALITY QUESTIONNAIRE SCALES AND SUBSCALES

Novelty Seeking (NS)
NS1: exploratory excitability vs stoic rigidity (9 items)
NS2: impulsiveness vs reflection (8 items)
NS3: extravagance vs reserve (7 items)
NS4: disorderliness vs regimentation (10 items)
NS = NS1 + NS2 + NS3 + NS4 (34 items)
Harm Avoidance (HA)
HA1: anticipatory worry vs uninhibited optimism (10 items)
HA2: fear of uncertainty vs confidence (7 items)
HA3: shyness with strangers vs gregariousness (7 items)
HA4: fatigability and asthenia vs vigor (10 items)
HA = HA1 + HA2 + HA3 + HA4 (34 items)
Reward Dependence (RD)
RD1: sentimentality vs insensitiveness (5 items)
RD2: persistence vs irresoluteness (9 items)
RD3: attachment vs detachment (11 items)
RD4: dependence vs independence (5 items)
RD = RD1 + RD2 + RD3 + RD4 (30 items)

1982) is that the latter assume the observed phenotypic structure reflects the underlying biogenetic structure of personality. However, the genetic and phenotypic structures of personality differ because variations result from the interaction of environmental and genetic influences (Eaves & Eysenck, 1975; Cloninger, 1987a). Genetically regulated neurophysiological processes determine basic personality dimensions which direct tendencies to activate, maintain, or inhibit behavior and influence the acquisition of attitudes, opinions, and beliefs from the range in a given society. Preliminary support for the utility of Cloninger's model of personality has been provided by a study in which ratings of students on the three dimensions predicted social adjustment in adulthood (Sigvardsson, Bohman, & Cloninger, 1987).

Even though biogenetic factors influence how an individual adapts to experience, experience in turn modifies adaptive tendencies; hence, personality traits are not expected to be fixed regardless of prior experience or current situation. The Tridimensional Personality Questionnaire (Cloninger, 1987b) is intended to correspond more closely to the underlying genetic structure of personality than earlier models derived by factor analysis of self-reported behavior. Detailed discussion of the neuroanatomical and biochemical networks thought to underlie the dimensions and regulate emotional and learning processes is presented elsewhere (Cloninger, 1986, 1987a, 1988, 1991). Gray (1988) discusses in detail the differences between his model of personality and those of Eysenck and Cloninger.

Each scale was generated *a priori* to measure traits predicted by the pos-

tulated biosocial learning model; then the structural model was to be tested empirically by factor analysis and comparison with other tests. Modification of the questionnaire has been limited up to now to simplifying the reading level of the items and adding questions to increase reliability without changing the original concepts. Using an 80-item precursor to the present questionnaire, Cloninger (1987a) showed that scores on the three dimensions predicted scores on Tellegen's 11 Multidimensional Personality Questionnaire component scales as well as the Eysenck Personality Questionnaire, although the proportion of variance explained varied from scale to scale. For instance, Impulsiveness on the Tellegen questionnaire is predicted by high Novelty Seeking and low Harm Avoidance, while Traditionalism is predicted by low Novelty Seeking and high Reward Dependence. In broad terms the dimension of Novelty Seeking measures phenotypic features similar to those of Eysenck's Extraversion or Tellegen's Positive Emotionality, and Harm Avoidance assesses behavioral dispositions similar to Neuroticism or Negative Emotionality. More precisely, extraversion is determined largely by high novelty seeking and low harm avoidance, and neuroticism by high novelty seeking and high harm avoidance.

The Tridimensional Personality Questionnaire has been translated into several languages (e.g., Japanese, Italian, Swedish, Russian, Serbo-Croatian) and used in a variety of studies ranging from cross-cultural surveys (Svrakic, Przybeck, & Cloninger, 1991; Takeuchi, Yoshino, Kato, Ono, & Kitamura, 1990) to cardiac ischemia (Freedland, Carney, Krone, Smith, Rich, Eisenkramer, & Fisher, 1991). Nixon and Parsons (1989), using a sample of 225 college students, provided evidence for the construct validity of the questionnaire (Cronbach & Meehl, 1955). In this paper we present normative values based on a U.S. national probability sample and report on the psychometric properties of the Tridimensional Personality Questionnaire.

Method

The normative values for the Tridimensional Personality Questionnaire in the United States are based on a national area probability sample of 1,019 respondents who completed the instrument as part of a follow-up of the 1987 General Social Survey (GSS). The Survey is conducted by the National Opinion Research Corporation (NORC) on a nearly annual basis with funding by the National Science Foundation (Davis & Smith, 1988). The 1987 Survey was conducted in spring and had a response rate of approximately 75% with 1,466 subjects. That year's Survey also included a black oversample of 353 (with a response rate of 79%). For the follow-up in June and July, 1,106 subjects of the Survey (NORC reserved 350 subjects for their possible future use) and the entire black oversample were eligible. Because the original Survey sample had large differences in response rate across gender, a stratified random sampling technique was used, with men and women being

chosen with equal probability. The black oversample also had an over-representation of women, but because the entire oversample was eligible for reinterview, no sampling scheme could ameliorate this problem. In the follow-up, 1,267 respondents were interviewed giving a response rate of 87% (Gibson, 1989). Seventy percent of those eligible completed the Tridimensional Personality Questionnaire, with no differences in response rate across race strata. The sample comprised 326 white men (mean age 43.6 yr., standard deviation 16.4 yr., range 18—89), 350 white women (mean age 45.3 yr., standard deviation 17.8, range 18—88), 136 black men (mean age 43.6 yr., standard deviation 18.1, range 18—99), and 217 black women (mean age 43.2 yr., standard deviation 18.1, range 19—99). Because we have conducted our analyses within race and gender strata, the data presented are unweighted.

In addition to the Tridimensional Personality Questionnaire, respondents completed a 10-item short version (M-C 1) of the Marlowe-Crowne Social Desirability Scale (Strahan & Gerbasi, 1972) and the 13-item intelligence scale (Factor B) of the 16 PF (Cattell, 1973; Cattell & IPAT Staff, 1985), as well as providing essential demographic information including age and number of years of education.

First, scale means and their distributions were examined and correlations between scales were computed, as well as correlations between the scales and age, score on the 16 PF Factor B, years of education, and Social Desirability. Second, Cronbach's coefficient alpha, a measure of internal consistency, was calculated for each of the scales and subscales. It should be noted that preliminary analyses led to the deletion of two items from scoring; hence, 98 items are actually scored (Cloninger, 1987b). Third, based on the theoretical assumption of a tridimensional structure of personality, we performed a principal component analysis rotating the factors obliquely by PROMAX, constraining the solution to the three factors. However, as a study of a large cohort of Australian twins, which used a 54-item version of the questionnaire, offered evidence that Persistence (Subscale RD2) may constitute a separate heritable dimension (Heath, personal communication), and as a result of evaluating eigenvalues from our initial analyses, we also examined a four-factor solution. Version 6.03 of the SAS statistical software (SAS Institute, 1989) was used for all analyses.

Also, because NORC permitted us to recontact the 676 white respondents to our original survey, we were able to obtain 6-mo. retest data. In response to a mailing, 65.2% (441) of the 676 returned usable questionnaires. The retest sample had 199 men (61.0% of those eligible) and 242 women (69.1%).

Results

Scale and subscale score means are shown in Table 2. The means and

TABLE 2
TRIDIMENSIONAL PERSONALITY QUESTIONNAIRE: SCALE AND SUBSCALE MEANS, STANDARD DEVIATIONS, AND CRONBACH ALPHAS

	Men						Women					
	White, $n = 326$			Black, $n = 136$			White, $n = 350$			Black, $n = 207$		
	M	*SD*	α	*M*	*SD*	α	*M*	*SD*	α	*M*	*SD*	α
Novelty Seeking												
NS1	4.2	1.9	.53	4.0	1.9	.46	4.4	2.0	.54	4.0	1.7	.36
NS2	2.5[c]	1.8	.56	2.3	1.5	.38	2.2	1.7	.55	2.0	1.5	.44
NS3	3.1	1.8	.64	3.0	1.6	.47	3.2	1.7	.63	3.0	1.8	.63
NS4	3.8[bc]	2.0	.48	3.7[c]	2.1	.57	3.2	1.8	.47	3.0	1.8	.44
NS	13.7[c]	5.2	.75	13.0	4.6	.68	13.0	4.9	.73	12.0	4.7	.71
Harm Avoidance												
HA1	2.3	2.0	.67	2.5	1.7	.45	2.6	2.1	.65	2.8	2.1	.62
HA2	3.7[bc]	1.9	.65	4.2[b]	1.8	.61	4.7	1.7	.65	4.8	1.6	.52
HA3	2.5[b]	2.0	.75	2.2[b]	1.6	.51	3.0	2.1	.74	2.4	1.9	.67
HA4	2.1[c]	2.2	.75	2.7	2.3	.71	2.5	2.4	.74	3.1	2.5	.73
HA	10.6[bc]	6.0	.85	11.6	5.1	.77	12.9	6.1	.85	13.2	5.5	.80
Reward Dependence												
RD1	3.8[abc]	1.2	.45	4.2	1.0	.46	4.3	0.9	.39	4.3	0.9	.46
RD2	5.6	2.0	.58	5.2	1.7	.38	5.6	2.0	.57	5.4	1.7	.35
RD3	6.6[b]	2.4	.67	6.2[b]	2.1	.55	7.2[c]	2.2	.64	6.4	2.2	.59
RD4	2.6[abc]	1.3	.44	2.1[b]	1.2	.37	3.0[c]	1.2	.38	2.0	1.3	.42
RD	18.5[b]	4.3	.69	17.7[b]	3.9	.63	20.1[c]	3.8	.61	18.2	3.7	.55

[a]Different from black men, [b]Different from white women, [c]Different from black women; $p < .01$: Bonferoni correction made for multiple comparisons.

standard deviations for all scales and subscales show small variation with respect to race or sex. Gender differences tend to be greater than ethnic differences, with men tending to have higher Novelty Seeking scores, lower Harm Avoidance scores, and lower Reward Dependence scores than women.

Even with the small number of items in each scale, skewness and kurtosis were generally moderate, falling in the range of −1 to 1 for most of the scales. The only notable exception was the Subscale RD1 (Sentimentality), for which the distribution of scores was negatively skewed (−1.46 to −1.70) and kurtotic (1.83 to 3.23) for white women and in both black subsamples. The RD1 subscale is very short (5 items) and had very high endorsement rates for all items (over 75%).

Alpha coefficients (Table 2) were very consistent across all groups. Harm Avoidance had alphas ranging from .77 to .85. The subscales generally had alpha values of about .6 to .7; exceptions were HA1 (.45) and HA3 (.51) for black men and HA2 (.52) for black women. The Novelty Seeking scale had alphas from .68 to .75, but its subscales had a preponderance of alphas below .60, ranging from .36 to .62. The Reward Dependence (RD) scale scores had alphas for three of the four subgroups of .61 to .69; for black women alpha was .55. With the exception of the attachment subscale (RD3), al-

phas for the subscales were low; however, there was no sex or race bias apparent in the distribution of these coefficients. The weakness of the three RD subscales is at least in part attributable to the fact that two of the three subscales (Sentimentality and Dependence) have only five items each.

Pearson correlations between scores on these scales (Table 3) were, as expected, weak for all subsamples, although significant in the larger white subsamples. Among white men and women scores on Novelty Seeking had a slight negative relationship with those of Harm Avoidance and a slight positive relationship with Reward Dependence, while scores on Harm Avoidance and on Reward Dependence were slightly negatively related. Among the black samples correlations between the scales were close to zero.

TABLE 3

CORRELATIONS AMONG TRIDIMENSIONAL PERSONALITY QUESTIONNAIRE SCALES, SOCIAL DESIRABILITY, IQ, AND EDUCATION* (x 100)

Measure	1	2	3	4	5	6	7
			White Respondents (326 men above diagonal/350 women below)				
1. Novelty Seeking		-21[b]	-11[a]	-37[c]	6	12[a]	-38[c]
2. Harm Avoidance	-16[b]		-22[c]	-08	-04	-07	08
3. Reward Dependence	17[b]	-14[b]		03	-07	-08	-11
4. Social Desirability	-33[c]	-06	-07		-18[c]	-28[c]	26[c]
5. IQ	13[a]	-06	10	-36[c]		44[c]	-23[c]
6. Education	19[c]	-24[c]	21[c]	-31[c]	46[c]		-27[c]
7. Age	-38[c]	13[a]	-26[c]	35[c]	-27[c]	-34[c]	
			Black Respondents (136 men above diagonal/207 women below)				
1. Novelty Seeking		11	02	-46[c]	12	-10	-42[c]
2. Harm Avoidance	-01		-10	-16	-06	04	02
3. Reward Dependence	-01	-12		10	15	-02	-12
4. Social Desirability	-39[c]	-11	-09		-16	05	37[c]
5. IQ	06	-9	16[a]	-11		-02	-29[c]
6. Education	03	-21[b]	13	-14[a]	03		21[b]
7. Age	-36[c]	-01	-19[b]	26[c]	-06	-12	

*Decimals omitted. 1. Novelty Seeking, 2. Harm Avoidance, 3. Reward Dependence, 4. Social Desirability, 5. 16 PF Factor B, 6. years of education.
[a]$p < .05$. [b]$p < .01$. [c]$p < .001$.

Scores on the Novelty Seeking dimension were moderately correlated with those on Social Desirability (-.33 to -.46) and with age (-.36 to -.42), and weakly positively correlated with scores on the 16 PF Factor B (.06 to .13) in all four demographic groups. Novelty Seeking scores were positively correlated with years of education for both white men and women, but not for black respondents. The Harm Avoidance dimension was generally uncorrelated with these measures, the exception being a weak negative relationship with education among both female groups. Likewise, Reward Depen-

dence scores had significant correlations only among women, although these were small.

The consistent age effect in Novelty Seeking led to further analysis. Regression of Novelty Seeking on age was linear (second and third degree terms were inconsistent and added only marginally to models) and showed intercepts of about 16 to 19 with slopes of −.09 to −.12, indicating that total Novelty Seeking scores decline approximately 1 point per decade. Also, to elucidate the relationship of Novelty Seeking to Social Desirability and the demographic variables, stepwise multiple regression of Novelty Seeking on Social Desirability, age, IQ, and education was performed. In these models only age and Social Desirability were significant; for all groups it is clear that entering age into a regression reduces by about 50% the variance in Novelty Seeking explained by Social Desirability.

The standardized factor loadings following Promax rotation (Table 4) show that in the three-factor solution the Harm Avoidance factor is robust and the Novelty Seeking factor is fairly well replicated across groups. For the putative Reward Dependence factor, in all groups but black men, Sentimentality (RD1), Attachment (RD3), and Dependence (RD4) load consistently, while Persistence (RD2) has only very weak loading. In contrast, for black men RD1 does not fit in this factor, but RD2 does. Interfactor correlations were low, with none exceeding .19 in absolute value. For men the Novelty Seeking and Harm Avoidance factors had low negative correlations

TABLE 4
FACTOR LOADINGS OF TRIDIMENSIONAL PERSONALITY QUESTIONNAIRE SUBSCALES IN THREE-FACTOR SOLUTION (× 100)

	Men						Women					
	White, n = 326			Black, n = 136			White, n = 350			Black, n = 207		
Factor:	NS	HA	RD	NS	HA	RD	NS	HA	RD	NS	HA	RD
Novelty Seeking												
NS1	51	−35		70		35	43	−51		64		36
NS2	74			60	39		69			74		
NS3	72			19	32	40	62			59		
NS4	75			76			79			71		
Harm Avoidance												
HA1		75			75			72			74	
HA2		73		−37	59			75		−45	62	
HA3		69			66			76			73	
HA4		74			68			63			63	
Reward Dependence												
RD1			65	−63		12	−30		47	−33		50
RD2		−38	17			55			11			7
RD3			75			66			66			79
RD4			66			70			77			68

Note.—Unless theoretically salient, only loadings with absolute values >30 are shown.

(−.19 for white, −.15 for black respondents), and for white men the Novelty Seeking factor had a correlation of −.16 with the Reward Dependence factor. All other interfactor correlations were less than .10 in absolute value. The obliquely rotated three-factor solution accounted for between 48 and 53% of the total variance.

In the four-factor solution the Novelty Seeking and Harm Avoidance factors appear largely as they do in the three-factor solution. The Reward Dependence factor is, except for black men, broken into a factor consisting of RD1, RD3, and RD4 (RD134) and a factor dominated by RD2 (Persistence) which has a moderate to strong negative loading of HA4 (Fatigability) and a weaker contribution of NS1 (Exploratory Excitability). For black men the factor loadings appear somewhat more muddled; RD2 is clearly part of the third factor, while RD4 (Dependence) is the major component of the fourth factor. Interfactor correlations remained low, although for white men the Novelty Seeking-Reward Dependence correlation shifted to the Persistence factor (−.22) and for black men the Novelty Seeking-Reward Dependence correlation is reduced to −.002 and a low negative correlation (−.15) emerges between Harm Avoidance and the RD123 factor. In the four-factor model explained variance is increased across all groups by approximately 10% and ranges from 58.3 to 64.9%.

Finally, test-retest correlations were moderately high (Table 6), .70 for Reward Dependence, .76 for Novelty Seeking, and .79 for Harm Avoidance.

TABLE 5

FACTOR LOADINGS OF TRIDIMENSIONAL PERSONALITY QUESTIONNAIRE SUBSCALES IN FOUR-FACTOR SOLUTION (× 100)

	Men								Women							
	White, n = 326				Black, n = 136				White, n = 350				Black, n = 207			
Factor:	NS	HA	RD	P	NS	HA	RD	P	NS	HA	RD	P	NS	HA	RD	P
Novelty Seeking																
NS1	54			31	70	−30			40			42	63			36
NS2	74				60	37			69				75			
NS3	74				13	30		52	62				56			
NS4	74				80				79				73			
Harm Avoidance																
HA1		82				75				81				75		
HA2		73			−38	59				72			−45	67		
HA3		76				66				81				73		
HA4		44		−59		69				33		−59		57		−31
Reward Dependence																
RD1			71		−42		57	−36			52		−37		48	
RD2				86			52	16				82				
RD3			78				78				69				78	92
RD4		34	58	28				80			74				72	

Note.—Unless theoretically salient, only loadings with absolute values >30 are shown. P: Persistence.

Because gender differences were negligible, the test-retest correlations are presented for both genders together. Initial scale values were not different between those who responded to the retest request and those who did not; however, the score for Reward Dependence declined significantly (19.4 vs 18.8; $t = -3.68$, $p < .0003$) at retest. The decline in the Reward Dependence score was largely accounted for by men, although a similar but nonsignificant trend was seen for women.

TABLE 6
SIX-MONTH TEST-RETEST CORRELATIONS FOR TRIDIMENSIONAL PERSONALITY QUESTIONNAIRE ($N = 441$)

Novelty Seeking	r_{tt}	Harm Avoidance	r_{tt}	Reward Dependence	r_{tt}
NS1	.68	HA1	.68	RD1	.59
NS2	.57	HA2	.69	RD2	.61
NS3	.70	HA3	.75	RD3	.69
NS4	.62	HA4	.59	RD4	.51
NS	.76	HA	.79	RD	.70

Note.—$p < .0001$ for all correlations.

DISCUSSION

The scores on the Tridimensional Personality Questionnaire scales and subscales are approximately normally distributed and the scales have low correlations with each other. Differences among the four demographic groups are not pronounced. To some extent, the low to moderate alphas in the subscales can be attributed to the small number of items in each scale.

The correlations between the scales, Social Desirability, age, education, and IQ show that questionnaire scores are only slightly influenced by sociodemographic factors. It is not surprising that Social Desirability is associated with low Novelty Seeking scores, which describes individuals who are reflective, stoic, frugal, and orderly. Further, the relationship between Novelty Seeking and age is a postulated feature of the biosocial theory of personality resulting from decreasing interest in accessible stimuli with increasing familiarity and maturation (Cloninger, 1986).

It is clear that the Reward Dependence scale is less consistent than Novelty Seeking or Harm Avoidance. There are several reasons for this. First, Reward Dependence has fewer items than either of the other two scales (30 vs 34 for the other two). The two subscales with the lowest alphas (Sentimentality and Dependence) have only five items. The Sentimentality (5 items), the Attachment (11 items), and the Persistence (9 items) subscales probably have response characteristics which do not differentiate among respondents finely enough. For example, between 75 and 88% of the items in the Sentimentality subscale were endorsed positively. Additionally, compared to Novelty Seeking and Harm Avoidance, the variances for all the Reward Dependence subscales, and the scale, tend to be smaller.

It is obvious that before theoretical (i.e., construct) validity of the Reward Dependence dimension can be confirmed, this section of the questionnaire requires some refinement. While there is some empirical evidence for a four-dimensional structure in the Tridimensional Personality Questionnaire, in a sample of Yugoslavian university students, we were not able to isolate Persistence as a fourth factor, even though it had only a low loading on the Reward Dependence factor (Svrakic, *et al.*, 1991). Hence, it is not clear whether Persistence represents a stable fourth factor or whether the scale is measuring features which should be separated from Reward Dependence and integrated into Novelty Seeking and Harm Avoidance.

One of the advantages of treating ethnic and gender groups separately is that they form replicate samples; we had little expectation of important differences between the groups, and this was to a large extent borne out in our analyses. The small gender differences were in the direction expected. The sample of black men yielded results, especially in the factor analyses, which set this sample apart from the other groups; we view this to be partly the result of the small number of the black men (136) and potentially the result of measurement problems in Reward Dependence rather than meaningful intergroup differences. This notwithstanding, the over-all consistency of results across the groups and the good test-retest performance of the questionnaire show it to be acceptably reliable.

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