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Revised Dimensions of Temperament Survey (DOTS-R): Simultaneous Group Confirmatory Factor Analysis for Adolescent Gender Groups

Michael Windle
Research Institute on Alcoholism
Buffalo, New York

Confirmatory factor analyses supported the plausibility of a 10-factor model of the Revised Dimensions of Temperament Survey (DOTS-R; Windle & Lerner, 1986) with a sample of 975 teenagers. Simultaneous group models across gender indicated an invariant pattern for factor loadings and factor intercorrelations. Internal consistency estimates and test-retest stability were moderately high for the 10 temperament attributes, and consensual validity was indicated by convergent/discriminant correlations between adolescent and primary caregiver agreement indexes. A second-order factor analysis revealed 3 factors: Adaptability/Positive Affect, Attentional Focus, and General Rhythmicity. In terms of levels of temperament, girls reported more adaptability/positive affect, whereas boys reported more attentional focus and general rhythmicity.

The principal purpose of this study was to investigate the dimensional structure and psychometric characteristics (e.g., internal consistency, test-retest stability) of the Revised Dimensions of Temperament Survey (DOTS-R; Windle & Lerner, 1986) with samples of midadolescent boys and girls (mean age = 15.5 years). Adolescence is often described as a phase in the life span involving confrontation with numerous challenges, psychosocial tasks, and novel events (e.g., Erikson, 1963; Havighurst, 1948/1972). The results of a study by Newcomb, Huba, and Bentler (1981) indicated that middle adolescence was a peak period for the occurrence of stressful life events (also see Compas, 1987). Because high levels of stressful life events and novel demands characterize adolescence, it is important to identify individual difference attributes (e.g., temperament, coping styles) that may potentiate salubrious outcomes and attenuate or ameliorate nonsalubrious outcomes. Research reviewed by Garmezy and Rutter (1983) has suggested that temperament is one of three major variables associated with healthy, adaptive functioning among children growing up under adverse circumstances (e.g., low socioeconomic status, parental alcoholism). Furthermore, the other two significant predictors of healthy, adaptive functioning were family support and external (community) support, both of which have been posed as influenced by temperament (e.g., Rutter, 1983; Werner, 1986).

The temperament measure used in this study, the DOTS-R (Windle & Lerner, 1986), and its predecessor, the DOTS (Lerner, Palermo, Spiro, & Nesselroade, 1982), were developed for assessing age-continuous features of temperament identified by Thomas and Chess (1977; Chess & Thomas, 1984) in their ongoing and highly influential New York Longitudinal Study. According to this conceptualization, *temperament* refers to stylistic features of behavior with an emphasis on how people behave rather than on how well they perform on tasks (i.e., ability levels) or on the underlying motivational dynamics regarding why people do what they do. For example, the temperament dimension *approach-withdrawal* refers to initial response tendencies to approach or withdraw when encountering new persons or novel situations, and *sleep rhythmicity* refers to the regularity of the daily sleep-wake cycle. The behavioral responses associated with temperament attributes are presumed to be manifested by virtually all people, but we propose that individual differences in the systematic expression of these attributes are significant with regard to interpersonal interactions with significant others (e.g., parents, peers, teachers) and in response to the demands of daily living.

Several studies on the scale construction, psychometric properties, interinventory relations, and concurrent validity of the DOTS-R have been conducted (Windle, 1989a, 1989b, 1991; Windle et al., 1986; Windle & Lerner, 1986). Concurrent validity studies have shown that the DOTS-R attributes are significantly associated with a range of mental health and perceived competence measures. For instance, Carson, Council, and Volk (1989) reported that an approach behavioral style, positive mood quality, flexibility, and a higher activity level were significantly predictive of positive psychological adjustment among women who had been incest victims. The findings of Windle et al. (1986) indicated significant associations between DOTS-R attributes and measures of perceived social and cognitive competence among subjects in early and late adolescence. Matheny (1989) reported significant associations between DOTS-R attributes and Wechsler Intelligence Scale for Children (WISC) measures of verbal and performance intelligence. Results of Windle's (1992) path-analytic study also indicated both direct effects and indirect effects of temperament (through family and friends' social support) on adolescents' depressive symptoms and delinquent activity.

Several issues that have not been investigated in prior studies

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Correspondence concerning this article should be addressed to Michael Windle, Research Institute on Alcoholism, 1021 Main Street, Buffalo, New York 14203.

with the DOTS–R were examined in this study. First, the sample consisted of subjects in middle rather than early or late adolescence; although *major* differences in the factor structure of the DOTS–R across these adolescent age groups were not expected, this study provided an opportunity to examine the possibility of their occurrence. Second, prior factor-analytic research on the DOTS–R had been exploratory or, because of small sample size, limited to single-attribute confirmatory factor analyses. The sample size used in this study was sufficiently large to specify confirmatory factor-analytic models for the full 54 × 54 interitem covariance matrix of the DOTS–R and to have reasonable confidence in the resulting parameter estimates, standard errors, and goodness-of-fit statistics. Third, possible gender differences in factor loadings or the factor intercorrelations of the DOTS–R had not been systematically examined. The simultaneous group confirmatory factor-analytic model was used to test a nested sequence of hypotheses regarding invariant (equivalent) relations across boys and girls on the DOTS–R (e.g., Alwin & Jackson, 1981; Jöreskog, 1971; Rock, Werts, & Flaugher, 1978).

Previous studies of gender differences in temperament have suggested that boys manifest higher activity levels, whereas girls are more approach oriented, or sociable (e.g., A. H. Buss, 1988; Maccoby & Jacklin, 1974). However, these conclusions about gender differences in temperament have often been based on studies of infants and children, and the results of Prior, Sanson, and Oberklaid (1989) suggest possible age effects on gender differences in temperament. I also conducted statistical tests for gender differences in mean levels of temperament for subjects in middle adolescence.

Method

Subjects

The sample consisted of 975 high school sophomores (53%) and juniors (47%) recruited from three homogeneous suburban high schools in western New York. Of the sample, 53% (n = 517) were female and 47% (n = 458) were male. The average age of the respondents was 15.54 years (SD = 0.66), and 98% were White. Seventy percent of the sample were Catholic, 18% Protestant, and 12% of other religions. Ninety-six percent of the fathers and 43% of the mothers were employed full time outside the home (an additional 37% of mothers were employed part time outside the home). Fathers had completed an average of 13.79 years of education (SD = 2.39), and mothers had completed an average of 13.55 years (SD = 2.01). The average number of children per family was 3. The mean annual family income was over $30,000, the median was approximately $40,000, and only 3% of the sample reported a family annual income of less than $12,000. Of the adolescents' primary caregivers, 88% were married at the time of the study, 12% were divorced, and 1% were widowed. Approximately 71% of high school students eligible for the study participated (see *Procedure* section).

Measure: Revised Dimensions of Temperament Survey (DOTS–R)

The DOTS–R (Windle & Lerner, 1986) is a 54-item, factor-analytically developed self-report instrument for measuring 10 temperament attributes: (a) activity level—general (α = .84; high scorers are characterized by high levels of energy, vigor, and overt motor activity); (b) activity level—sleep (α = .89; high scorers are characterized by high levels of motor activity during sleep—e.g., tossing and turning); (c) approach–withdrawal (α = .85; high scorers tend to approach, or move toward, new persons, objects, situations, or events); (d) flexibility–rigidity (α = .78; high scorers tend to respond flexibly to changes in the environment); (e) mood quality (α = .89; high scorers are characterized by high levels of positive affect—e.g., smiling, being cheerful); (f) rhythmicity—sleep (α = .78; high scorers are characterized by timing of the daily sleep–wake cycle to be highly regular—i.e., varying little from day to day); (g) rhythmicity—eating (α = .80; high scorers are characterized by regularity of eating habits pertinent to appetite and quantity consumed); (h) rhythmicity–daily habits (α = .62; high scorers are characterized by regularity of timing of diurnal activities such as toileting, peak period of feeling full of energy, and taking a rest or a break in daily activities); (i) distractibility (α = .81; high scorers tend to be able to concentrate and maintain perceptual focus despite extraneous stimuli); and (j) persistence (α = .74; high scorers tend to stay with, or continue steadily in, an activity for a relatively long period of time). Test–retest correlations for a sample of 179 late-adolescent subjects with an interval of 6 weeks between occasions of measurement were .75, .74, .69, .64, .63, .71, .72, .62, .64, and .59, respectively (Windle & Lerner, 1986).

Scoring the DOTS–R corresponds to the subject's ratings of all items along the continuum *usually false* (1), *more false than true* (2), *more true than false* (3), and *usually true* (4). In order to limit the influence of some response set tendencies, 15 randomly dispersed items were reversed in terms of directionality of scoring. On the basis of the number of items per attribute on the DOTS–R, the ranges of scores for each dimension were 7–28 for activity level—general, 4–16 for activity level—sleep, 7–28 for approach–withdrawal, 5–20 for flexibility–rigidity, 7–28 for mood quality, 6–24 for rhythmicity—sleep, 5–20 for rhythmicity—eating, 5–20 for rhythmicity—daily habits, 5–20 for low distractibility, and 3–12 for persistence.

Procedure

After receiving approval from school administrators to conduct the study, I was provided with a mailing list of the addresses of sophomores and juniors. A packet of materials, including a letter of introduction by the school principal, a description of the study, an informed consent form, and self-addressed stamped envelopes, was mailed to students and their parents. Students willing to participate in the study were requested, along with one parent, to sign the informed consent form and send it to me in the return envelope. Teachers also made announcements about the study in homeroom classes. Adolescents completed survey materials in large groups in the high school setting. The survey took about 45–50 min to complete, and subjects received $10.00 for their participation. A make-up date for testing was arranged for participants who were absent or unable to participate on the regularly scheduled day of testing.

At one of the three participating high schools, 88% (275) of the primary caregivers of participating adolescents agreed to complete survey materials that included parents' ratings of the adolescents' temperament. Survey forms were mailed to primary caregivers (in most instances, mothers) and, upon completion, were returned to me in self-addressed, stamped envelopes. At the same high school, 95% (295) of the adolescents who participated in the first measurement session were reassessed 6 months later. One of the measures administered in the second measurement session was the DOTS–R, and this assessment enabled the calculation of test–retest correlations.

Results

Preliminary Analyses

The multivariate test statistic Box's M indicated that the variance/covariance matrices of boys and girls were not equal,

$\chi^2(1485, N = 975) = 1{,}844.25$, $p < .001$. Subsequent univariate homogeneity comparisons with Cochran's statistic indicated statistically significant differences ($p < .05$) for 5 of the 54 items of the DOTS–R. Of these five items, three were manifest indicators of mood quality, and in each instance, variability was greater for girls than for boys. Thus although the multivariate test statistic was statistically significant (contraindicating pooling across gender), the univariate homogeneity comparisons did not suggest dramatic gender group differences in the variance of individual items within the context of the full 54-item DOTS–R.

Confirmatory Factor Analytic Models

Single (independent) group confirmatory factor-analytic models were specified separately for boys and girls. The model specification included (a) the freeing of a parameter corresponding to each item's loading on its referent factor and the fixing of numerical values to zero for parameters corresponding to each item's loading on nonreferent factors; (b) fixing the scale metric of the 10 factors by assigning numerical values of 1 to the diagonal elements of the factor intercorrelation matrix; (c) freely estimating off-diagonal parameters in the factor intercorrelation matrix; and (d) freely estimating the diagonal elements of residual matrix and fixing the off-diagonals elements to zero. In total, 153 parameters were estimated for each model (54 factor loadings, 45 factor intercorrelations, and 54 residuals).

Simultaneous group models (e.g., Alwin & Jackson, 1981; Jöreskog, 1971; Rock et al., 1978) were specified by imposing equality constraints on parameters across gender groups. The first simultaneous group model specified included constraining factor loadings to equivalence across groups. The second simultaneous group model constrained both factor loadings and factor intercorrelations to equivalence across gender groups. Because of assumptions that were less restrictive (e.g., multivariate normality not assumed) than those posed by other estimators (e.g., maximum likelihood), generalized least squares estimates from normal theory were used with these models as implemented by the EQS program (Bentler, 1989).

The goodness-of-fit statistics for the independent and simultaneous group models are summarized in Table 1. The chi-square likelihood ratio test statistic was significant ($p < .001$) for all models specified, but as has been repeatedly noted, this test statistic is highly sensitive to sample size and to minor departures from multivariate normality (e.g., Bentler & Bonett, 1980; James, Mulaik, & Brett, 1982). Numerous alternative goodness-of-fit indexes have been proposed, and common practice is to search for consistency across multiple fit indexes (e.g., Mulaik et al., 1989). For all models specified, the normed-fit index (NFI), the comparative-fit index (CFI), and an examination of the matrix of standardized residuals converged in supporting the plausibility of the specified models. Two chi-square difference tests were evaluated. First, the chi-square value and the degrees of freedom for the simultaneous group model with factor loadings constrained to equivalence were compared with the chi-square value and the degrees of freedom for the sum of the independent group models. The simultaneous group model was not rejected statistically, $\chi^2(54, N = 975) = 66.17$, $p = .11$; thus the invariance of factor loadings across boys and girls was supported. The chi-square difference test was also conducted for invariant factor intercorrelations by comparing differences in fit for the simultaneous group–factor loading equivalent model with those for the simultaneous group–factor loading and factor intercorrelation equivalent model. The simultaneous group–factor loading and factor intercorrelation equivalent model was not rejected statistically, $\chi^2(45, N = 975) = 50.57$, $p = .26$; thus the invariance of factor loadings and factor intercorrelations across groups was supported.

All parameter estimates corresponding to factor loadings were statistically significant ($p < .001$). Parameters (and their significance levels) corresponding to factor intercorrelations of the simultaneous group solution are presented in Table 2. The average absolute value for the factor intercorrelations is .22, which is suggestive of overall low to moderate interfactor correlations. However, a closer inspection reveals relatively high interrelations for three sets of attributes. In a second-order confirmatory factor-analytic model, Flexibility–Rigidity, Approach–Withdrawal, and Mood Quality were indicators of Adaptability/Positive Affect, the three first-order rhythmicity factors were indicators of General Rhythmicity, and Low Distractibility and Persistence were indicators of Attentional Focus (with equality constraints imposed on the factor loadings

Table 1
Goodness-of-Fit Information for Independent and Simultaneous Group Models of Temperament for Male and Female Adolescents

Model specification	χ^2	*df*	Ratio χ^2/df	Normed fit index	Comparative fit index
Male subjects (independent group)	2,104.96	1,332	1.58	.97	.99
Female subjects (independent group)	1,967.86	1,332	1.48	.97	.99
Sum (independent male and female groups)	4,072.82	2,664	1.53	—	—
Simultaneous (factor loadings equivalent)	4,138.99	2,718	1.52	.97	.99
Simultaneous (factor loadings and factor intercorrelations equivalent)	4,189.56	2,763	1.52	.97	.99

Table 2
Factor Intercorrelation Matrix for Simultaneous Group Model With Factor Loadings and Intercorrelations Constrained to Equivalence

Temperament factor	1	2	3	4	5	6	7	8	9
1. Activity level—general	—								
2. Activity level—sleep	.22***	—							
3. Approach–withdrawal	.11*	.04	—						
4. Flexibility–rigidity	−.12*	.09	.71***	—					
5. Mood quality	.07	−.05	.42***	.30***	—				
6. Rhythmicity—sleep	−.16**	−.17***	.06	.05	.04	—			
7. Rhythmicity—eating	−.08	−.11*	.10	.03	.08	.59***	—		
8. Rhythmicity—daily habits	.03	−.06	.29***	.14*	.25***	.67***	.73***	—	
9. Low distractibility	−.22***	.11*	.18***	.18**	.08	.25***	.18***	.32***	—
10. Persistence	−.13*	−.09	.33***	.27***	.13**	.25***	.13**	.31***	.86***

* $p < .05$. ** $p < .01$. *** $p < .001$.

for Attentional Focus). The factor intercorrelations reported in Table 2 were used as the sample matrix of correlations. The fit of the higher order model supported the plausibility of the representation, $\chi^2(18, N = 975) = 249.84$, $p < .001$, NFI = .99, CFI = .99. The resulting parameter estimates for the second-order model are provided in Figure 1.

Reliability and Interrater Agreement

Internal consistency estimates, test–retest coefficients (with a 6-month interval between measurement sessions), and interrater agreement indexes (between adolescents and primary caregivers) are provided in Table 3. The internal consistency estimates at both occasions of measurement were similar to those reported in other studies (e.g., Windle, Iwawaki, & Lerner, 1987; Windle & Lerner, 1986) and indicate acceptable levels of reliability for research purposes. The test–retest coefficients for the 10 temperament attributes and the second-order factors indicate moderate levels of stability of individual differences across the 6-month interval. The convergent correlations, reflecting interrater agreement between adolescents and their primary caregivers, are statistically significant ($p < .01$) but of low to moderate magnitude. The size of the convergent correlations in relation to the discriminant correlations further supports the consensual validation of the temperament dimensions (e.g., McCrae, 1982).

Gender Differences in Mean Levels

The multivariate analysis of variance statistical model was used to evaluate differences in mean levels between boys and

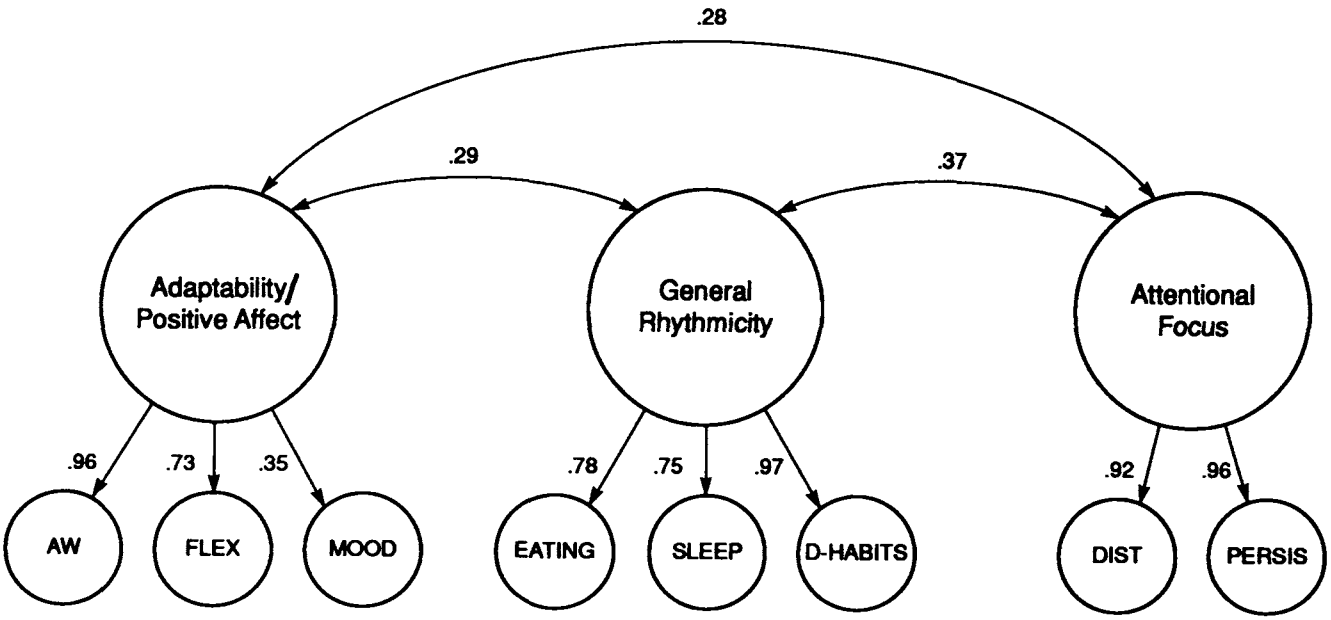

Figure 1. Standardized parameter estimates (GLS) for second-order factor analysis of DOTS-R. (All parameter estimates displayed are statistically significant, $p < .001$. AW = approach–withdrawal; FLEX = flexibility–rigidity; MOOD = mood quality; EATING = rhythmicity–eating; SLEEP = rhythmicity–sleep; D-HABITS = rhythmicity–daily habits; DIST = low distractibility; PERSIS = persistence.)

Table 3
Internal Consistency Estimates, Stability Coefficients, and Convergent/Discriminant Interrater Agreement for Temperament Attributes

Temperament attributes	Cronbach's alphas		Test–retest coefficients	Interrater agreement	
	Time 1 (n = 975)	Time 2 (n = 295)	(n = 295)	Convergent correlations (n = 275)	Discriminant correlations (n = 275)
First-order factors					
Activity level—general	.83	.89	.64***	.38***	.11
Activity level—sleep	.86	.89	.56***	.22***	.08
Approach–withdrawal	.73	.77	.58***	.21***	.05
Flexibility–rigidity	.68	.73	.62***	.25***	.09
Mood quality	.91	.91	.60***	.25***	.08
Rhythmicity—sleep	.67	.70	.55***	.31***	.07
Rhythmicity—eating	.77	.81	.59***	.21***	.10
Rhythmicity—daily habits	.53	.62	.52***	.17**	.09
Low distractibility	.79	.81	.55***	.29***	.10
Persistence	.73	.75	.61***	.30***	.13
Second-order factors					
Adaptability/Positive Affect	.85	.86	.65***	.19**	.02
General Rhythmicity	.81	.82	.66***	.25***	.05
Attentional Focus	.84	.86	.63***	.32***	.15*

Note. Convergent correlations correspond to interrater correlations for the same (like) attribute; discriminant correlations correspond to the average level of agreement between parents' scores for a given attribute (e.g., mood quality) and the nine scores for the different (nonlike) attributes. The discriminant correlations thus correspond to the average correlations of the nine nonlike attributes.
* $p < .05$. ** $p < .01$. *** $p < .001$.

girls. The multivariate test statistics (i.e., Pillais, Hotelling, and Wilks) indicated that the gender groups differed significantly, $F(10, 935) = 8.38$, $p < .001$. Means, standard deviations, and univariate F test statistics for the gender groups are presented in Table 4, along with the effect sizes. Boys reported higher levels of rhythmicity, or regularity of eating and sleeping habits, as well as higher levels of persistence and lower levels of distractibility. Girls reported higher levels of approach behavior, or sociability, and higher levels of positive mood quality.

Discussion

The findings of the confirmatory factor analyses supported the plausibility of a 10-factor representation of the 54-item DOTS–R measure for samples of midadolescent boys and girls. Furthermore, the simultaneous group models indicated that factor loadings and factor intercorrelations were invariant across the two gender groups. These findings are substantively significant in that they confirm a factor structure of the DOTS–R for this age group that is consistent with ones obtained for other age groups (e.g., Windle, 1989b; Windle et al., 1987); thus they establish conditions that may facilitate longitudinal studies of temperament with regard to salient developmental issues such as stability and change or continuity and discontinuity. A second-order factor analysis of eight of the first-order factors supported the plausibility of three higher order dimensions: Adaptability/Positive Affect, General Rhythmicity, and Attentional Focus. These higher order factors are consistent with dimensions frequently identified in the literature on infancy and childhood temperament (e.g., Kohnstamm, Bates, & Rothbart, 1989), and future research with the DOTS–R will benefit from a comparison of the usefulness of these broader band factors with that of the first-order, narrower band factors.

Establishment of the plausibility of the 10-factor representation of the DOTS–R through confirmatory factor analysis was supplemented by findings regarding reasonably high levels of internal consistency and moderate levels of test–retest stability. The adolescent–parent interrater agreement ratings were consistent with prior research on parent–child agreement (e.g., Kazdin, French, Unis, & Esveldt-Dawson, 1983; Lyon & Plomin, 1981) but were not high in an absolute sense. The interrater agreement issue has been especially thorny in temperament research because much of this research has relied on maternal reports of infants' and children's behavior, and concerns have been expressed over possible maternal bias as a result of, for example, maternal depression (e.g., Bates, 1980; Hagekull, Lindhagen, & Bohlin, 1980). The self-report form of the DOTS–R used in my study enabled adolescents to rate themselves with regard to temperament and enabled me to compare those ratings with the primary caregivers' ratings of adolescent temperament. Nevertheless, the magnitude of the convergent correlations was limited. Limited convergent validity between different raters and between different methods of measurement characterizes not only temperament research (e.g., Rothbart & Goldsmith, 1985) but also many other areas of psychological study (e.g., Achenbach, McConaughy, & Howell, 1987; Kazdin et al., 1983). Conceptualizations and methodological approaches beyond the standard multitrait–multimethod approach, preferably theoretically driven, are required in order to more fully address issues associated with convergent and discriminant sources of variability for raters or methods of mea-

Table 4
Gender Differences in Mean Levels for Temperament Attributes

Temperament attributes	Male subjects (n = 458)		Female subjects (n = 517)			Effect size
	M	*SD*	*M*	*SD*	*F*	
First-order factors						
Activity level—general	19.65	4.49	19.23	4.60	2.01	—
Activity level—sleep	11.05	3.43	10.89	3.68	0.49	—
Approach–withdrawal	19.54	3.49	20.11	3.54	6.37*	.16
Flexibility–rigidity	14.79	2.75	14.86	2.72	0.16	—
Mood quality	23.31	4.43	24.42	4.03	16.34**	.26
Rhythmicity—sleep	15.20	3.63	14.44	3.66	10.20**	.21
Rhythmicity—eating	13.97	3.52	12.94	3.71	19.02**	.28
Rhythmicity—daily habits	12.47	2.72	12.10	2.73	4.35*	.14
Low distractibility	11.93	2.99	11.10	3.10	17.42**	.27
Persistence	8.30	1.99	7.85	2.03	12.05**	.22
Second-order factors						
Adaptability/Positive Affect	57.64	7.67	59.39	7.98	13.65**	.22
General Rhythmicity	41.64	7.67	39.48	7.97	19.18**	.27
Attentional Focus	20.23	4.49	18.95	4.65	18.20**	.28

Note. Effect size is derived by subtracting mean scores for male and female subjects and dividing by the average of the standard deviations (Cohen, 1988). Differences in effect sizes are, therefore, in standard normal deviate units.
* $p < .05$. ** $p < .001$.

surement that may be influenced by person, measurement, and occasion variables and their interactions (e.g., temperament attributes interacting with assessment methods).

An examination of gender differences in mean levels of temperament indicated nonsignificant differences for three attributes (activity level—general, activity level—sleep, and flexibility–rigidity). The nonsignificant differences in general activity level deviated from findings of studies with infants and children, in which boys tended to be more active than girls (e.g., Maccoby & Jacklin, 1974); however, despite the lack of gender differences in mean levels of activity for these adolescents, a separate study by Windle (1992) indicated that high activity level among girls, but not boys, was significantly correlated with lower perceived family support and higher levels of depressive symptoms and delinquent activity. Thus even though mean activity levels may not differ for male and female adolescents, similar levels of activity may have different implications. D. M. Buss (1981), for instance, reported more negative interactions between highly active young girls (aged 4–5 years) and their fathers than between highly active young boys and their fathers.

In keeping with previous findings (e.g., Maccoby & Jacklin, 1974), girls were more approach oriented, or sociable. They also reported higher levels of positive mood quality, which, in view of the consistent findings of higher levels of depression among adolescent girls than boys (e.g., Roberts, Andrews, Lewinsohn, & Hops, 1990), may appear contradictory. However, virtually all of the mood quality items concerned ratings along a positive affective dimension (e.g., key words are *cheerful, happy, frequency of smiling or laughing*), and no items concerned negative affective characteristics often typified in the measurement of depression (e.g., *felt lonely or alone, felt that others were not supportive of me*). To the extent that positive and negative affect represent different features of emotional functioning (e.g., Tellegen, 1985), the results of this study may suggest that girls not only have more low points (e.g., depressive symptoms) than boys but also more high points (e.g., feelings of happiness).

Boys reported higher levels of rhythmicity and higher levels of attentional focus than did girls. With regard to attentional focus, Eccles (1985) reviewed research on gender differences in persistence in laboratory tasks and concluded that, contrary to widespread belief, there were minimal differences between gender groups. However, the DOTS–R requires a rating of *perceived* persistence (and low distractibility) rather than objective measurement through a laboratory task. Objective test data on attentional and cognitive tasks are required for addressing adequately the source of gender differences in perceived attentional focus. Similar factors (e.g., perceived sex role inconsonance) contributing to lower levels of perceived achievement among adolescent girls (e.g., Eccles, 1985) may also contribute to lower ratings of attentional focus.

Considerable research remains to be conducted in order to determine the usefulness of the DOTS–R in adolescence as a measure of temperament, especially in relation to its concurrent and predictive validity. In other words, the functional significance of temperament in adolescence has to be established through consistent relations with outcome variables in interpersonal domains (e.g., dating behavior, parent and peer relations), in the self domain (e.g., self-esteem, identity formation, perceived competence), in ecologically relevant school or occupational domains, in responses to stressful life events, and in association with mental health indexes. This study focused on White, middle-class adolescents, and generalizability to other adolescents (e.g., Blacks, Hispanics, school dropouts) needs to be tested. Future researchers will benefit by using the DOTS–R in conjunction with other methods of measurement in an attempt to obtain convergent and discriminant relations and further validate the obtained dimensions.

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