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Psychometrics of a Self-Report Version of the Child and Adolescent Dispositions Scale

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Abstract

Lahey and Waldman (2003; 2005) proposed a model in which three dispositions—sympathetic response to others; negative emotional response to threat, frustration, and loss; and positive response to novelty and risk—transact with the environment to influence risk for conduct disorder (CD). To test this model, the Child and Adolescent Dispositions Scale (CADS) was developed to measure these dispositions using parent ratings of the child. Here we report psychometric evaluations of a parallel youth self-report version (CADS-Y). Exploratory factor analysis of CADS-Y items among 832 9–17 year olds yielded a 3-factor structure that was consistent with the model and invariant across sex and informants. In 1,582 pairs of 9–17 year old twins, confirmatory factor analyses supported the CADS-Y 3-factormodel. Each CADS-Y dimension was associated with CD as predicted. Correlations between the CADS-Y and the NEO Five-Factor Inventory described relations between the dispositions and an important model of personality.

Keywords

socioemotional dispositions; five-factor model of personality; children and adolescents

Lahey and Waldman (2003, 2005) proposed a model of conduct disorder (CD) in which children learn to engage in CD behaviors through transactions with the environment. Unlike previous social learning models of CD, the developmental propensity model posits that three relatively enduring child socioemotional dispositions—low levels of sympathetic response to other people; high levels of negative emotional response to threat, frustration and loss; and high levels of positive response to novel and risky situations—influence the child's propensity to develop CD behaviors through transactions with the environment. The disposition of *prosociality* is defined primarily by sympathetic concern for others, helping, and spontaneously sharing, but also by respect for social rules and guilt over misdeeds. The disposition of *daring* is defined by the descriptors of daring, brave, and adventurous. Children rated high on

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negative emotionality are easily and intensely upset by frustrations, threats, and losses. The model asserts that these three dispositions jointly influence risk for CD in at least an additive manner. The model offers testable hypotheses regarding the roles of the dispositions in fostering CD and posits that the three dispositions provide an organizing framework for understanding the role of genetic and environmental influences on CD (Lahey & Waldman, 2003).

A parent version of the Child and Adolescent Dispositions Scale (CADS-P) was developed to operationalize the three hypothesized socioemotional dispositions (Lahey et al., 2008) and to allow empirical tests of predictions derived from the developmental propensity model (Lahey & Waldman, 2003, 2005). Parents and other adult caretakers were orally administered the 48 CADS-P items in interview format. Caretakers rated their children on a pool of 48 items selected to potentially reflect the dispositions. These excluded items that were clear synonyms or antonyms of symptoms of psychopathology. In a population-based sample of 4–17 year olds, exploratory factor analysis (EFA) was conducted, yielding three clear factors that were consistent with the model. The items with the strongest unique loadings on each factor were then tested using confirmatory factor analyses of data from a second population-based sample of 6–17 year olds, with the predicted 3-factor solution providing the best fit. The CADS-P dimensions were found to have high test-retest reliability and tests of construct validity and tests of predicted associations of the CADS dimensions with CD and with direct observations of behavior provided strong support for the CADS-P(Lahey et al., 2008).

An independent test of the CADS developmental propensity model was conducted using data from a longitudinal study of boys from mostly lower-income families (Trentacosta, Hyde, Shaw, & Cheong, in press). Caretaker ratings on the three CADS-P dimensions at age 12 years each accounted for unique variance in the prediction of antisocial behavior at age 15 years, even when controlling for antisocial behavior in middle childhood. Furthermore, consistent with hypotheses of the developmental propensity model regarding transactions with the environment, the *prosociality* dimension was found to interact with level of parental knowledge of the whereabouts and companions of the youth (i.e., parental supervision), and the *daring* dimension interacted with neighborhood dangerousness in predicting antisocial behavior at age 15 (Trentacosta et al., in press).

Thus, there is emerging evidence supporting the reliability and validity of the CADS-P and its use in tests of the developmental propensity model. In order to extend possibilities for future tests of the model, this paper reports evaluations of the psychometrics of a parallel child and adolescent self-report version, the CADS-Y, for 9–17 year olds. If the psychometrics of the CADS-Y are supported, this version of the instrument will allow both multi-informant studies and studies of the dispositions when adult caretakers are either not available or have limited knowledge of the youth (e.g., foster children who have had experienced multiple recent placements). Like the CADS-P, our first step is to use EFA of youth self-ratings of items from the CADS in a representative sample to select the items that best define each dispositional dimension. Second, we conduct CFA using data from a second independent sample to confirm the hypothesized factor structure of the CADS-Y. Third, we assess the test-retest reliability of the CADS. Fourth, we provided initial evidence on the external validity of the CADS-Y by testing the hypotheses that each dispositional dimension is uniquely related to child and adolescent CD. Fifth, in order to understand the CADS-Y in the context of a dominant model of personality, we report correlations between dimensional scores from the CADS-Y and scores from a five-factor model (FFM) measure of personality at 16–18 years of age in a case-control sample. In all three studies reported here, the child's parent or guardian signed an informed consent form approved by the University of Chicago Institutional Review Board and the child gave oral assent after hearing an approved assent script.

STUDY 1

In Study 1, all CADS-P items were revised to be in self-report format and were orally administered to 9–17 year-old youth in a representative sample in interview format to provide data for EFA of the CADS item pool.

Study 1 Methods

Study 1 Participants—Participants in the Georgia Health and Behavior Study (GHBS; (Lahey, Applegate et al., 2004) were representative of all 4–17-year-old youth living in the Atlanta metropolitan statistical area in 2000. Interviews of caretakers (82.0% biological mothers, 13.6% biological fathers, 1.2% step-mothers, and 3.2% grandmothers) and 9–17-year-old youth were conducted in the family's home by trained interviewers, with a response rate of 71% for caretakers and 95% for youth whose caretaker was interviewed. After the interviews, 24 youth were excluded because they had been diagnosed by a professional as mentally retarded, psychotic, and/or autistic. As a result, 832 9–17 year old youth interviews were used in the analyses. The caretaker classified 68.3% of these youth as Non-Hispanic white, 24.1% as African American, 2.9% as Hispanic, and 4.7% as other race-ethnicity. The proportion of females was 51.2%. A randomly selected subsample of 196 youth stratified on caretakers' initial ratings of emotional and behavior problems were re-interviewed 7–14 days later to assess test-retest reliability (Lahey, Applegate et al., 2004).

Study 1 Measures—Youth were asked to rate each of the 48 CADS-Y items by thinking about how well it described their emotional behavior and how often the behavior occurred during the last 12 months using a response scale of: "1. Not at all, 2. Just a little, 3. Pretty much, 4. Very much." CADS-Y items were randomized and administered in counterbalanced order, with random halves of the samples administered the items in forward or reverse order to control order effects.

Parallel versions of the *Child and Adolescent Psychopathology Scale (CAPS)* also were completed by adult caretakers for all youth and by 9–17 year old youth themselves. The CAPS (Lahey, Applegate et al., 2004) assesses DSM-IV symptoms of ADHD, ODD, CD, depression, and anxiety disorders. Not all symptoms were measured using both informants in the CAPS. Both respondents are reliable and valid informants on anxiety, depression, and CD from 9 years of age on, but only caretakers are strong informants on ODD and ADHD (Bird, Gould, & Staghezza, 1992; Hart, Lahey, Loeber, & Hanson, 1994).

CAPS items were rated on the same response scale as CADS-Y items and items were randomized and administered in counterbalanced order like the CADS-Y. For the CAPS, test-retest intra-class correlations (ICCs) for youth respondents were CD = .78, major depression (MDD) = .68, and all anxiety disorders combined = .75. The CAPS test-retest ICCs for adult caretaker respondents were: CD = .89, ODD = .80, MDD = .80, and anxiety disorders = .86. Strong correlations with relevant measures of functional impairment indicated good external validity for both the caretaker and youth versions of the CAPS (Lahey, Applegate et al., 2004).

Study 1 Data Analysis—Exploratory principal factors analyses of youth-rated versions of all 48 items from the CADS were conducted using 9–17 year olds in the GHBS to identify the items that loaded most strongly and uniquely on each factor for youth. These EFAs were conducted in SAS 9.1 on the product-moment correlation matrix using varimax rotation, defining the communalities as the squared multiple correlation, but results were highly similar using promax rotation. Less than 2% of items had missing data, but to avoid listwise deletion of all cases with any missing data, we assumed that this small amount of information was missing at random and the correlation matrix was reset to have a pairwise sample size of 832

for youth self-ratings. To determine the number of factors to extract in this EFA, we conducted parallel analyses in which eigenvalues were derived from random data matrices with the same numbers of items and participants (Glorfeld, 1995; O'Connor, 2000). We conducted 1,000 random analyses and used the 95th percentile of the distribution of eigenvalues to determine that three factors could be extracted (Glorfeld, 1995). Items with loadings > .40 on each factor and no loadings >.30 on another factor were selected to define each dispositional dimension. Principal components analysis yielded virtually identical results as principal factors analysis.

Study 1 Results

EFA of Youth Ratings in Study 1—The results of the EFA of youth ratings were very similar to that for caretaker ratings. As shown in Table 1, the eigenvalues for the first three factors exceeded the 95th percentile of the distribution of eigenvalues derived from the parallel analyses of random data sets, indicating that up to three factors could be extracted. The 3-factor solution was interpretable and highly consistent with the developmental propensity model. As shown in Table 2, items referring to sympathetic concern for others, helping, sharing, respect for rules, and the capacity for guilt had loadings ≥ .40 on only the *prosociality* factor. Unlike caretaker ratings, however, three sociability items (*likes meeting people*, *friendly*, and *enjoys being with others*) also loaded uniquely on the *prosociality* factor for youth ratings. The items that loaded uniquely on the second factor (*negative emotionality*) referred to getting upset easily, intensely, unpredictably, and out of proportion to the provocation. In addition, items referring to jealousy and getting bored easily loaded uniquely on the second factor. The items loading uniquely on the third factor (*daring*) described the youth as someone who enjoys rough games and sports, likes things that are exciting and loud, and is daring, adventurous, and brave.

Tests of Invariance of the 3-Factor Solution Across Sex—Using Rummel's (1970) congruence coefficient, the 3-factor solution was highly similar for the CADS-Y among girls and boys, with the coefficients for the three factors ranging from .91 to .95.

Tests of Factor Invariance Across Informants—The results of the earlier EFA of adult caretaker ratings in this sample (Lahey et al., 2008) were compared to the results of the present EFA of youth self-ratings. The congruence coefficients (Rummel, 1970) between the CADS and CADS-Y for *prosociality*, *negative emotionality*, and *daring* for 9–17 year olds were .96, .97, and .89, respectively, indicating a very high degree of invariance across informants.

STUDY 2

Study 2 used data from a representative sample of twins to conduct CFAs to test the 3-factor model suggested by the theoretical model (Lahey & Waldman, 2003, 2005), the results of the CFA of the CADS-P (Lahey et al., 2008), and the present results of the Study 1 EFA. Items with factor loadings of ≥ .40 on each factor in the EFA in Study 1, and no secondary loadings on another factor of ≥ .30 (Table 3), were selected as the best manifest indicators of the three hypothesized dimensions in the CADS-Y for use in Study 2. In order to provide the strongest tests to the 3-factor hypothesis for the CADS-Y, it is necessary to compare the findings of the EFAs to other plausible structural models.

We compared the hypothesized CADS-Y 3-factor model to the following simpler nested alternative models in CFA using data from Study 2:

1. *One-factor model*. A 1-factor model was the baseline model.
2. *Two-factor model*. We compared the CADS-Y 3-factor model to a 2-factor model based on the broad construct of constraint (Tellegen, 1982), in which *negative*

emotionality constituted one factor in the CADS-Y and the combination of *prosociality* and *daring* dimensions constituted the second factor.

3. *Three-factor model*. The three dimensions of *negative emotionality*, *prosociality*, and *daring* defined in Table 3 constituted the 3-factor model of socioemotional dispositions (Lahey et al., 2008;Lahey & Waldman, 2003,2005).

Study 2 Methods

Study 2 Participants—The Tennessee Twin Study (TTS) sample was representative of all 6–17 year old twins who were born in Tennessee and were still living in one of the state's five metropolitan statistical areas (Nashville, Memphis, Knoxville, Chattanooga, and Bristol) in 2001. Addresses of potentially eligible families were provided by the Tennessee Department of Health. A random sample of those families was selected stratified on the age of the twins and 35 geographic subareas. Household interviews were completed with 2,063 adult caretakers (90.8% biological mothers, 7.5% biological fathers, 0.5% step-mothers, and 1.2% grandmothers), with a response rate for caretakers of 69.8% and 97.9% for 9–17year old twin pairs whose caretaker was interviewed. Twin pairs were excluded if either twin had been diagnosed as psychotic (twin 1 $n = 17$; twin 2 $n = 11$), or autistic (twin 1 $n = 8$; twin 2 $n = 5$). Only pairs in which both twins were interviewed are included (N = 2,025 pairs). The caretaker classified 71.4% of the twin pairs as Non-Hispanic white, 23.3% as African American, and 5.3 % as members of other race-ethnic groups. The proportion of females was 51.5% (twin 1) and 49.8% (twin 2). The present analyses are based on self-report data from the 832 pairs of 9–17 year old twins.

Study 2 Measures—Exactly the same measures were used in Study 2 as in Study 1.

Study 2 Data Analysis—CFAs were next conducted in Mplus 3.0 using data from Study 2 to confirm the three hypothesized CADS-Y dimensions, which were defined by the items that loaded most strongly and uniquely on each of the three factors identified in the EFA of data from Study 1. CFA was used to compare the fit of the hypothesized 3-factor model to alternative structural models of CADS-Y items. CFA was conducted on the variance-covariance matrices for CADS-Y items using maximum-likelihood estimation, which assumes multivariate normality. Given the untenability of this assumption for the skewed and kurtotic CD data, we also estimated the asymptotic covariance matrix. This allows estimation of appropriate standard errors and use of the Satorra-Bentler scaled χ^2, which does not assume multivariate normality and scales the χ^2 test to adjust for the non-normality of the data. Alternative models were compared using the scaled difference (Δ) χ^2 test, which is appropriate for non-normal data (Satorra & Bentler, 2001). The last step was to choose between orthogonal and correlated (oblique) factor versions of the hypothesized 3-factor model.

Study 2 Results

Hypothesis Tests in CFA of the CADS-Y—For the CAD-Y, the scaled $\Delta\chi^2$ (Satorra & Bentler, 2001) indicated a slightly but significantly better fit for each twin for the correlated 3-factor model than the orthogonal 3-factor model (Table 4). There were only very slight differences between these models, however, in the NFI, RMR, AIC, or RMSEA, with the RMSEA for both the correlated and orthogonal 3-factor models being near the .05 threshold for a "close fit" (Brown & Cudeck, 1993) for both twins. As shown in Table 4, the scaled $\Delta\chi^2$ and all fit indices showed that the correlated 3-factor model fit significantly better than either the 1-factor model or the correlated 2-factor model for the CADS-Y. Note that the scaled $\Delta\chi^2$ test is only appropriate for comparisons among nested models, which not all of the tested alternatives are.

Factor Inter-Correlations—Correlations among the latent factors in the best-fitting 3-factor model are presented in Figure 1. Because the correlations among factors were virtually identical for twin 1 and twin 2, the averages of the inter-factor correlations for the two twins are presented for simplicity. The small correlations among factors resulted in the correlated 3-factor model fitting significantly better than the orthogonal model, even though the differences in the supplemental fit indices were slight.

STUDY 3

The CADS-Y and a self-report measure of the widely-endorse five-factor model of personality (Costa & McCrae, 1992) was administered to the participants in Study 3 in order to describe correlations between CADS-Y dimensions and these dimensions of personality. These correlations help place the CADS-Y dimensions in the context of an established measure of socioemotional dispositions developed for different purposes.

Study 3 Methods

Study 3 Participants—Participants were enrolled in a longitudinal case-control study of children who met DSM-IV diagnostic criteria for ADHD and matched comparison children (Lahey, Pelham et al., 2004). Participants were recruited at 4–6 years old at two sites and in two cohorts, with the second cohort entering one year after the first cohort. In Chicago, children presenting to a university child psychiatry clinic with inattention and/or hyperactivity were recruited. In Pittsburgh, 42.4% of the children who met criteria for ADHD were referred to a university child psychiatry clinic and the rest were recruited through advertisements. Non-ADHD comparison children had never been referred for mental health services and matched on age, sex, and race-ethnicity were recruited from the same schools and neighborhoods. Participants were eligible only if they lived with their biological mother and did not exhibit pervasive developmental disorder, psychosis, or clear neurological disorder. Of the 315 eligible children, 259 (82.2%) participated in the initial assessment.

Study 3 participants were reassessed in years 2–4 and 6–9 with > 90% retention in each reassessment wave (Lahey et al., 2007; Lahey, Pelham, Loney, Lee, & Willcutt, 2005). Due to limitations in funding, the participants were next reassessed in years 12–13, with approximately half of the comparison children dropped from the study after year 9. Of the youth participating in the year 12 and/or year 13 assessment, 96 had met DSM-IV symptom criteria for ADHD in year 1 and 59 were non-ADHD comparison children. The caretaker classified 60.9% of these participants as Non-Hispanic white, 33.5% as African American, and 5.6% as members of other race-ethnic groups. The proportion of female participants was 23.0%.

Study 3 Measures—Beginning in year 6, both youth and caretakers rated the youth on the 48 CADS items in each reassessment. In addition, during a single calendar year, youth participating in either the year 12 or year 13 assessment (depending on their cohort) completed the NEO Five-Factor Inventory (NEO-FFI) (Costa & McCrae, 1992) at ages 16–18 years.

Study 3 Data Analysis—Because CADS-Y scores were not normally distributed in Study 3, Spearman rank correlations were calculated between the CADS-Yand NEO-FFI scores completed by the same youth. The CADS-Y was completed when the youth were 16–18 years in the year 12 (N = 158) and year 13 (N = 150) reassessments. The NEO-FFI was completed by all youth in a single calendar year during either their year 12 or year 13 reassessment, depending on the youth's cohort. Correlations between CADS and NEO-FFI factor scores were corrected for attenuation due to lack of perfect reliability of both instruments (Spearman, 1904). Estimates of the test-retest reliability of the CADS were based on the results of Study

1, and estimates of the test-retest reliability for the NEO-FFI used in the correction of correlations for attenuation were based on published findings (Murray, Rawlings, Allen, & Trinder, 2003).

Study 3 Results

Spearman rank correlations corrected for attenuation due to unreliability between CADS-Y dimensions and NEO-FFI dimensions at ages 16–18 years are shown in Figure 2. As discussed below, these revealed complex, but definable relations between the two instruments.

TESTS OF RELIABILITY AND EXTERNAL VALIDITY OF CADS-Y DIMENSIONS IN STUDY 1

Reliability of CADS-Y Dimensions

Data from the test-retest subsample of Study 1 were used to estimate the reliability over 7–14 days of CADS-Y factor scores (Lahey, Applegate et al., 2004). Unit-weighted factor scores were computed by taking the mean of all non-missing items with loadings on each factor of ≥ .40 and no secondary loadings of ≥ .30 (see Table 3). Test-retest intra-class correlations and Cronbach's alphas for each factor score are presented in Table 5. These indicate that all factor total scores of the CADS-Y are reliable, both in the sense of short-term stability and internal consistency for both informants.

Relations of the CADS-Y Dimensions to CD

We conducted a test of the external validity of the CADS-Y using data from Study 1 to determine if unit-weighted CADS-Y factor scores exhibit the same pattern of associations with CD predicted by the model (Lahey & Waldman, 2003, 2005), as already has been confirmed for the CADS-P (Lahey et al., 2008).. The criterion variables were mean ratings on DSM-IV symptoms of DSM-IV CD completed by both caretaker and youth separately on the CAPS to test hypothesized associations between CADS-Y dimensions and CD within and between informants in two analyses. Because CD ratings were highly skewed and kurtotic, log-linear regression models employing robust standard errors were used. In these models, the three unit-weighted CADS-Y factor scores, age, sex, total family income, and race-ethnicity were entered as simultaneous predictors. Two separate log-linear regression models used adult caretaker and youth ratings of CD symptoms as the response variables, with the three dimensions of socioemotional dispositions, age, sex, and race-ethnicity as predictor variables. As shown in Table 6, *negative emotionality* and *daring* scores of the CADS-Y were each positively related to CD, and *prosociality* was inversely related with CD in joint regression models, both within and across informants. Because log-linear regression does not provide an estimate of the amount of variance explained by the predictors, a pseudo-R^2 was calculated by taking the square of the Pearson correlations between the predicted and observed values in each model using only the three CADS dimensions as the predictors. Only for the purpose of estimating pseudo-R^2, CD scores were first residualized on age, sex, race-ethnicity, and total family income.

Means and Standard Deviations

In order to allow comparisons across samples in future studies, means and standard deviations for the three CADS-Y dimension scores are presented in Table 7 by sex and age group.

DISCUSSION

Lahey et al. (2008) developed the CADS based on adult caretaker reports for the purpose of testing the developmental propensity model (Lahey & Waldman, 2003, 2005) and related

models of the transactional origins of CD during childhood and adolescence. Consistent with the developmental propensity model, an EFA of an initial item pool suggested a 3-factor structure, which was confirmed using CFA in a separate sample. Other analyses showed that the CADS had high test-retest validity and provided strong construct validation.

The present study used youth self-report versions of the same initial item pool to conduct parallel EFA and CFAs to construct the CADS-Y. EFA of these items indicated virtually the same 3-factor structure as in the CADS, which was confirmed using CFA in a separate sample. Similarly, the CADS-Y was shown to have good test-retest reliability and internal consistency. CADS-Y and CADS factor scores were substantially correlated with one another and showed the same pattern of independent associations with symptoms of CD as specified in the model. Indeed, the CADS-Y dimensions accounted for substantial variance in CD, both within and across informants.

These findings suggest that the CADS-Y functions as a parallel youth self-report version of the CADS, providing a basis for further tests of the model. Furthermore, the high degree of invariance of the factor structure of the CADS and CADS-Y provides substantial support for the model. Similarly, the findings that both the CADS and CADS-Y were associated with CD as predicted by the model, both within and between informants on CD, provides additional strong validation. Clearly, the three socioemotional dispositions specified in the model can be identified empirically and they show exactly the independent associations with CD as hypothesized. Furthermore, an independent longitudinal test of the developmental propensity model using the CADS confirmed its predictions in the sense that the three CADS dimensions measured at time 1 predicted time 2 CD controlling for time 1 conduct problems (Trentacosta et al., in press). Thus, at the level of measurement and correlations with CD, the model is well-supported. The next necessary steps will involve more detailed tests of the hypotheses of the model related to the causes of the dispositions and the causal role of the dispositions in the social learning of antisocial behavior.

The correlations between CADS-Y and NEO-FFI factors scores are important in helping place the three dispositional dimensions of the developmental propensity model in the context of the FFM of personality (Costa & McCrae, 1995). As shown in Figure 2, the three CADS-Y factor scores explained a considerable amount of variance in four of the five NEO-FFI factor scores, and vice-versa. There was generally not a one-to-one association between the two sets of factor scores, however. CADS-Y *negative emotionality* showed a robust positive correlation with NEO-FFI neuroticism, as might be expected, but also was inversely correlated with agreeableness and conscientiousness at more modest levels. Similarly, CADS-Y *prosociality* was moderately correlated with each of the NEO-FFI agreeableness, conscientiousness, and extraversion factors. Only CADS-Y *daring* showed a simple association with the FFM, being moderately correlated with extraversion.

There is a well-established literature on associations between FFM traits and antisocial behavior, including studies that indicate that the FFM constructs of agreeableness and conscientiousness are correlated with conduct problems in youth (Heaven, 1996; John et al., 1994). The developmental propensity model, and the CADS which operationalizes its constructs, provides an alternative perspective on relations between socioemotional dispositions and CD. The correlations shown in Figure 2 indicate that the CADS-Y and NEO-FFI both provide alternative ways of specifying much of the same variance in such dispositions in adolescents. Therefore, can an argument be made for utility of the alternative developmental propensity model?

On the one hand, the FFM is a widely supported and accepted theoretical model of personality traits. Therefore, using the NEO-FFI or other measures of FFM traits has the important

advantage of integrating research on CD with a large literature on personality traits and other behavioral characteristics related to those traits. On the other hand, there are a number of reasons why the developmental dispositions model may have value as an alternative to understanding the role of dispositions in the development of CD.

First, the developmental dispositions model provides a coherent and face-valid theoretical account of the role of socioemotional dispositions in transactions with the social environment across the course of development that result in the learning of antisocial behaviors and there is not a coherent theoretical model of the development of CD based on the FFM at this point. Second, because the FFM was developed primarily in adult populations, the FFM may not apply equally well to younger age groups. Indeed, there is some evidence of important differences in the content and structure of dispositions in childhood and adolescence compared to adulthood (Shiner & Caspi, 2003). In this context, it is important to note that the absolute fit of the three CADS-Y dimensions to the data was quite good, whereas previous tests of both FFM and 3-factor models of personality using CFA in adults have not yielded acceptable fits (Egan, Deary, & Austin, 2000; Jackson, Furnham, Forde, & Cotter, 2000; McCrae, Zonderman, Costa, & Bond, 2002; Moosbrugger & Fischbach, 2002; Renner, 2002; Vassend, & Skrondal, 1997; Yoon, Schmidt, & Ilies, 2002). Moreover, Barbaranelli, Caprara, Rabasca, and Pastorelli (2003) developed a scale to assess FFM dimensions in children and adolescents, which also did not achieve an acceptable fit in CFA for the five factors. They then evaluated the fit using an unrestricted CFA, in which items were free to load on any of five factors. This provided a far more lenient test of their model than the CFA used in the present study, in which each item was specified in advance to load on only one factor. Using this lenient test, Barbarnelli et al. (2003) found that the FFM fit at levels comparable to the fit indices in the present CFA of the CADS. Thus, the construct validity of the three distinct dispositions measured by theCADS and CADS-Y could be greater than that of existing instruments based on the FFM for children and adolescents.

It is possible that CFAs of FFM inventories have not yielded acceptable fits to the data partly because the structure of socioemotional dispositions in these instruments is obscured by the inclusion of many items that are similar to symptoms of psychopathology. Because symptoms of anxiety, depression, and conduct problems are substantially correlated with one another in the general population (Angold, Costello, & Erkanli, 1999), including items similar to these correlated symptoms of psychopathology in a personality scale would tend to increase correlations among the dimensions. This is one reason that such items were excluded from the CADS and the parallel CADS-Y.

It is also potentially important to note that the three CADS-Y factor scores were found to be nearly orthogonal (i.e., showed only modest correlations among the factors), whereas the factors scores of FFM scales are substantially inter-correlated (Digman, 1997). Thus, one reason that CADS-Y *prosociality* and *negative emotionality* factors were each correlated with multiple NEO-FFI factors is that the latter scales are themselves substantially correlated with one another. This could mean that the CADS-Y 3-dimensional structure provides a more parsimonious and more differentiated representation of the dispositional variance measured by the NEO-FFI for children and adolescents. A great deal of additional research is needed to resolve these questions, of course. At this point, the CADS-Y appears to offer researchers an empirically validated alternative tool to assess socioemotional dispositions related to CD in a self-report questionnaire format.

It is important to note that the CADS-P and CADS-Y were developed specifically for research and, at least at this point in time, they should not be used for clinical purposes. Nonetheless, it is possible that future research using the CADS-P and CADS-Y will show that youth with CD who have different dispositional profiles will differ in terms of their prognosis and most

effective treatment strategies, giving them significant clinical utility. Similarly, it is possible that future research could find that the CADS instruments could be used to screen for high-risk groups that have not developed CD, but are at risk for developing it. At this point, however, such clinical applications would be premature and not evidence-based.

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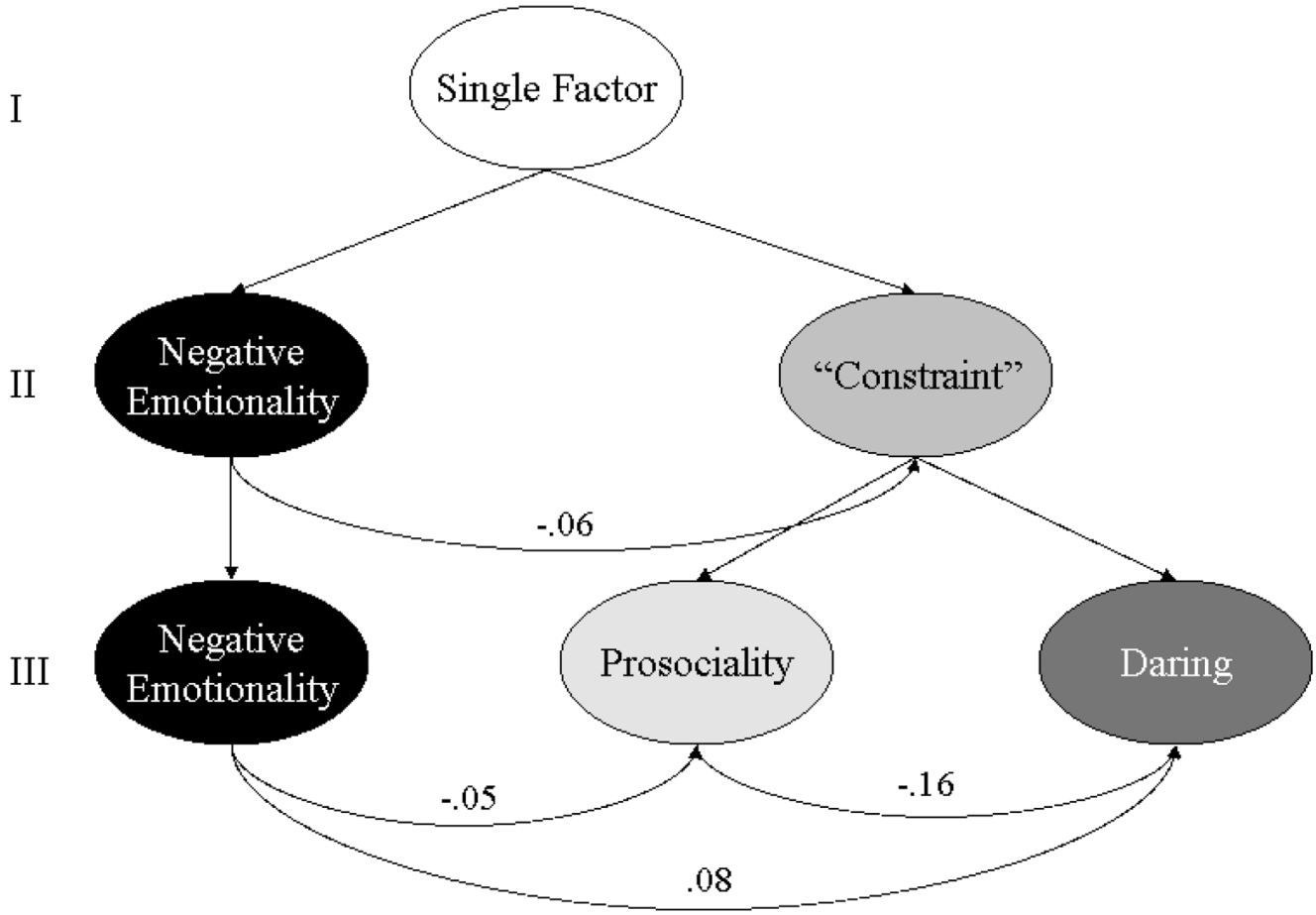

Figure 1.
Correlations among the latent factor scores in three nested models of CADS dimensions compared in confirmatory factor analysis using self-report ratings in Study 2 (Tennessee Twin Study). Correlations of $r \geq .08$ were significant at $p < .05$.

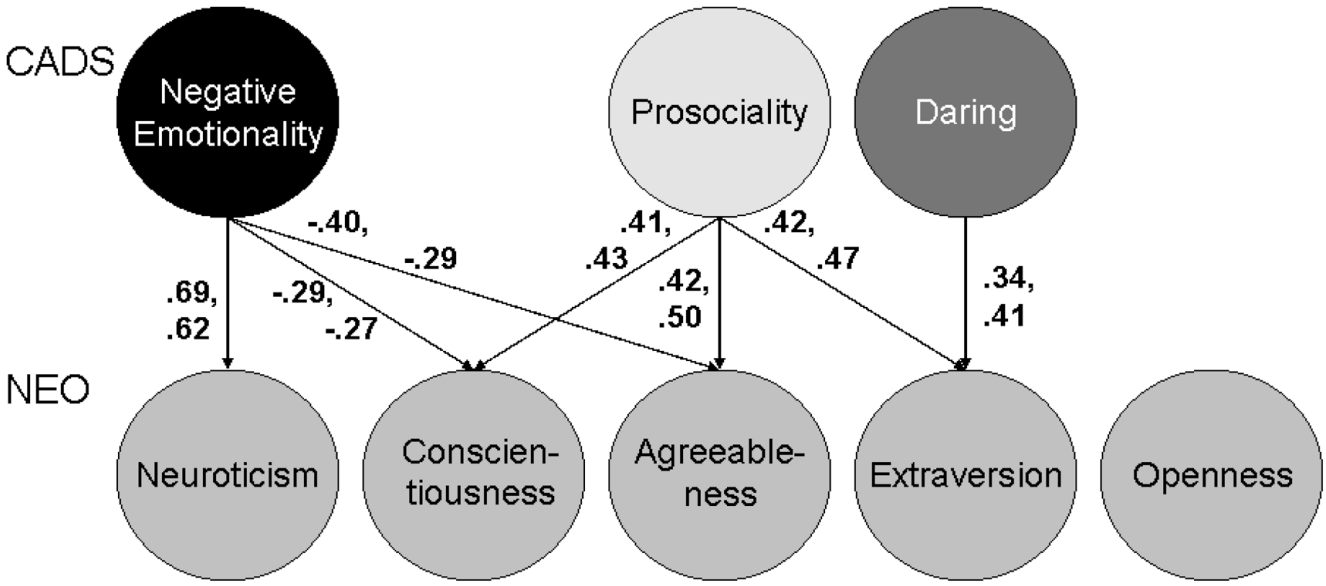

Figure 2.

Spearman rank correlations corrected for attenuation due to lack of perfect reliability between the CADS-Y in the years 12 (N = 158) and 13 (N = 150) reassessments, respectively, and NEO-FFI factor scores completed by the same youth at 16–18 years in sample 3 (Growing Up with ADHD Study). Participants completed the NEO-FFI during either year 12 or 13 depending on their cohort. All correlations ≥ .20 (before adjustment for attenuation) are shown (all $p < .05$).

Table 1

Eigenvalues from parallel analyses of random data and actual eigenvalues of the reduced correlation matrix and proportion of variance explained by each of the first 10 factors in the principal factor analyses of 48 items from the Child and Adolescent Dispositions Scale items for 832 self-report ratings of 9- through 71-year-olds (434 girls and 398 boys) in Study 1 (Georgia Health and Behavior Study).

Number of Factors Extracted	95th %ile of Random Data Eigenvalues	Study Eigenvalues	Proportion of Explained Variance
1	1.54	6.20	.444
2	1.48	3.15	.226
3	1.44	2.30	.165
4	1.40	1.03	.074
5	1.37	0.68	.049
6	1.35	0.64	.046
7	1.32	0.54	.039
8	1.30	0.46	.033
9	1.27	0.39	.028
10	1.25	0.32	.023

Table 2

Factor loadings from principal factors analysis of self-report ratings of items from the Child and Adolescent Dispositions Scale (n = 832) in Study 1 (Georgia Health and Behavior Study).

	Prosociality	Negative Emotionality	Daring
Concerned about others when they are hurt	**.662**		
Cares about others' feelings	**.655**		
Cheers up others	**.649**		
Feels sorry for kids who get picked on	**.633**		
Spontaneously helps others	**.602**		
Likes meeting people	**.536**		
Friendly	**.488**		
Enjoys being praised	**.480**		
Would feel guilty if broke a law	**.458**		
Concerned about right and wrong	**.453**		
Enjoys being with others	**.430**		
Would be upset if saw an animal get hurt	**.425**		
Wants everyone to follow the rules, including self	**.419**		
Tries to do excellent work	.398		
Enjoys learning interesting things	.374		
Cautious	.332		
Avoids situations where might get hurt	.332		
Spontaneously shares	.328		
Would be bothered if had no friends	.313		
Thinks it would be fun to watch dogs fight	−.316		.314
Enjoys bothering or hurting others	−.346		
Thinks it is funny when others are upset	−.374		
Gets upset easily		**.619**	
Reacts intensely		**.553**	
Moods change unpredictably		**.511**	
Blows things out of proportion		**.472**	
Gets bored easily		**.462**	
Jealous		**.441**	
Easily embarrassed		**.433**	
Emotional	.355	**.417**	
Selfish		.357	
Enjoys disobeying adults		.351	
Daring and adventurous			**.611**
Enjoys risky and dangerous things			**.599**
Likes rough games and sports			**.528**
Brave			**.526**
Likes things that are exciting and loud			**.504**
Likes violent TV, games, movies	−.358		**.430**
Likes to scare other kids			.367

	Prosociality	Negative Emotionality	Daring
Can be smooth and charming to get own way			.347
Afraid of kids who fight			−.339

Note: All factor loadings of ≥ .30 are shown; loadings of ≥ .40 are in bold.

Table 3

CADS-Y items specified on the three hypothesized dimensions derived from Sample 1 exploratory factor analyses for testing in the Sample 2 confirmatory factor analyses.

Prosociality Dimension
Cares about others' feelings
Concerned about others when they are hurt
Spontaneously helps others
Cheers up others
Feels sorry for kids who get picked on
Would be upset if saw an animal get hurt
Enjoys being praised
Concerned about right and wrong
Wants everyone to follow the rules
Would feel guilty if broke a law
Likes meeting people
Friendly
Enjoys being with others
Negative Emotionality Dimension
Gets upset easily
Reacts intensely
Moods change unpredictably
Blows things out of proportion
Jealous
Gets bored easily
Easily embarrassed
Daring Dimension
Daring and adventurous
Enjoys risky and dangerous things
Likes rough games and sports
Likes things that are exciting and loud
Brave

Table 4

Fit statistics and comparisons of alternative models of the latent structure of the self-reportversion of the Child and Adolescent Dispositions Scale using confirmatory factor analysis for each member ofthe 9–17 yearold twin pairs, randomly designated as “twin 1” and “twin 2” in Study 2 (Tennessee Twins Study).

Models	Twin	d.f.	Satorra-Bentler χ^2	NFI	RMR	AIC	RMSEA (90% C.I.)	Scaled $\Delta\chi^{2\,a}$	d.f.
Hypothesized 3-factor model:									
Three factors (orthogonal)	1	275	1389	.88	.043	1489	.055 (.052–.058)	12*	3
	2	275	1370	.88	.045	1470	.055 (.052–.058)	40*	3
Three factors (correlated)	1	272	1377	.88	.042	1483	.055 (.052–.058)		
	2	272	1325	.88	.040	1431	.054 (.051–.057)		
Alternative models:									
One factor	1	275	3578	.75	.071	3678	.094 (.092–.097)	2275*	3
	2	275	3254	.77	.064	3354	.090 (.088–.093)	2968*	3
Two factors (correlated)	1	274	2403	.82	.058	2505	.076 (.073–.079)	1481*	2
	2	274	2270	.83	.055	2372	.074 (.071–.077)	896*	2

All model Satorra-Bentler χ^2 tests significant at $p < .0001$.

*$p < .05$.

Note: 1-factor = Negative Emotionality + Prosociality + Daring; 2 factors = Negative Emotionality, Prosociality + Daring; 3 factors = Negative Emotionality, Prosociality, and Daring; NFI = normed fit index; RMR = root mean square residual; AIC = Akaike’s Information Criterion; RMSEA = root mean square error of approximation; N = 830 for “twin 1” and N = 832 for “twin 2.”

Table 5

Test-retest reliability coefficients and internal consistency (Cronbach's α) of unit-weighted total factor scores for the hypothesized socioemotional dispositions dimensions and facets in Study 1 (Georgia Health and Behavior Study).

	Test-Retest Reliability ICC (N = 194)	Cronbach's α (N = 790)
Prosociality	.72	.84
Negative Emotionality	.62	.70
Daring	.78	.69

Note: ICC = intraclass correlation; ICCs $p < .0001$.

Table 6

Associations between the three hypothesized socioemotional dispositions dimensions of the CADS-Y and conduct disorder assessed in joint multiple regression analyses in Study 1 (Georgia Health and Behavior Study).

	Caretaker-Rated Conduct Disorder			Youth-Rated Conduct Disorder		
	β	χ^2	Pseudo R^2	β	χ^2	Pseudo R^2
Prosociality	−1.02	55.45	.35	−0.90	89.82	.54
Negative Emotionality	0.62	24.08		0.68	58.56	
Daring	0.56	20.03		0.70	66.10	

Note: All coefficients $p < .0001$; all joint models controlled for the two other socioemotional dispositions, age, sex, and race-ethnicity; statistically significant interactions among the socioemotional dispositions are reported in the Results section for Study 1. Pseudo R^2 is defined in the Data Analysis section for Study 1.

Table 7

Means and standard deviations of CADS-Y dimension scores by sex and age groups in Study 1 (Georgia Health and Behavior Study).

		Negative Emotionality	Prosociality	Daring
Females	*N*			
9–11 years	137	1.11 (0.53)	2.68 (0.24)	1.45 (0.56)
12–14 years	141	1.09 (0.48)	2.54 (0.34)	1.56 (0.53)
15–17 years	156	1.20 (0.52)	2.52 (0.36)	1.56 (0.59)
Males				
9–11 years	132	1.10 (0.54)	2.44 (0.37)	1.81 (0.57)
12–14 years	133	1.14 (0.51)	2.31 (0.41)	1.85 (0.62)
15–17 years	133	1.05 (0.49)	2.26 (0.45)	1.89 (0.61)

Note: Dimension scores are the means of all non-missing items (rated 0–3) that load uniquely on each dimension.