Supplemental Information

COGNITIVE EVALUATION:

Participants were individually administered the Differential Ability Scales[45] to assess general cognitive ability in children ages 4 through 17 years, 11 months. The General Conceptual Ability (GCA) score is a general index of an individual's ability to perform complex mental processing.[15]

COGNITIVE RESULTS

Results from the Differential Ability Scales, including GCA, revealed, on average, higher scores (by > 1 SD) in the control group, compared with the XYY and KS groups (Table 1, analysis of variance, $P < .0001$). Performance in the XYY and KS groups was similar and was published previously.[15] GCA was <70 in 3 (12%) and could not be measured in 4 (15%) of 26 boys with XYY because of behavioral difficulties during testing. Thus, GCA was <70 or could not be measured in 27% of the boys with XYY. GCA was <70 in 6 (7%) and could not be measured in 1 of 82 boys with KS because of behavioral difficulties during testing. No control boys had GCA <70.

A. Parent Questionnaires

1. The Child Behavior Checklist

The CBCL was developed by Achenbach and Edlebrock[47] as a standardized measure of behavior problems and social competency in children ages 2 to 18 years. The CBCL includes *t* scores for 10 problem behavior areas and for 3 social competency areas (activities, social, and school). The behavior problem scales include internalizing, externalizing, and total behavior domain scores. The internalizing domain scale measures behaviors with an internal locus of control, and includes subscales of anxiety/depression, withdrawal, and somatic complaints. The externalizing domain scale includes symptoms, such as aggressive behavior, lying, and hyperactivity. The social competency scales include measures of activities (participation in sports, activities, and jobs), social interactions (friends, time with friends, relationships with peers, siblings, and parents), and school performance (academic achievement, need for special education, and grades repeated). Reliability and validity for the CBCL is well established and the measure is widely used in child behavior studies.

2. Conners' Parent Rating Scale–Revised-Long Version

The CPRS-R[48] is a well established, standardized measure assessing parental report of attention problems, hyperactivity, impulsivity, and other behavioral symptoms associated with ADHD in children ages 3 to 17 years and is based on normative age- and gender-specific data from 2000 parents. Subscales include Oppositional (difficulty with authority figures, likely to break rules, feeling easily annoyed or angered by others), Cognitive Problems/Inattention (inattention and/or difficulties with schoolwork as well as difficulties with organization, completing tasks, and distractibility), Hyperactivity (difficulty sitting still, being more restless than others, engaging in impulsive behavior), Anxious-Shy (worrying more than others, sensitive to criticism, feeling anxious or shy in new situations), Perfectionism (sets high goals for self and more obsessive than others), Social Problems (having few friends, low levels of self-esteem, isolated socially from peers), and Psychosomatic (complaints of physical symptoms). The CPRS-R index scales include Restless-Impulsive Global index, Emotional Lability Global index, DSM-IV: Inattentive index (DSM-IV criteria of inattentive symptoms), and DSM-IV: Hyperactive-Impulsive index (DSM-IV criteria of hyperactive-impulsive symptoms).

3. Social Communication Questionnaire

The SCQ[49] screens for autistic behaviors. It consists of 40 items that were determined to be the most predictive for autism diagnoses from the Autism Diagnostic Interview, a standardized interview measure used in the diagnosis of autism. Items include yes/no questions related to communication (reciprocal conversation, repetitive speech, use of gestures), reciprocal social interactions (interactions with other children, friendships, play skills), restricted interests, and stereotyped behavior. There are 2 forms: the Current version for children 4 to 5 years of age, and the Lifetime version for children 6 years and older. Scores of 15 or higher indicate that further assessment should be performed to evaluate for an autism spectrum disorder.

B. Child Self-Report Questionnaires

1. Children's Depression Inventory

The Children's Depression Inventory (CDI)[50] is a widely used self-report

measure for assessment of depression in children. Reliability, internal consistency, and validity have been well established. The CDI assesses cognitive, affective, and behavioral signs of depression in children ages 6 to 17. Total CDI score reflects the presence of overall depressive symptoms. Additional measures include Negative Mood (symptoms of sadness, guilt, crying), Interpersonal Problems (symptoms related to not getting along with others, misbehaving), Ineffectiveness (symptoms focusing on difficulties with schoolwork, feelings of inferiority), Anhedonia (symptoms of feeling decreased pleasure and fun, sleep or appetite changes, feeling alone, worrying), and Negative Self-Esteem (symptoms of self-dislike, feeling unloved, feeling unsure of the future).

2. Revised Child's Manifest Anxiety Scale

The Revised Child's Manifest Anxiety Scale[51] measures self-reported anxiety symptoms in children ages 6 to 19 years.

SES AND GCA ANALYSIS OF COVARIANCE

Parent Behavioral Questionnaire Results

1. The Child Behavior Checklist

SES was a significant covariate in the 3-group analyses for CBCL Total Problem behavior ($P < .05$), Internalizing ($P < .02$), and Somatic ($P < .03$) subscales. Age was a significant covariate for the CBCL Social Problems ($P < .0001$) and Attention ($P < .01$) subscales. GCA was a significant correlate of many of the behavioral subscales including Social Total ($P < .0001$), Problem Behavior Total ($P < .02$), Social Problems ($P < .0004$), Thought ($P < .003$), Attention ($P < .0004$), Aggressive ($P < .006$), and Sex Problems ($P < .02$) subscales, with lower GCA scores being associated with more behavior difficulties.

Social Competence

Age was not a significant covariate; however, SES was for Social Problems ($P < .03$), and GCA was a significant covariate for Activity ($P < .04$), Social ($P < .01$), and School subscales ($P < .0001$).

2. Conners' Parent Rating Scale–Revised-Long Version

In the CPRS-R, SES was not a significant covariate in the comparison of the 3 groups of boys. Age was a significant covariate for the Social Problems subscale ($P < .04$), with increased problems as boys got older. GCA was a significant covariate for all domains of the CPRS-R except for Anxiety and Perfectionism.

3. Social Communication Questionnaire

Age and SES were not significant covariates in the SCQ. GCA was a significant covariate ($P < .05$).

Child Self-Report Behavioral Questionnaire Results

Anxiety and Depression Questionnaire Results

SES was found to be a significant covariate for the negative self-esteem domain of the CDI with higher SES associated with lower symptom scores. Age and GCA, and prenatal diagnosis, were not significant covariates.