Covariation of the Anxious–Depressed Syndrome During Adolescence: Separating Fact From Artifact

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Nosological (symptom overlap) and methodological (informant) artifact in the covariation of an empirically derived syndrome of anxious–depressed symptoms with 7 other syndromes of emotional and behavior problems was examined in reports by parents, teachers, and adolescents on a nationally representative sample of 908 adolescents. Although minor symptom overlap was observed and the effects of informant were significant, the anxious–depressed syndrome covaried significantly with all other syndromes after controlling for these effects. Indices of covariation controlling for informant effects were all significant and ranged for all syndromes except for delinquent behavior from .619 to .681, reflecting significant covariation of the anxious–depressed syndrome with both externalizing and internalizing syndromes. Covariation of the anxious–depressed syndrome and delinquent behavior was .470. Implications for research on the comorbidity–covariation of depressive syndromes during childhood and adolescence are highlighted.

The covariation of symptoms or syndromes and the comorbidity of disorders are central characteristics of psychopathology during childhood and adolescence. In no instance is this more true than for symptoms, syndromes, and disorders that are related to depression in young people. Depressive problems represent a major mental health concern for children and adolescents, yet they present researchers and practitioners with an intriguing paradox. The recognition of depression as a distinct problem in children and adolescents has been accompanied by findings that it rarely occurs alone (Hammen & Compas, 1994); that is, depressive phenomena—whether we refer to depressed mood, an empirically derived syndrome of mixed anxious and depressive symptoms, or a diagnosis of major depressive disorder or dysthymic disorder in accordance with the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM–IV*; American Psychiatric Association, 1994)—are more likely to co-occur with other psychological problems than in isolation (Angold & Costello, 1993; Hammen & Compas, 1994).

Co-occurrence has been defined in two ways, reflecting different yet complementary approaches to psychopathology (Compas & Hammen, 1994; Lilienfield, Waldman, & Israel, 1994). According to one approach, co-occurrence is defined as *comorbidity*, a term that refers to the co-occurrence of two or more categorically defined disorders at a rate greater than would be expected by chance, as determined by the base rates of each of the disorders in the general population (Maser & Cloninger, 1990). According to a second approach, co-occurrence is defined as *covariation*, a statistical term for the degree to which symptoms covary or correlate with other symptoms (Achenbach, 1988; Compas & Hammen, 1994). The concept of comorbidity reflects a categorical approach to present or absent psychopathology, as embodied in nosologies such as the *DSM–IV* (American Psychiatric Association, 1994) and the *International Classification of Diseases—10 (ICD-10;* World Health Organization, 1992). The concept of covariation, by contrast, focuses on quantitative variations in problems and in relations between different groups of problems. Quantitative variation may better reflect psychopathology in childhood and adolescence, particularly with regard to depression. For example, subclinical levels of depressive symptoms are related to significant impairment and other problems in adolescence (Gotlib, Lewinsohn, & Seeley, 1995). Without clear assessment of symptom or syndrome covariation, we may erroneously attribute etiological factors, correlates, and sequelae to one disorder or syndrome when they are truly associated with a separate but comorbid condition (Angold & Costello, 1993; Caron & Rutter, 1991; Klein & Riso, 1993; Lilienfield et al., 1994; Maser & Cloninger, 1990).

The focus of the present article is the covariation of an empirically derived syndrome of anxious and depressed symptoms with seven other syndromes reflecting internalizing, externalizing, and mixed problems. Depressive problems during childhood and adolescence have been defined and operationalized in a variety of ways (see reviews by Angold, 1988; Compas, Ey, & Grant, 1993). In the present article, we used an empirically derived syndrome of symptoms of anxiety and depression (Achenbach, 1991a). The tendency for anxious and depressed symptoms to co-occur is consistent with findings from studies of adults (e.g., Clark & Watson, 1991) and studies with children using other measures of these problems (e.g., Lonigan, Carey, & Finch, 1994). Because the syndrome used in the present analysis is a mixture of anxious and depressed symptoms, however, it

precludes analyses of the covariation of symptoms of anxiety and depression per se, an important focus of other research (Brady & Kendall, 1992; Kendall, Kortlander, Chansky, & Brady, 1992). The anxious–depressed syndrome corresponds moderately with *DSM–IV* diagnoses of major depressive disorder and dysthymia (Compas et al., 1993). The symptoms comprised within the syndrome correspond most closely to the diagnostic category of mixed anxiety–depression that was included in the *DSM–IV* as a category proposed for further consideration. Findings from these analyses, however, may not generalize to categorical diagnoses of major depression or dysthymia. It is expected, however, that investigation of the covariation among empirically derived syndromes of emotional and behavioral problems will further illuminate the nature of depressive psychopathology as manifested in children and adolescents.

Recent reviews of the literature on syndrome covariation and diagnostic comorbidity have noted that several conceptual and methodological issues may fundamentally obscure "true" rates of covariation (Achenbach, 1990/1991; Angold & Costello, 1993; Caron & Rutter, 1991). These issues must be addressed before basic questions regarding patterns of comorbidity or theoretical and applied implications of comorbidity can be explored. Three potential sources of error are detection factors, nosological factors, and informant or method variance, all of which may contribute to artifactual as opposed to factual findings of comorbidity–covariation (Caron & Rutter, 1991; Cole & Carpentieri, 1990; Garber, Quiggle, Panak, & Dodge, 1991; Greenbaum, Dedrick, Prange, & Friedman, 1994). Detection factors include referral biases in clinical samples and screening and surveillance biases in research samples that may inflate comorbidity by focusing on participants who are more likely to have multiple problems (Caron & Rutter, 1991). Nosological sources of error include overlapping diagnostic criteria, the erroneous subdivision of single diagnostic categories into multiple disorders, and the possibility that one disorder may represent an early manifestation of another disorder rather than a separate condition (Caron & Rutter, 1991). .

Informant effects, the third potential source of error, are one type of method variance. It is well documented that ratings of different syndromes or disorders by the same informant tend to be highly correlated (Kazdin, 1994). This phenomenon may reflect a bias within the informant toward the child, the particular perspective of an informant as a result of the informant's relationship to the child, the context in which the informant experiences the child, or the behaviors that the informant is more likely to observe. Informant effects are particularly relevant to research with children and adolescents, where the reports of multiple informants are often needed (Achenbach, McConaughy, & Howell, 1987; McConaughy & Achenbach, 1994).

Three studies have directly addressed the issue of informant effects in the covariation of questionnaire measures of depressive symptoms with other problems. Garber and colleagues (Garber et al., 1991; Quiggle, Garber, Panak, & Dodge, 1992) examined the covariation of depressive symptoms and aggressive behavior among nonreferred children as reported by parents, teachers, and the children themselves. They found that correlations between depressive symptoms and aggression were stronger within informants than were correlations of the same construct across informants, suggesting the presence of infor-

mant effects and the potential inflation of observed rates of covariation. Using confirmatory factor analysis (CFA) to control for these effects, Garber et al. obtained a covariation index, equivalent to a correlation, of .42, reflecting a moderate and significant degree of association beyond the effects of informant (Garber et al., 1991). Cole and Carpentieri (1990) also examined the covariation of depressive symptoms and conduct problems in reports of peers, teachers, and children on a community sample and obtained a covariation index of .73 using CFA for depressive symptoms and conduct problems. Finally, Greenbaum et al. (1994) tested informant effects in parent, teacher, and self-reports of emotional and behavioral problems among clinically referred children and adolescents. Using CFA on a model that assesses informant effects by the degree of correlation of error terms (uniquenesses), they found substantial informant effects in the reports of all respondents across internalizing, externalizing, thought, and attention problems. However, beyond these effects, they also found good convergent and divergent validity for all targeted problem areas, indicating that measures of the underlying constructs were not merely a function of informant effects.

These studies suggest that high rates of covariation are not fully accounted for by informant effects; that is, rates of covariation do not simply represent an artifact of methodology and may, therefore, validly reflect the covariation of symptoms. A number of questions regarding covariation, however, remain. First, prior studies of informant effects offer substantially different rates of covariation (Cole & Carpentieri, 1990; Garber et al., 1991). Second, prior research has examined covariation between depressive syndromes and aggression–conduct problems; however, the covariation between depressive syndromes and other syndromes that reflect both internalizing (e.g., somatic complaints) and externalizing (e.g., attention difficulties) problems after controlling for informant effects still needs to be investigated. Third, the studies cited have used large and representative samples; however research using a nationally representative sample of children and youths may provide a more widely generalizable test of covariation. Finally, prior investigations have used different measures across informants that operationalized depression and conduct problems differently depending on the source of information (i.e., the method of measurement was potentially confounded with the source of the information). Research using a common assessment procedure across informants, with reference to a single, well-defined taxonomy may provide clearer definitions of individual taxonomic constructs as well as of the degree of covariation between these constructs.[1]

The purpose of the present study was to examine the contribution of symptom overlap and informant variance to the covariation of a syndrome of mixed anxious and depressive symptoms

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[1] The use of common measures across all informants is useful in ensuring that all informants are responding to the same items and, therefore, the same operational definition of the construct. This approach is not without problems, however, as it introduces an additional source of bias in the form of "instrument variance;" that is, the covariation of different syndromes could be somewhat inflated because the same method (questionnaire) and the same items were used for all informants. The present findings may have been affected by this potential source of error.

with seven other problem syndromes. Detection biases that result from the use of clinically referred and other deviant samples were minimized by using a nationally representative sample of children and youths[2] (Achenbach, Howell, Quay, & Connors, 1991). Data were collected from parents, teachers, and adolescents on common assessment instruments that operationally define a single, well-validated taxonomy. To avoid nosological artifact caused by overlapping symptoms, we established rates of covariation after partialing out symptoms that were common across multiple syndromes. The major focus of the study involved analyses of informant effects through CFA and a test of the correlation of uniquenesses (Kenny & Kashy, 1992). CFA partials variance into trait and unique factors. Correlations of the uniquenesses of variables assessed by a common method represent method variance, whereas correlations between trait factors represent the degree of covariation of these factors beyond method variance (Greenbaum et al., 1994; Kenny & Kashy, 1992). Finally, the present study examined the covariation of a syndrome of depressive and anxious symptoms with a wider range of other symptoms and syndromes than in previous studies.

Method

Participants

Participants were 908 11- to 19-year-olds ($M = 14.11$, $SD = 2.31$) drawn from a larger study (Achenbach et al., 1991; McConaughy, Stanger, & Achenbach, 1992; Stanger, McConaughy, & Achenbach, 1992). They were recruited by Temple University's Institute for Survey Research in 1986. They were originally selected to be representative of 4- to 16-year-olds with respect to ethnicity, socioeconomic status (SES), geographic region, and area of residence within the 48 contiguous United States. Data for the present study reflect reports at the time of the first follow-up, 3 years after initial contact. Participants were included in the present analyses if complete data were available from parent, teacher, and self-reports.[3] The sample was 51% female and 49% male. Scored on Hollingshead's (Hollingshead, 1975) 9-point scale for parents' occupation, where 1 = *unskilled labor* and 9 = *major business or professional status*, SES ranged from 1 to 9 with a mean of 5.60 ($SD = 2.17$). The sample was 78% Caucasian, 12% African American, 7% Hispanic American, 1.5% percent Asian American, and 1.5% other groups.

Measures

We assessed emotional and behavioral problems using parent reports on the Child Behavior Checklist (CBCL), teacher reports on the Teacher's Report Form (TRF) and self-reports on the Youth Self-Report (YSR; Achenbach, 1991b, 1991c, 1991d). The CBCL and the TRF each have 118 items tapping behavioral and emotional problems; the YSR has 102 similar items. Problems are scored as 0 (*not true*), 1 (*somewhat or sometimes true*), and 2 (*very true or often true*) of the participant. Most items have counterparts across the three forms, but some items are specific to a single informant as they represent problems more likely to be observed by that informant.

The CBCL, TRF, and YSR yield scores for eight empirically derived cross-informant syndromes that were created from instrument-specific "core syndromes." Cross-informant syndromes represent the following distinct problem areas: social withdrawal, somatic complaints, anxious–depressed, social problems, thought problems, attention problems, aggressive behavior, and delinquent behavior (Achenbach, 1991a). Reliability and validity of the CBCL, TRF, and YSR have been reported

elsewhere (Achenbach, 1991b, 1991c, 1991d) and reflect excellent psychometric properties.

Symptoms of mixed depression and anxiety were assessed by scores on the anxious–depressed syndrome. The anxious–depressed syndrome includes anxious as well as depressive items and has been shown to be a reliable and valid measure of depressive symptoms with a moderate degree of association with DSM–III (DSM, third edition; American Psychiatric Association, 1980) diagnoses of depression (Compas et al., 1993). Specifically, in a study of the convergence between CBCL depression scores and the National Institute of Mental Health's Diagnostic Interview Schedule for Children, Edelbrock and Costello (1988) reported significant correlations ($p < .01$; correlation not reported) for these two measures and found that increasing scores on the CBCL Depression subscale showed a significant linear association with the probability of receiving a diagnosis of major depression, $F(1, 6) = 35.5$, $p < .001$. Similarly, using receiver operating characteristics, Rey and Morris-Yates (1991) found that a CBCL Depression subscale developed by Nurcombe et al. (1989) distinguished best between referred adolescents diagnosed with major depression as compared with those diagnosed with other disorders; that is, participants qualifying for diagnosis with major depression scored significantly higher on the CBCL Depression subscale than did participants who did not qualify for diagnosis. The symptoms on the anxious–depressed syndrome are most similar, however, to the construct of mixed anxiety depression described by Watson, Clark, and their colleagues (see Clark & Watson, 1991; Kendall & Watson, 1989; Watson et al., 1995) and proposed in the DSM–IV for consideration as a new diagnostic category.

Analyses

To test for artifactual covariation resulting from overlapping symptoms across the eight cross-informant syndromes, we computed Pearson correlations between the anxious–depressed syndrome with all other syndromes in two steps. First, we computed correlation matrices using full scale scores for all syndromes. Then, we deleted items that were common to the Anxious–Depressed scale and any other scale, and we computed correlations among the abridged scales. Only the social withdrawal and attention problems syndromes contained overlapping items.

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[2] The present sample was a general community sample, and as such it included a small proportion of youths who were receiving mental health services ($n = 116$; 12.8%). These clinically referred children were included in analyses so that results reflected covariation in a nationally representative sample. Although concerns have been raised with respect to referral biases (Caron & Rutter, 1991), the small number of referred adolescents in the present sample did not disproportionately affect the observed rates of covariation.

[3] Eight hundred ten (47%) participants were missing data and were, therefore, excluded from the present analyses. It is noteworthy that all but 6 of these participants were missing a TRF. Thus, participants were excluded by virtue of a missing TRF. Comparative analyses of participants with complete data and participants with missing data revealed significant differences for age, race, SES, and mean scores for parents' reports on the anxious–depressed and aggressive behavior syndromes and for self-reports on the somatic complaints and delinquent behavior syndromes. Although reaching statistical significance, these differences were small in magnitude. Participants included in current analyses were slightly younger and had higher SES than those eligible but not included. In addition, relatively more Caucasian and fewer African American youths were included in our study. Participants used in our analyses also showed slightly higher scores on parents' reports of the anxious–depressed syndrome and aggressive behavior syndrome and on self-reports of somatic complaints. By contrast, included participants reported lower scores on self-reports of delinquent behavior.
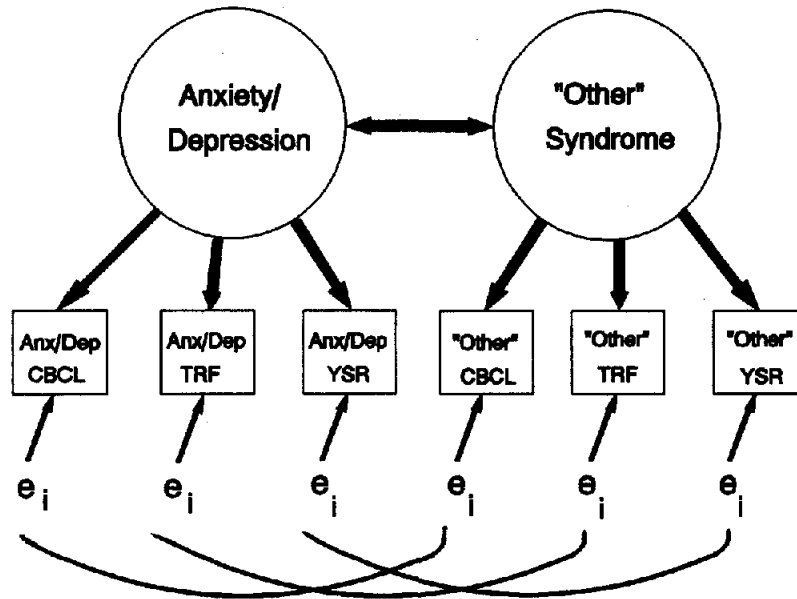
Figure 1. Model for confirmatory factor analysis of the anxious–depressed syndromes (Anx/Dep) and seven other cross-informant syndromes. Double-headed arrow between circles represents the hypothesized correlation or covariation between latent trait constructs. Double-headed arrows between e_i pairs represent hypothesized correlations between syndrome scores. CBCL = Child Behavior Checklist; TRF = Teachers' Report Form; YSR = Youth Self-Report; e_i = unique factor or random error.

Next, to examine the respective influences of trait and informant effects on syndrome scores, we constructed covariance matrices of the Anxious–Depressed scale with each of the other syndrome scales, excluding overlapping items, and we performed a CFA (Bentler, 1989) by using these matrices and Bentler's CFA approach. CFA assesses the fit of a proposed model to observed data and produces estimates of the relative loadings of hypothesized latent variables on measured dependent variables. Parameter estimates for the correlation and covariation between these latent variables are also generated. In essence, CFA partials out variance so that the effects of trait variables may be distinguished from the effects of other proposed latent variables and error.

The models tested in the present study were the correlated uniqueness models proposed by Kenny and Kashy (1992) and used successfully by Greenbaum et al. (1994).[4] In these models, latent trait and unique factors are hypothesized to contribute to observed syndrome scores. The correlations among the uniquenesses reflect informant effects, whereas the correlations among latent factors reflect covariation among traits. Specifically, we hypothesized significant correlations between selected uniquenesses, reflecting informant effects, and significant correlations between the construct of anxious–depressed and each of the other seven syndromes after controlling for these effects by CFA. (For a graphic representation of this model, see Figure 1.)

The reported syndrome scores across informants (parent, teacher, and youth) for each of the scales being considered (Anxious–Depressed and each "other" syndrome) are identified by squares across the middle of the figure. Latent constructs associated with psychological, or "trait," constructs, which contribute to the observed scale scores (and to the resulting covariance matrix) are represented by circles above the boxes. The circle on the left represents the latent construct of anxious–depressed; the circle on the right represents a construct with which it is hypothesized to covary (e.g., social withdrawal). Each observed variable is associated with a unique factor or random error represented by "e_i." Double-headed arrows between pairs of e_i represent the correlations that are hypothesized between syndrome scores reported by the same

informant (informant effects). The hypothesized correlation or covariation between latent trait constructs is represented by the double headed arrow at the top of the figure. For all analyses, the input matrix was the covariation matrix.[5]

Results

Descriptive Statistics

Table 1 presents means and standard deviations of raw scores on cross-informant syndromes for the CBCL, TRF, and YSR. All raw scores for the present sample were equivalent to T scores within the normal range.

Correlations of Syndromes With and Without Common Items

Table 2 presents the correlations between the anxious–depressed syndrome and the other cross-informant syndromes

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[4] The more traditional approach using CFA has been to hypothesize a model containing both trait (underlying syndrome) and method (informant) factors and to look at relationships within each of these sets of factors. Kenny and Kashy (1992) have pointed to serious problems in fitting such models, with parameters often being out of range unless error variances are set at zero or other unreasonable constraints are applied. Indeed, when we tried fitting complete models of this form, four of our seven models could not be fit without application of such constraints. By dropping the method (informant) factors and allowing the uniquenesses (error terms) for traits within informant to be correlated, it was possible to arrive at solutions that converged smoothly without inappropriate constraints.

[5] These matrices are available to interested readers on request from Beth R. Hinden.

Table 1

Cross-Informant Syndrome Scores for the CBCL, TRF, and YSR

	CBCL		TRF		YSR	
Syndrome	M	SD	M	SD	M	SD
Anxious–depressed	4.03	3.74	2.32	3.32	5.93	4.76
Social withdrawal	2.65	2.37	2.08	2.91	3.80	2.33
Somatic complaints	1.43	1.92	0.52	1.44	2.77	2.69
Social problems	1.84	2.07	1.38	2.17	2.66	2.12
Thought problems	0.61	1.03	0.51	1.15	2.50	2.23
Attention problems	3.33	3.12	3.30	4.02	4.91	3.00
Delinquent behavior	1.74	2.25	2.52	3.32	2.87	2.44
Aggressive behavior	7.02	5.70	3.76	6.18	8.52	5.16

Note. CBCL = Child Behavior Checklist; TRF = Teachers' Report Form; YSR = Youth Self-Report.

within informant for the current sample. Correlations are listed for each of the syndromes scored on all symptom items and, where relevant, listed again excluding common items across syndromes. The anxious–depressed syndrome shared only the following items with another syndrome: "Unhappy, sad, or depressed" was shared with the social withdrawal syndrome and "nervous, high strung, or tense" was shared with the attention problems syndrome. As indicated in Table 2, correlations decreased when these items were omitted. The correlations between the anxious–depressed and social withdrawal syndromes decreased .08 for parent reports, .09 for teacher reports, and .09 for self-reports. The correlations between the anxious–depressed and attention problems syndromes showed reductions of .09, .07, and .08 for parent, teacher, and self-reports, respectively. Although Fisher's z tests revealed that all of these changes were significant, the correlation between syndromes remained strong and significant after the common items were omitted.

CFAs

Results of CFA of the anxious–depressed syndrome with the seven other cross-informant syndromes of emotional and

Table 2

Correlations of the Anxious–Depressed Syndrome With Other Cross-Informant Syndromes on the CBCL, TRF, and YSR: With and Without Overlapping Items

	Anxious–Depressed syndrome					
	CBCL		TRF		YSR	
Syndrome	With	W/O	With	W/O	With	W/O
Social withdrawal	.62	.54	.66	.57	.64	.55
Somatic complaints	.42	—	.41	—	.54	—
Social problems	.53	—	.59	—	.52	—
Thought problems	.49	—	.54	—	.47	—
Attention problems	.57	.48	.59	.52	.63	.55
Delinquent behavior	.41	—	.56	—	.37	—
Aggressive behavior	.62	—	.50	—	.59	—

Note. All correlations are significant at $p < .001$. CBCL = Child Behavior Checklist; TRF = Teachers' Report Form; YSR = Youth Self-Report; W/O = without.

Table 3

Confirmatory Factor Analysis Results: Chi-Square Values and Goodness-of-Fit Indices

Syndrome with anxiety–depression	$\chi^2(5, N = 208)$	BBFI nonnormed	CFI
Social withdrawal	2.654	1.000	1.000
Somatic complaints	11.362*	0.997	0.999
Social problems	16.861*	0.996	0.999
Thought problems	15.866**	0.995	0.998
Attention problems	39.278***	0.989	0.996
Delinquent behavior	23.317***	0.993	0.998
Aggressive behavior	29.522***	0.994	0.998

Note. BBFI nonnormed = Bentler-Bonett Fit Index, nonnormed (Bentler, 1989); CFI = Comparative Fit Index (Bentler, 1989).
*$p < .05$. **$p < .01$. ***$p < .001$.

behavior problems are reported in Table 3.[6] The analyses for six of the seven proposed models produced significant chi square values, indicating an imperfect fit between each model and the data. However, large samples often produce significant chi-square values when differences are reliable but of small magnitude, and others have argued against using this statistic with large samples for testing the appropriateness of models (Bentler, 1989; Cole & Carpentieri, 1990). Bentler (1989) recommended the nonnormed Bentler–Bonett Fit Index (BBFI nonnormed) and the Comparative Fit Index (CFI) as appropriate measures of fit for large samples. For all analyses, both these indices exceeded 0.98, indicating that across all seven syndromes, the proposed models fit the observed data well.

The correlated uniqueness model used in these analyses did not contain a method (Informant) factor, but the presence of method variance is seen in the correlations among the uniquenesses (error) of observed variables (syndrome scores) within methods (informants). These correlations are shown in Table 4. Other than the correlation between the uniquenesses for parent reports of anxious–depressed and somatic complaints, all correlations were significant at $p < .001$ and ranged from .380 to .619. The fact that these correlations are sizable indicates significant informant variance in all syndromes.

The standardized parameter estimates for the association of parents' reports (CBCL), teachers' reports (TRFs), and adolescents' reports (YSRs) with the latent construct of anxious–depressed and each other syndrome are presented in Table 5. All loadings of the latent constructs (trait variance) were significant at $p < .001$. These loadings are standardized regression

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[6] Results presented later are from analyses performed on participants having complete CBCL, TRF, and YSR data. CFA can be performed on participants with partially missing data if these data are missing in a particular pattern (Bentler, 1989), as was the case here where most participants having missing data were missing a TRF. Results of a two-group CFA performed for participants with complete and missing data converged nicely and produced high goodness-of-fit indices, similar to CFA with the complete sample alone. Small differences were noted in the correlations of traits and uniquenesses, but these differences did not change the overall picture of the proposed models or the degree of covariation between syndromes. Thus, only results for the complete sample are presented later.

Table 4

Correlations Among Uniquenesses for the Anxious–Depressed Syndrome With Other Cross-Informant Syndromes

| | Anxious–depressed syndrome informant | | |
Syndrome	Parent	Teacher	Youth
Social withdrawal	.443	.566	.526
Somatic complaints	.231[a]	.392	.514
Social problems	.394	.582	.510
Thought problems	.390	.522	.430
Attention problems	.381	.471	.539
Delinquent behavior	.380	.547	.382
Aggressive behavior	.619	.463	.580

Note. Table values represent the correlation of error terms for reports by the same informant for the anxious–depressed syndrome with each of the other cross-informant syndromes.

[a] Not significant. All other correlations were significant at $p < .001$.

coefficients between the trait and the observed variable after adjusting for the combined effects of method and unreliability. They measure the degree to which the scales converge and assess the same trait (convergent validity). In most cases, the loadings on the anxious–depressed latent variable were lowest for the TRF, intermediate for the YSR, and highest for the CBCL. This same pattern held for each of the other syndromes with the exception of social problems, where the TRF and YSR loadings were reversed, although nearly equal (.453 and .446, respectively).

CFA revealed substantial covariation between the Anxious–Depressed syndrome and all other syndromes after controlling for method and error variance. These covariation indices are presented in Table 5 and represent partial correlation coefficients. The internalizing syndromes of social withdrawal and somatic complaints covaried with anxious–depressed, .656 and .614, respectively. Externalizing syndromes representing delinquent and aggressive behavior problems correlated with the anxious–depressed syndrome, .470 and .635, respectively. The mixed problem syndromes of attention problems, social problems, and thought problems produced indices of .635, .626, and .681, respectively.

Discussion

The present study examined whether a syndrome of anxious and depressed symptoms covaried with seven other syndromes of internalizing and externalizing problems after controlling for referral biases, overlapping symptoms across syndromes and informant effects, a type of method variance. Results of the study indicated that both symptom overlap and method variance affected the degree of covariation between syndromes, but substantial and significant covariation remained after controlling for these effects; that is, the anxious–depressed syndrome exhibited substantial covariation with seven other syndromes of emotional and behavioral problems after controlling for nosological and methodological artifact. The indices of covariation were comparable across both internalizing and externalizing syndromes, in-

dicating that mixed anxiety–depression is not only related to other internalizing problems.

With regard to symptom overlap, it is noteworthy that this was not a major source of error in the present analyses, as the anxious–depressed syndrome shared only one symptom with the social withdrawal syndrome (unhappy, sad, or depressed) and only one symptom with the attention problems syndrome (nervous, high strung, or tense); there was no symptom overlap between the anxious–depressed syndrome and the remaining five cross-informant syndromes. Removing common items reduced correlations between syndromes significantly, but the smaller correlations remained moderate in magnitude and retained statistical significance. Thus, within the empirically derived taxonomy developed by Achenbach (1991a), symptom overlap was minimal and did not account for the covariation of the anxious–depressed syndrome with the other cross-informant syndromes.

CFA and a test of the correlation of the uniquenesses were used to examine the contribution of informant effects to the covariation between the anxious–depressed syndrome and other syndromes. Parameter estimates generated by CFA indicated that both method (informant) and trait (latent construct) effects contributed significantly to the obtained scores on the CBCL, TRF, and YSR. Teachers' ratings on the anxious–depressed syndrome appeared to be particularly affected by method variance, whereas parent reports appear to reflect trait variance to a stronger degree. Despite the significant contribution of method factors, the anxious–depressed construct was found to covary significantly with all other cross-informant constructs after such factors were controlled. All covariation indices fell within a small range from .614 (with somatic complaints) to .681 (with thought problems), with the exception of delinquent behavior, which was .470.

Prior research using CFA with community samples to examine the covariation of depressive phenomena with other symptoms or disorders has focused exclusively on aggression and conduct problems (Cole & Carpentieri, 1990; Garber et al., 1991). These studies reported divergent rates of covariation after controlling for method variance with CFA, with Garber et al. (1991) reporting a covariation index of .42 and Cole and Carpentieri (1990) reporting an index of .73 for depressive symptoms and aggression–conduct problems. Comparable analyses in the present study are reflected in the covariation index of .635 between the anxious–depressed and aggressive behavior syndromes, and an index of .470 between the anxious–depressed and delinquent behavior syndromes. The former is similar to that reported by Cole and Carpentieri for depressive symptoms and conduct problems, whereas the latter index is comparable with that reported by Garber et al. for depressive symptoms and aggression. This relatively wide range of covariation does not appear to be attributable to informant effects but may be accounted for by different definitions and assessment of the constructs of depression, aggression, and conduct disorder, or differences in the age of the participants. The higher index of covariation between symptoms of depression and aggression reported here appears to be a valid estimate, as the present analyses distinguished between aggression and delinquent behavior problems and were based on syndromes reported by parents, teachers, and adolescents for a nationally representative

Table 5

Standardized Parameter Estimates for Trait and Unique Factors and Covariation Indices for the Anxious–Depressed Syndrome With Other Cross-Informant Syndromes

Measure	Trait	Unique	Trait	Unique	Covariation index[a]
	Anxious–depressed		Social withdrawal		.656
CBCL	.759	.652	.658	.753	
TRF	.326	.945	.318	.948	
YSR	.453	.892	.446	.895	
	Anxious–depressed		Somatic complaints		.614
CBCL	.709	.705	.716	.698	
TRF	.339	.941	.199	.980	
YSR	.491	.871	.485	.874	
	Anxious–depressed		Social problems		.626
CBCL	.764	.646	.761	.649	
TRF	.360	.993	.453	.892	
YSR	.440	.898	.446	.895	
	Anxious–depressed		Thought problems		.681
CBCL	.730	.683	.563	.826	
TRF	.365	.931	.234	.972	
YSR	.463	.886	.409	.912	
	Anxious–depressed		Attention problems		.635
CBCL	.655	.756	.746	.666	
TRF	.461	.888	.555	.832	
YSR	.411	.912	.482	.876	
	Anxious–depressed		Delinquent behavior		.470
CBCL	.650	.760	.785	.619	
TRF	.436	.900	.525	.851	
YSR	.496	.868	.571	.821	
	Anxious–depressed		Aggressive behavior		.635
CBCL	.664	.748	.701	.713	
TRF	.426	.905	.470	.883	
YSR	.440	.898	.505	.863	

[a] Covariation indices represent partial correlation coefficients for correlations between the anxious–depressed syndrome and the other cross-informant syndromes after partialing out unique variance. All ps < .001.

sample. This finding is consistent with the growing literature on the high rate of co-occurrence of depressive symptoms and disruptive behavior problems in adolescence (e.g., Dodge, 1993; Garber et al., 1991; McConaughy & Achenbach, 1994; Rey, 1994).

These results suggest that observed rates of covariation are not merely artifactual and that they further legitimize and encourage continued research on the co-occurrence of mental health problems. However, although promising, the results reported here are an initial step in distinguishing "factual" from artifactual covariation–comorbidity. First, these results are based on a quantitative approach to psychopathology and cannot be generalized to categorical, diagnostic approaches where nosological sources of artifact, such as symptom overlap and poorly defined and validated categories may be more abundant and problematic. This is particularly true of research on depres-

sion where depressed mood is both a hallmark symptom of major depression and a common, nonspecific symptom associated with several diagnoses (Caron & Rutter, 1991). Research on diagnostic comorbidity of depression needs to attend to symptom overlap and to source–informant effects in diagnostic interviews with children and parents. Second, depression was operationalized as an empirically generated syndrome of anxious and depressive symptoms that did not include an assessment of anhedonia. Rates of covariation for more pure depressive states or depressive disorders (see Watson et al., 1995) may, therefore, be different. Third, although controlling for methodological artifact to the best extent possible is important, it is also only a preliminary step—most of the exciting questions about the patterns of covariation and the implications for risk and resiliency processes are yet to be explored. Moreover, differences in rates, patterns, and processes across developmental

periods, gender, ethnicity, and SES are also yet to be investigated. These basic questions will ultimately address the applied issues of assessment, diagnosis, treatment, and prevention of depression and co-occurring problems (Clarkin & Kendall, 1992). Appropriate assessment of co-occurrence should promote more effective treatment strategies and improved outcome. In addition, if certain problems are known to precede or follow other problems, prevention of the latter becomes possible.

The present study also has implications for the use of checklists in the assessment of depressive problems in clinical practice. Assessment needs to be broad based, as multiple problems or syndromes are likely to be associated with elevated depressive symptoms. Reliance on measures that focus exclusively on depressive symptoms is likely to present a misleading picture of child–adolescent problems. Furthermore, broad-based assessment needs to include more than the assessment of aggression, as other syndromes are highly related to the anxious–depressed syndrome. Clinicians can infer that the elevation of multiple syndromes is not merely the consequence of a negative bias on the part of a single informant; the covariation of multiple syndromes appears to be a genuine phenomenon rather than a measurement artifact.

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