

Development and Validation of an Early Adolescent Temperament Measure

Deborah M. Capaldi

University of Oregon and the Oregon Social Learning Center

Mary K. Rothbart

University of Oregon

Two studies were employed to develop a self-report temperament measure for the early adolescent period. The measure was based on the work of Rothbart and colleagues with adults and focused on emotionality, reactivity, and self-regulation. In Study 1, 97 middle school students (50 girls and 47 boys), aged 11 to 14 years, completed the Early Adolescent Temperament Questionnaire (EATQ). In addition, 93 parents reported on their adolescent's temperament. Analyses assessing scale reliability, dimensionality, and discriminant validity were conducted. Two of the EATQ's 14 scales were eliminated, and 2 were collapsed to form 1 scale; 92 of the original 168 items were retained after these analyses. The 11 final scales assessed fear, irritability, shyness, sadness, high-intensity pleasure, low-intensity pleasure, sensitivity, autonomic reactivity, motor activation, activity level, and attention. Alphas for the 11 scales were high, and average convergence between parent report and adolescent report for the scales was .29. Three factors were identified in an analysis of the remaining 11 scale scores: negative emotion and somatic arousal, positive emotion and sensitivity, and high intensity pleasure or sensation seeking. In Study 2, participants were 64 boys and 64 girls, aged 11 to 14 years. Scale reliability and the factor structure of the modified adolescent scale were replicated in Study 2. In addition, eight scales from other measures were administered to assess convergent validity of the scales, and retests were conducted. Retest stability was high, and correlations with parallel scales averaged .50, indicating scale validity. Results indicate that the EATQ provides reliable and valid assessment of 11 dimensions of temperament for early adolescents.

During the past decade, there has been a major increase in research on temperament in childhood and a renewed interest in theoretical approaches to its study (Goldsmith et al., 1987; Kohnstamm, Bates, & Rothbart, 1989). Although theorists' definitions of temperament vary, McCall in Goldsmith et al. (1987) provided a helpful general definition: "Temperament consists

of relatively consistent, basic dispositions inherent in the person that underlie and modulate the expression of activity, reactivity, emotionality and sociability. Major elements of temperament are present early in life, and these elements are likely to be strongly influenced by biological factors" (p. 524).

Developmental research on temperament, except for life-span approaches (Buss & Plomin, 1984; Lerner, Palermo, Spiro, & Nesselroade, 1982), has been chiefly directed toward the study of infancy and early childhood (Kohnstamm et al., 1989). Temperament variables are nevertheless especially important to the study of adolescence because adolescence constitutes a period of biological growth second only to infancy (Tanner, 1962), and this growth is accompanied by profound physical change. Early adolescents are able to report on their own experiences and feeling states. At this age, parent observation questionnaires need not be relied on solely, and the subjects can report on emotional states that are not easily observed. Developmental continuity and change in temperament within the adolescent period can be investigated only if psychometrically sound, age-appropriate measures are available. Development of comprehensive measures of temperament also would allow the study of temperament-environment interactions in adolescence, such as those previously studied in the development of infant attachment (Van Den Boom, 1989) and the young child's development of conscience (Kochanska, 1990).

To date, measures developed assessing temperament across the life span (Buss & Plomin, 1984) or in adolescence within a life-span approach (Windle et al., 1986) assess a relatively limited portion of the temperament domain. The Buss and Plomin (1984) EAS scale contains only negative emotionality, activity, and sociability. Lerner et al. (1982) based their work on dimensions from the New York Longitudinal Study (NYLS; Thomas, Chess, Birch, Hertzog, & Korn, 1963), these dimensions having been originally identified in infants. Lerner et al.'s (1982) purpose was to identify which of the NYLS dimensions could be measured at all ages rather than to assess temperament completely at each age. No items assessing mood were retained in the original Dimensions of Temperament Survey. A revised Dimensions of Temperament Survey (Windle et al., 1986) assessed nine temperament dimensions, including three rhythmicity and two attention dimensions, along with approach/withdrawal, flexibility/rigidity, quality of mood, and task orientation. The

measure contained only one emotion dimension. Adequate measurement of temperament at adolescence is not possible with measures originally designed for infants. Aspects of temperament such as sadness, sensitivity, and low-intensity pleasure are either not yet apparent or are hard to measure in an infant. In addition, the items that may reliably assess these dimensions are different at different ages.

For measures of temperament at adolescence, one of these measures or more comprehensive measures developed for different age groups, such as adult measures, must be relied on. Items on the adult measure developed by Derryberry and Rothbart (1988) do not operationalize constructs in terms of everyday situations familiar to young adolescents. Thus developing a measure of temperament designed for early adolescents based on the adult measure and including a multidimensional assessment of emotion seems essential for the advancement of research in this area. A measure designed specifically for adolescence can tap experiences common to the age group, such as school experiences, making items more age appropriate and easier to understand. Although it may seem harder to assess change if differing measures are used at different ages, the constraints of developmental change and ecological validity indicate the need for such age-appropriate measures. Scale items might change, but similar dimensions can be assessed at different ages, and the factor structure of the dimensions can be compared.

The major purpose of the current study, therefore, was to develop a comprehensive temperament measure for the early adolescent period, the Early Adolescent Temperament Questionnaire (EATQ), based on the measure of Derryberry and Rothbart (1988) for adults. The reliability of temperament scale scores was assessed, and the validity of the measure was investigated by examining convergence between adolescent and parental report of adolescent temperament. Exploratory analyses were conducted to determine the factor structure of the questionnaire. Findings regarding scale reliability and factor structure from the first study were then replicated on a second sample. In addition, convergent validity of the scales was assessed by comparison with standardized measures of similar dimensions, and retest stability was checked. Parental report was not included in the second study.

DEVELOPMENT OF THE EARLY ADOLESCENT MEASURE

The early adolescent measure was based on the adult measure developed by Derryberry and Rothbart (1988). Adult and adolescent scales were designed using a strategy developed by Fiske (1966, 1971). Each of the three general constructs of emotionality, reactivity, and activity or self-regulation

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was decomposed into subconstructs. These subconstructs were then operationally defined, and items derived from the definitions were generated.

Derryberry and Rothbart (1988) argued that the processes of arousal, emotion, and self-regulation play central roles in the structure of human personality. Differences in reticulo-cortical and autonomic arousal are thought to underlie the personality dimensions of extroversion-introversion and neuroticism-stability, respectively (Eysenck, 1967, 1981). The second major area of temperament is emotion, which probably has an interactive relationship with arousal. Gray (1982) organized dimensions of emotionality into approach and inhibition constructs that resemble the Watson and Tellegen (1985) factors of positive emotionality and negative emotionality. The third temperamental process, self-regulation, involves the degree to which the individual can actively control arousal and emotional responses.

Several scales used in the adult measure were not used in the adolescent measure. The adult measure contained eight scales assessing reactivity or arousal of which sensitivity, autonomic reactivity, and motor activation were retained for the adolescent measure. Negative emotion scales of discomfort and frustration on the adult scale were combined in a scale of irritability for the adolescent scale; shyness and emotional lability were added. Finally, the positive emotion scale of relief was not included in the adolescent scale, whereas activity level was added. In general, these adjustments simplified the rather complex definitions of temperament of the adult measure (which contained 18 scales), especially for assessment of reactivity. Item analysis was conducted with the goal of achieving internal homogeneity in scales assessing the subconstructs, and factor analysis of scales scores was conducted to explore patterns of relationships among the temperament variables. Scale definitions and two sample items selected to show the range of items are reported for each scale in the appendix.

Arousal

Reactivity, or sensory and motor reactions to stimulation, constitutes a major dimension of temperament. The Sensitivity Scale included items assessing both internal and external sensitivity to low-intensity stimulation. The other two reactivity scales focused on symptoms and behaviors related to somatic arousal. Autonomic Reactivity assessed physical reactions often associated with tension, stress, or excitement. Motor Activation measured repetitive and stereotyped behavioral patterns often related to somatic arousal, such as leg jiggling (Derryberry & Rothbart, 1988).

Emotion

Four scales were designed to assess aspects of negative emotionality: Fear, Irritability, Shyness, and Sadness. Research on caregiver-reported temperament in infancy has identified the first two of these dimensions: distress to novelty (fear) and general distress proneness, including irritability (see review by Rothbart & Mauro, 1990). Shyness assesses a third important aspect of negative emotionality, that is, behavioral inhibition to novelty or challenge (Garcia-Coll, Kagan, & Reznick, 1984). Behavioral inhibition is thought to be evidenced as shyness in early childhood, and behavioral inhibition shows considerable developmental stability in the early years (Kagan, Reznick, & Snidman, 1989).

Sadness, the fourth scale of negative emotion, has been assessed in adulthood (Derryberry & Rothbart, 1988) and is an important construct for a comprehensive assessment of temperament in adolescence. Kazdin (1987) noted that no consistent sex differences in depression have been found in samples of children aged 6 to 12 years, but in adolescence, the greater prevalence of depression in females is first found. Also, there is evidence that the prevalence of dysphoric mood is particularly high among adolescents when compared with adults. Kashani et al. (1987) found that almost one third of the 14- to 16-year-olds examined met *DSM-III* symptom counts for depressive disorders. When those reporting dysphoric mood were included, almost half of the sample had problems with depressive feelings. These findings suggest that sadness is an aspect of negative emotionality that is particularly appropriate for the study of adolescents.

Two scales were constructed to assess aspects of positive emotionality: High-Intensity Pleasure and Low-Intensity Pleasure, designed to reflect more extroverted or introverted preferences (Eysenck, 1967). The High-Intensity Pleasure dimension was based on the Zuckerman (1979) construct of sensation seeking and emphasizes physical and social thrill seeking. Zuckerman hypothesized that sensation seeking increases until some time in late adolescence and then declines with age. He based this hypothesis on observations of animals and humans, noting that play and exploration seemed to peak in adolescence or young adult life. The Low-Intensity Pleasure Scale was designed to assess simpler, less stimulating forms of enjoyment, such as enjoyment of nature and the outdoors. Finally, the attempt was made to develop what was labeled the Emotional Lability Scale to assess individual differences in the speed and magnitude of mood swings between positive and negative emotions.

Self-Regulation

Activity Level is probably the most widely studied aspect of temperament, having its place in the McCall definition (see Goldsmith et al., 1987), and is appropriate across ages. The related scale of Impulsivity assessed the adolescent's ability to modulate or control activity when it was not appropriate, a scale important in connection with the development of behavior problems (Gorenstein & Newman, 1980). Finally, individual differences in attentional control were assessed in scales for Attentional Focusing and Attentional Shifting. In research on adult temperament, attentional control has been found to be negatively related to measures of negative emotionality (Derryberry & Rothbart, 1988). Similar patterns of relationships between emotion and attention may be found for young adolescents.

Psychometric properties of the questionnaire were assessed in two studies. Study 1 involved a test of scale reliability, dimensionality, and discriminant validity for the 14 scales as well as convergence with the parent report. Study 2 involved a replication of scale reliability and factor structure for the modified 11-scale instrument. In addition, convergent validity was assessed for eight of the scales, and retests were conducted.

STUDY 1

Method

Subjects

Students from 10 *houses* (mixed grades and ability levels) in one middle school were invited to participate in the study; parental consent forms were obtained for 53% of these children, resulting in 97 participants (50 girls and 47 boys), 11 to 14 years of age. Parent questionnaires assessing the child's temperament were also obtained from one of the children's parents (almost all mothers) for 93 of the participants. The sample was representative of the area in being predominately White. No data regarding socioeconomic status were collected, but teachers indicated that participants represented the full range of children at the school in an area of both middle- and working-class families. The children completed their questionnaires over a 2-day period at school; parent questionnaires were mailed out. Participants were asked not to discuss the questionnaires until after parents and children had completed them.

Measures

The initial version of the Early Adolescent Temperament Questionnaire (EATQ) contained 168 items assessing 14 scales; the number of items assessing each scale ranged from 10 to 13. Conceptually, item choice relied heavily on the adult scale, many of which items were developed from the work of Eysenck (1967), Zuckerman (1979), and others. Items were designed to be concrete and relevant to the experience of middle schoolers without being too narrow in applicability or gender specific. The questionnaire used a 5-point Likert-type scale: 5 = *very true*, 4 = *mostly true*, 3 = *neither true nor false*, 2 = *mostly false*, or 1 = *very false*. The scales were scored such that a high score indicated that the dimension was very true for that child (e.g., that the child liked activities involving high-intensity stimulation, or for Fear, that they were more fearful).

The parent version of the questionnaire excluded 2 of the 14 scales because the researchers felt that parents would not be able to observe or reliably assess their children's autonomic reactivity and sensitivity. The adolescent questionnaire was abbreviated for the parent version and contained just 60 items, 5 for each of the 12 scales assessed. To assure parental cooperation, it was necessary to keep the parent questionnaire short, requiring just 10 minutes for completion. Items were selected randomly from the adolescent version, but if it was determined that an item would be too difficult for a parent to observe (such as a school behavior), then a more easily observed item was substituted.

Results

Analysis of the EATQ

After development of a pool of items for the EATQ, a small pilot test was conducted, and items that were poorly worded or did not seem to relate well to the experiences of middle school children were eliminated. Following full administration of the adolescent questionnaire for each hypothesized scale, items that had an item-total correlation of less than .20 were eliminated. Coefficient alpha was then estimated based on the reduced pools of items. The scales had to have an alpha of .60 or higher to be retained. All 14 scales reached the .60 alpha criterion, and 138 of the original 168 items were retained. These steps ensured that the scales were internally consistent.

Discriminant Validity

Some scales for temperament dimensions hypothesized to be discriminable might actually assess the same dimension. For example, the Attentional Shifting and Attentional Focusing scales might assess only one dimension of attention rather than the two dimensions hypothesized. Further, an individual item with an acceptable item-total correlation on one scale might have an even higher correlation with a related scale. For example, a negative item might be nonspecific and relate to several negative temperament scales, such as Irritability, Fear, and Sadness.

To assess discriminant validity, all of the 138 items retained after the scale internal consistency analyses were correlated with the scale scores. To improve the discriminant validity of the scales, items showing a higher correlation with another scale than its item-total correlation with its own scale were excluded. The coefficient alphas of three scales dropped below .60 after these exclusions: Emotional Lability, Impulsivity, and Attentional Shifting.

The Emotional Lability Scale was excluded from further analyses. Attentional Shifting was combined with Attentional Focusing and formed a satisfactory scale of General Attention. An attempt was made to combine Impulsivity and High-Intensity Pleasure items in one scale, but the scale did not attain satisfactory reliability. The Impulsivity Scale was therefore dropped from the measure. In total, 46 items were dropped because of poor discriminant validity. The main pattern of overlap for these items appeared to be with the Irritability Scale and in general appeared to be due to overlap among the negative scales.

The remaining 92 items assessed 11 scales, for an average of 8 items per scale. The number of items retained and the scale alphas are reported in Table 1. Despite the loss of a large number of items, there were no systematic patterns that would change scale definitions. In the case of sensitivity, the three items referring to internal processes (example: "I have heavy feelings in my head when I am tired") were eliminated; items referring to either other people or objects in the environment were retained.

Scale Homogeneity

Windle (1988) argued that the steps described earlier still do not ensure scale homogeneity or unidimensionality. It is possible to have a set of scale items in which the average interitem correlation is relatively high but which contains clusters that correlate more highly internally than with other items from the same scale. A homogeneous scale is one in which all items converge

TABLE 1: Scale Alphas for EATQ Adolescent Report Scales (Study 1)

Scale	Alpha	Number of Scale Items
High-Intensity Pleasure	.74	8
Fear	.74	7
Irritability	.69	8
Autonomic Reactivity	.78	7
Attention	.76	13
Shyness	.67	5
Sadness	.74	9
Motor Activation	.76	9
Low-Intensity Pleasure	.79	11
Sensitivity	.65	7
Activity Level	.78	8

on the measurement of a single factor. According to Green, Lissitz, and Mulaik (1977), "Coefficient alpha is a lower bound estimate of the proportion of the total-score variance due to common factors and an upper bound to the proportion of the total-score variance due to the first common factor" (p. 831).

To assess whether each scale was unidimensional, principal components factor analyses were run on each of the 11 scales. In only one case was one factor extracted. For 7 of the 11 scales, two factors were extracted, and for 3 others, three factors were extracted. Examination of the eigenvalues and percentage of variance explained showed that in every case there was a very large decrease in the amount of variance explained between the first and second factors. The amount of variance explained by the first factor was close to 40%, and the amount explained by the second factor was between 10% and 20%. Furthermore, for most of the scales, no interpretable pattern emerged from the factor loadings. In the case of irritability, there was some slight difference between the factors. The second factor involved items on the adolescents not getting their own way or frustration, and the first factor involved mixed items. In the case of the Sensitivity scale, items loading on the first factor involved sensitivity to people, and items loading on the second factor concerned other aspects of the environment. Further analysis showed that each of the scale items loaded at least .30 in a forced one-factor solution. The results of the factor analyses thus did not warrant scale redefinition, and it was concluded that a single-factor solution was not inconsistent with the data for any of the scales.

Factor Analysis of Scale Scores

The principal axis, rather than the principal components method of exploratory factor analysis, was selected for factor-analyzing the scale scores. The principal components model assumes error-free measurement, considered unjustifiable in the analysis of multiple dimensions of temperament from a self-report questionnaire.

Exploratory factor analyses using principal axis factoring and oblique rotation were then conducted on the 11 remaining scales. Communalities were estimated by squared multiple correlations because reliability data were unavailable. Windle (1988) argued that in applications where complex, interdependent relations are expected between constructs, oblique rotations where the factors are allowed to correlate may be preferred to orthogonal rotation; therefore, oblique rotation was selected for these analyses. Cattell (1978) also suggested that in many applications, factors should be permitted to correlate. If the factors are truly uncorrelated, then oblique rotation will show this. Delta, controlling the degree of correlation between the factors, was varied from 0 to -1 and -2 for the rotation to estimate the impact on the solution.

Factor loadings, eigenvalues, explained variance, and correlations between the factors are shown in Table 2. Three clear factors emerged. Negative Emotionality and Somatic Arousal scales loaded on the first factor, which could be characterized as *Negative Temperament*, including sadness, irritability, fear, autonomic reactivity, and motor activation. Poor attention also loaded on this factor. The second factor reflected positive aspects of *Temperament*, with low-intensity pleasure, sensitivity, and activity level loading together. The third factor was defined by a negative loading of high-intensity pleasure or sensation seeking, and a positive loading for shyness and could be characterized as a factor of *Behavioral Inhibition*. Note that fear also tends to load on this factor. Correlations between the factors were essentially zero when delta was zero. Varying the value of delta made little difference to the results of the oblique rotation because the factors showed low intercorrelations.

The Parent Report Questionnaire

Scales for the parent version of the questionnaire were developed in a similar way to those for the adolescent version, but no further analyses were conducted after acceptable alphas were obtained. The analyses of scale dimensionality and discriminant validity were not deemed appropriate because only five items assessed each temperament dimension; the main purpose of administering the parent version of the questionnaire was to assess convergent validity between the parent and the adolescent report. Of the 60

TABLE 2: Factor Solution (Study 1)

	Factor 1	Factor 2	Factor 3
Autonomic Reactivity	.73	.07	.09
Sadness	.66	-.02	.09
Fear	.61	.26	.40
Motor Activation	.60	.00	-.23
Attention	-.59	.38	.22
Irritability	.57	-.06	.07
Sensitivity	.11	.63	-.01
Activity Level	-.12	.55	-.12
Low-Intensity Pleasure	-.04	.51	-.20
High-Intensity Pleasure	.05	.25	-.67
Shyness	.37	-.25	.38

Eigenvalue	% Variance	Factor	Correlation	Matrix
		1	2	3
3.08	28.0	1	—	
1.95	17.7	2	-.05	—
1.35	12.3	3	.07	-.10

parent report items, 58 were retained after analyses, with all scales having either four or five items each. Alphas for the parent report items are shown in Table 3. All scales attained the .60 or above criterion, although alphas for the parent report scales were lower than those for the adolescent report due to the smaller number of items in each scale. Table 3 also contains the correlations between the parent and the adolescent report for each of the nine scales that were on both versions. Convergence between the two reports was generally low to moderate (from $-.05$ to $.50$), with six correlations significant at the .01 level. The poorest convergence was for Sadness.

STUDY 2

Method

Subjects

The subjects were recruited through an advertisement in the local newspaper. A sample of 64 boys and 64 girls, aged 11 to 14 years, was obtained.

TABLE 3: Parent Report Scales, EATQ

Scale	Alpha	Correlations With Adolescent Scales
High-Intensity Pleasure	.64	.50**
Fear	.60	.22
Irritability	.62	.20
Autonomic Reactivity	—	—
Attention	.81	.37**
Shyness	.65	.37**
Sadness	.67	-.05
Motor Activation	.70	.27*
Low-Intensity Pleasure	.66	.27*
Sensitivity	—	—
Activity Level	.81	.50**

* $p < .01$; ** $p < .001$.

Again, the sample was predominately White, with 44% of the mothers and 48% of the fathers having graduated from college. The children completed the EATQ and standardized questionnaires in one session at the Center. A random selection of subjects (14 boys and 13 girls) participated in a retest of the EATQ 2 to 3 weeks after the initial questionnaire administration.

Measures

Early Adolescent Temperament Questionnaire. The version administered in the second study contained 86 items and 11 scales. The items and scales were those retained after modifications made following Study 1, except that four items were added to the Shyness Scale, which had contained only five items, and lowest loading items were deleted from scales with more than eight items to keep down the length of the questionnaire (as detailed in the Results section). This 86-item version is the final version of the questionnaire (available from the first author, Oregon Social Learning Center).

Validation scales. Parallel scales were administered for 8 of the final 11 EATQ scales. No satisfactory parallel scales were found for Low-Intensity Pleasure, Sensitivity, or Autonomic Reactivity.

Sensation Seeking Scale for Children (SSSC). This 28-item scale was developed by Russo et al. (1991). Each item of the questionnaire involves selection from two alternate statements—for example: (a) "I get bored seeing

the same old friends all the time" or (b) "I like seeing only my old friends all the time." The 3-week retest correlation was .71. Coefficient alpha for the 28 items was .49. Ten items loaded on a boredom susceptibility factor, and six loaded on a thrill and adventure seeking factor (factor loadings above .40). Because of the poor internal consistency of the whole scale, only these 16 items were used for the current study.

Dimensions of Temperament Survey—Revised (DOTS-R). This 54-item questionnaire contains 11 scales (Windle & Lerner, 1986). The full questionnaire was administered, but only the scales pertaining to task orientation, distractibility, persistence, and general activity level were used in the analyses. Items were answered on a 4-point scale: 1 = *usually false*, 2 = *more false than true*, 3 = *more true than false*, and 4 = *usually true* (sample item for task orientation: "Once I am involved in a task, nothing can distract me from it"). Alphas for the four scales ranged from .70 to .84 across samples of preschoolers, elementary aged children, and young adults.

Anxiety Scale. The "How I Feel" questionnaire contains 20 items assessing fear or anxiety on a 3-point scale: 1 = *hardly ever*, 2 = *sometimes*, and 3 = *often* (sample item: "I am secretly afraid"). The alpha on a normative sample of high school students was .90, and 30-day retest correlations were over .70. For college students, correlations with other anxiety measures ranged from .41 to .85 (Spielberger, 1983).

Irritability. The Irritability measure used (Caprara et al., 1985) is a shortened version containing 10 items. Each of the items loaded .4 or above on the first factor extracted. The answer format is *true/false* (sample item: "I think I am rather touchy").

Shyness. The Shyness Scale contains 13 items, with a 5-point answer scale from 1 = *very uncharacteristic or untrue* to 5 = *very characteristic or true* (sample item: "I feel tense when I'm with people I don't know well"). This scale is an expansion of the nine-item scale reported in Cheek and Buss (1981). Coefficient alpha for the nine items was .79. The measure was found to relate to fearfulness and observed behavior.

Child Depression Rating Scale. This 18-item scale was used to assess sadness or depression (Birleson, 1981) using a 3-point answer scale: 1 = *most of the time*, 2 = *sometimes*, and 3 = *hardly ever* (sample item: "I feel like crying"). Internal consistency estimated by the split-half reliability coefficient was found to be .86. Test-retest reliability was .80. The 18 items were

TABLE 4: Scale Alphas for EATQ Scales (Study 2)

Scale	Alpha	Number of Scale Items	Test/Retest Correlations (n = 27)
High-Intensity Pleasure	.68	8	.89
Fear	.74	7	.81
Irritability	.67	8	.54
Autonomic Reactivity	.65	7	.77
Attention	.66	8	.72
Shyness	.79	9	.84
Sadness	.78	8	.80
Motor Activation	.74	8	.90
Low-Intensity Pleasure	.76	8	.84
Sensitivity	.63	7	.77
Activity Level	.73	8	.82

found to separate a clinically diagnosed group of depressed children from three control groups: normal, clinic, and maladjusted.

Motor Activation. The Fidget Scale (Mehrabian & Friedman, 1986) is a 40-item scale assessing manipulation of one's own body parts and other objects, such actions being nonessential to ongoing events. The questions are answered on a 9-point scale from 1 = *very strongly disagree* to 9 = *very strongly agree*. Coefficient alpha for the 40 items with 256 subjects was .89. Correlation with observed fidgeting with 70 subjects was .38. The correlation between self-report and friends' report was .53.

Results

The analyses regarding scale reliability, factor structure, and validity of the temperament dimensions were replicated and extended in the second study. Table 4 shows alphas, number of scale items, and test-retest correlations for the 11 scales in Study 2. All alphas were above the .60 criterion level. Test-retest correlations were generally high, being above .70, except for irritability.

The factor structure in Table 5 shows a three-factor solution as in Study 1, and the factors were substantively similar to Study 1. Again, negative temperament dimensions loaded on the first factor along with poor attention. The second factor reflected positive dimensions, and the third was again

TABLE 5: Factor Solution (Study 2)

	Factor 1	Factor 2	Factor 3
Fear	.81	.31	-.41
Autonomic Reactivity	.73	.16	-.20
Sadness	.60	.16	-.22
Irritability	.59	.00	-.04
Shyness	.57	-.03	-.40
Attention	-.52	.39	.29
Motor Activation	.43	.13	.04
Sensitivity	.09	.62	.20
Low-Intensity Pleasure	.18	.56	-.09
High-Intensity Pleasure	-.24	.01	.79
Activity Level	-.03	.39	.45

Eigenvalue	% Variance	Factor	Correlation	Matrix
		1	2	3
3.43	31.2	1	—	
1.81	16.5	2	.11	—
1.20	10.9	3	-.24	.14

TABLE 6: Cross-Validation Measures

Measure	Alpha	Correlation (EATQ Scale)
DOTS-R		
General Activity Level	.80	.25* (Activity Level)
Attention		
Task	.75	.51** (Attention)
Distractibility	.69	.45** (Attention)
Persistence	.53	.45** (Attention)
SSSC (Sensation Seeking)	.55	.63** (High-Intensity Pleasure)
Spielberger (Fear, Anxiety)	.85	.58** (Fear)
Caprara (Irritability)	.52	.48** (Irritability)
CDRS (Depression)	.75	.43** (Sadness)
Cheek and Buss (Shyness)	.78	.77** (Shyness)
Mehrabian and Friedman (Fidget Scale)	.81	.50** (Motor Activation)

* $p < .01$; ** $p < .001$.

defined by high-intensity pleasure, loading positively this time with activity level. So, rather than a behavioral inhibition factor as in Study 1, the third factor appeared to be an extroversion factor.

Table 6 shows alphas for the cross-validation measures along with correlations between the measures and the parallel scale from the EATQ. The validation correlations were all significant at the .001 level, except for the activity level, which was significant at the .01 level. Correlations are shown for the EATQ Attention Scale and three similar scales from the DOTS-R: Task, Distractibility, and Persistence. Note that autonomic reactivity correlated .54 with the Spielberger fear/anxiety measure, a close, although not parallel measure.

DISCUSSION

The main goals of these studies were to develop an early adolescent temperament measure and to provide evidence of the reliability and validity of its dimensions. In the first study, the Early Adolescent Temperament Questionnaire showed good internal consistency for 11 of the 14 scales and moderate convergence with the parent report. In the second study, the reliability of the scales was replicated, and test-retest correlations were high, a further indication of scale reliability. The three-factor structure also replicated from Study 1 to Study 2, with only relatively minor shifts in the loading of two scales (Shyness and Activity Level). Finally, the eight EATQ scales tested correlated significantly with the parallel measures administered.

Differences from the adult measure were seen in that impulsivity could not be measured reliably for the adolescents; the two attention scales, Attentional Focusing and Attentional Shifting, collapsed into one scale. The attempt to combine the impulsivity and high-intensity pleasure items showed that these items would not form a single scale. A study of adults (Zuckerman, 1984) also found that sensation seeking and impulsivity loaded on separate factors. Impulsivity might be a measurable dimension of temperament at adolescence, but the items developed to assess it in the current study were either not adequate or the items could not be discriminated from such dimensions as irritability.

In tests for convergence between the adolescent and the parent report, six of the nine scales were significant at the .01 level. The scales showing the poorest convergence with parent report were all negative emotionality scales (Fear, Irritability, and Sadness). This could again be due in part to lack of adequate measurement of the dimensions. Convergence between the child and the parent report, however, is generally found to be low for many areas

of behavior and emotion. In a review of studies of behavioral and emotional problems with children and adolescents up to 19 years of age, Achenbach, McConaughy, and Howell (1987) found that the average correlation between the parent and the child report was .25. Average correlations for reporters were found to be lower for adolescents than for 6- to 11-year-olds and also lower for internalizing rather than externalizing problems. In the present study, the temperament dimensions showing higher convergence between the parent and the adolescent report include both positive (e.g., High-Intensity Pleasure) and negative (e.g., Shyness) dimensions. Only Sadness was uncorrelated with the parent report. Sadness may be very much an internal state at adolescence with little affective expression and thus may not be communicated to the parents, or parents may not want to believe that their children are sad.

Several consistencies in the factor solution were found between this study and the study of adults using similar dimensions (Derryberry & Rothbart, 1988), although the three factors identified in the adult study are not equivalent to those identified in the adolescent studies. As for adolescents, a negative temperament factor emerged for adults, but there was not a clear positive temperament factor or an introverted/extroverted factor.

In the adult study, Fear, Attention (negative loading), and the scales related to irritability (frustration and discomfort) all loaded on the same factor, as for the adolescents. However, High-Intensity Pleasure also loaded negatively on this factor for adults, whereas for adolescents, it formed a separate factor. A further difference in the adolescent solution was that the Somatic Arousal scales also loaded on this negative emotion factor, whereas they formed a separate factor in the adult solution. As in the adult solution, Sensitivity and Low-Intensity Pleasure loaded on the same factor, but Sadness also loaded on this factor in the adult study. The shift in the loading of Sadness from the negative to the positive factor from early adolescence to adulthood is particularly interesting considering the lack of convergence between the adult and the adolescent report of the adolescent's sadness. Perhaps sadness is defined or experienced differently by early adolescents and adults.

Some similar conclusions can be drawn for this sample of adolescents as for the adult sample on the organization of temperament. The negative and positive emotional components of temperament do not appear to be unidimensional. Individuals high in negative affect are not necessarily low in positive affect. They may experience both high negative affect and high positive affect at different times. In addition, positive affect was not unidimensional for the adolescents or the adults, with high- and low-intensity pleasures loading on separate factors. However, whereas high-intensity pleasure loaded negatively on the negative emotion factor for adults, it formed a separate factor for adolescents, loading negatively with shyness in

Study 1. In Study 2, high-intensity pleasure loaded positively with activity level on the third factor. This third factor in the adolescent solution appears to be closely related to the Eysenck (1967) extroverted/introverted dimension. Zuckerman (1979) hypothesized a decline in sensation seeking with age, and such a decline in adulthood might be related to a change in the organizational structure of these emotions.

In summary, 11 of the 14 temperament dimensions tested formed valid and reliable scales; the dimensions identified showed some similarity to those identified by Derryberry and Rothbart (1988) for adults. In addition, the factor structure of the scales showed considerable stability across two studies. This instrument will allow for future investigation of temperament in early adolescence, taking advantage of self-report.

APPENDIX:
Scale Definitions and Sample Items
From Each of the Adolescent Report Scales

Negative emotionality

Fear	Unpleasant affect related to anticipation of distress "The thought of death makes me frightened." "I am afraid of being late to activities and appointments."
Irritability	Unpleasant affect resulting from the qualities of stimulation "Little things other kids do annoy me." "I hate it when people don't agree with me."
Shyness	Behavioral inhibition to novelty and challenge, especially social "I am shy." "It is hard for me to talk to my friends' parents."
Sadness	Unpleasant affect and lowered mood, loss of enjoyment and interest in activities "I hardly ever feel sad." (reverse) "My friends often seem to enjoy themselves more than I do."

Positive emotionality

High-Intensity Pleasure	The pleasure derived from activities involving high intensity and novelty "I would like to skateboard or ride a bike really fast down a steep slope." "I like big parties with lots of people and loud music."
Low-Intensity Pleasure	Amount of pleasure related to activities or stimuli involving low intensity, rate, complexity, novelty, and incongruity

Emotional Lability (dropped from final version)	"I like to look at the pattern of clouds in the sky." "I like the sound of words." Speed and magnitude of mood swings between positive and negative emotions and vice versa "If I start the day feeling happy, I usually stay that way all day." "I usually feel quite calm, not up and down like some kids."
Reactivity Sensitivity	Detection or perceptual awareness of slight, low-intensity stimulation in the environment "When I am talking to someone, I rarely notice how their body and face react to what I am saying." "I am very aware of noises."
Autonomic Reactivity	Cardiovascular, electrodermal, gastrointestinal, and respiratory activity "When I have to speak in front of a group, my voice sounds funny." "When something unexpected startles me, my heart usually starts beating quite fast."
Motor Activation	Activation of the motor system in stereotyped and nondirected actions "I often squirm around in my chair." "I cannot help picking at little bits of skin and things when I am in class."
Self-Regulation Activity Level	Participation in activities requiring high levels of physical activity "Whenever I have the chance I am physically active (sports, dancing, etc.)." "Long winter weekends make me want to get out of the house and do something physical."
Impulsivity (dropped from final version)	Inability to suppress positively toned impulses, resulting in inappropriate approach tendencies "I cannot keep from talking to my neighbor in class, even though I know I will get into trouble." "I can usually hold back from laughing when I need to."
Attention^a	The capacity to focus attention and also shift attention when desired
Focus	"I pay close attention when someone is telling me how to do something."
Shift	"I find it hard to shift gears when I go from one class to another at school."

a. The two scales were collapsed in the final version.

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Requests for reprints should be addressed to Deborah M. Capaldi, Oregon Social Learning Center, 207 East 5th Avenue, Suite 202, Eugene, OR 97401.