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Gender Differences in the Longitudinal Structure of Cognitive Diatheses for Depression in Children and Adolescents

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Abstract

In a school-based, four-wave, longitudinal study, children (grades 4–7) and young adolescents (grades 6–9) completed questionnaires measuring depressive symptoms and depressive cognitions, including positive and negative cognitions on the Cognitive Triad Inventory for Children (CTI-C; Kaslow, Stark, Printz, Livingston, & Tsai, 1992) and self-perceived competence on the Self-Perception Profile for Children (SPPC; Harter, 1985). Application of the Trait-State-Occasion model (Cole, Martin, & Steiger, 2005) revealed the existence of a time-invariant trait factor and a set of time-varying occasion factors. Gender differences emerged, indicating that some cognitive diatheses were more trait-like for girls than for boys (i.e., positive and negative cognitions on the CTI-C; self-perceived physical appearance and global self-worth on the SPPC). Implications focus on the emergent gender difference in depression, the design of longitudinal studies, and clinical decisions about the implementation of prevention versus intervention programs.

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Keywords

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The fact that various maladaptive cognitive styles constitute diatheses for depression virtually compels investigation into the developmental origins of these diatheses and development of clinical methods to prevent their depressogenic effects. Both enterprises require a thorough understanding of the longitudinal characteristics of these cognitive structures. Many studies have focused on the cross-sectional structure of cognitive diatheses in childhood and adolescence; however, surprisingly little is known about the longitudinal structure of these constructs. A key aspect of longitudinal structure pertains to the over-time stability. Two important questions are as follows: How stable or *style-like* is cognitive style? At what age do these cognitive diatheses become so stable that they can be regarded as personological characteristics?

On the one hand, understanding the longitudinal structure of depressive cognitions informs the design of longitudinal studies. For example, if one is interested in factors that predict change in a particular cognitive diathesis for depression, one should focus on ages when these diatheses are still undergoing change. Waiting until these construct have become highly stable and style-like could put the researcher the frustrating position of trying to predict change in a variable that is no longer changing. On the other hand, clinical decisions are also informed by an understanding of longitudinal structure. Clinical strategies that focus on preventing the development of cognitive diatheses for depression are logically best implemented before such diatheses become highly stable personal characteristics. Conversely, interventions that are designed to dismantle already-established cognitive diatheses would seem more appropriate once the cognitive die is cast. The goal of the current article is to examine the longitudinal structure of negative cognitions that have been associated with the emergence of depression and positive cognitions that have been associated with the prevention of depression in youth.

The current article focuses on two sets of cognitions that have been implicated as diatheses for depression in children and adolescents. One set comprises the structures described in Beck's cognitive model of depression (Beck, 1963; Clark, Beck, & Alford, 1999). Originally designed to explain depression in adults, Beck's model has been frequently applied to adolescents and children (Lakdawalla, Hankin, & Mermelstein, 2007). The model posits that depressive prone individuals harbor latent depressive cognitive schemas. When activated, these schemas trigger a triad of negative thoughts about one's self, world, and future (Beck, 1964, 1987). Activation of these schemas has been associated with the emergence of depressive symptoms in youth. The most commonly used measure of Beck's depressive cognitions in youth is the Cognitive Triad Inventory for Children (CTI-C; Kaslow et al., 1992).

The second set of cognitions comprises those implicated in Cole's (1991) competence-based model of depression. Originally developed to explain the cognitive origins of depression in youth, the competence model focuses on the unsuccessful negotiation of a major developmental task: the construction of self-perceived competence. Self-perceptions of competence are domain-specific. Domains that are particularly salient during middle childhood and early adolescence include scholastic competence, social acceptance, physical appearance, behavioral competence, and athletic competence. Perceiving oneself as incompetent in multiple domains has been associated with the emergence of depressive symptoms in youth (Cole, Martin, Peeke, Seroczynski, & Fier, 1999; Cole, Martin, Peeke, Seroczynski, & Hoffman, 1998; Cole, Martin, & Powers, 1997). The most commonly used child measure of self-perceived competence in these domains is the Self-Perception Profile for Children (SPPC; Harter, 1985).

An investigation of longitudinal structure should begin with what is already known about cross-sectional structure. In child and young adolescent populations, cross-sectional factor analyses of the CTI-C have revealed the emergence of two broad factors (LaGrange et al., 2008). All of the positively worded items about self, world, and future loaded onto a *positive cognitions* factor. All of the negatively worded items loaded onto a *negative cognitions* factor. One goal of this article is to map the longitudinal structure of the positive and negative cognition factors of the CTI-C. Factor analyses of the SPPC have repeatedly confirmed its structure (e.g., Harter, 1985). Five domain-specific factors have emerged plus a global self-worth factor. A second goal of this article is to map out the longitudinal structure of these six SPPC factors.

The third goal is to examine gender differences in the longitudinal structure of these cognitive factors. In childhood, gender differences in the rate of depression are negligible. Through early adolescence, the incidence of depression rises for both genders; however, the increase is greater for girls. By age 13, the incidence of depression in females is nearly twice that of males (Nolen-Hoeksema, 1987, 1990). Many studies have attempted to explain this emergent gender difference via various psychosocial risk factors (Eberhart, Shih, Hammen, & Brennan, 2006; Hankin & Abramson, 2001; Nolen-Hoeksema & Girgus, 1994; Rudolf, 2002). This research has almost exclusively focused on variables on which mean differences between the genders emerge prior to the gender difference in depression. For example, Eberhart et al. (2006) reported that low levels of self-worth, self-perceived scholastic competence, and self-perceived physical attractiveness partially mediated the relation between gender and depression.

We submit that the analysis of means tells only part of the story. Low levels of self-perceived competence may not have serious consequences if they are transitory and state-like. If they represent highly stable, time-invariant liabilities, however, they take on the style-like properties inherent in the definition of most cognitive diatheses for depression. Their role as potential risk factors should substantially increase. Both Beck’s cognitive model and Cole’s self-perceived competence model suggest that the cognitive diatheses for depression emerge in youth (Lakdawalla et al., 2007), becoming increasingly stable and integrated characteristics over the course of middle childhood and early adolescence (Cole, 1991). Instead of just focusing on mean differences, the current study examines gender differences in longitudinal structure.

Several structural equation methods have been designed to facilitate this kind of analysis (Cole et al., 2005; Curran & Bollen, 2001; Kenny & Zautra, 1995; Steyer & Schmitt, 1994).

Each of theses methods begins with a longitudinal time series of measures representing the same underlying construct over at least four waves. The covariances among these measures are partitioned into two sources: a single, time-invariant factor (herein referred to as a “trait factor”) and a series of time-varying factors (called “occasion factors”). The methods differ with regard to the ease with which they can be successfully applied to a given data set without incurring convergence problems or out-of-range parameter estimates. They also differ with regard to the assumptions they make about the underlying pattern of covariances. In a series of articles, Cole and colleagues show that their model has a lower rate of problematic solutions, makes fewer assumptions about the underlying covariances, and can be expanded to accommodate complex multi-method designs (Ciesla, Cole, & Steiger, 2007; Cole et al., 2005; LaGrange & Cole, 2008). In the current article, we applied Cole et al.’s method to a four-wave, two-cohort data set containing repeated measures of both the CTI-C and the SPPC.

Method

Participants

At the beginning of the study, students were either in grade 4 (cohort 1) or grade 6 (cohort 2). Both cohorts were followed for four waves, grades 4-7 and grades 6-9, respectively. Over the course of the study, we recruited 854 students from five public elementary and three public middle schools in a mid-sized southern city. Of these, 593 (69%) provided parental consent and ultimately participated in the study. Comparing the demographic characteristics of participants versus nonparticipants revealed no significant differences on gender, grade level, or ethnicity (*ps*>.20). Not all students participated at every wave of the study. Each year, approximately 10.1% students moved out of the school district (making them unavailable for data collection), while approximately the same number transferred into the district (making them eligible for data collection). On average, students participated in 3.1 of the 4 waves of data collection (*SD* = .8). Via a series of three-group ANOVAs, we compared students who were lost, students who were added, and students who were retained on all available variables. The three groups did not differ on any demographic characteristic. Out of 48 comparisons on other study variables, only three were significant at the .05 level (approximately the number that would be expected by chance). Correlations between study variables and the number of waves in which students participated ranged from −.09 to .11 (ns).

Of the 593 participants, 56% were girls and 44% were boys. Participants were nearly equally divided between cohort 1 (51%) and cohort 2 (49%). The sample was racially heterogeneous, including 28.6% White, 63.5% African American, 3.5% Latino, .9% Asian American, .4% Native American, and 3.2% “other” or “mixed” race participants. Annual family incomes ranged from $10,000 to $120,000 (*Mdn* = $25,000).

Measures

Cognitive triad—The Cognitive Triad Inventory for Children (CTI-C; Kaslow et al., 1992) comprises 36 questions, equally divided between positive and negative cognitions about self, world, and future (6 items each). Children respond “yes,” “maybe,” or “no” to positive items (e.g., “I am a good person) and negative items (e.g., ”I am a failure“). Kaslow et al. reported high reliability for the CTI-C (alpha = .92). Factor analysis of the measure reveals the emergence of two primary factors, one representing positive cognitions and the other representing negative cogntions (LaGrange et al., 2008). In the current study, Cronbach’s alphas ranged from .84 to .88 (*Mdn* = .86) on the negative cognitions scale and from .86 to .93 (*Mdn* = .90) on the positive cognitions scale. Higher scores represent more negative and more positive cognitions, respectively.

Self-perceived competence—The Self-Perception Profile for Children (SPPC; Harter, 1985) is a self-report inventory appropriate for use during middle childhood. It comprises 36 items measuring perceived competence in five domains (scholastic competence, social acceptance, athletic competence, physical appearance, and behavioral conduct) plus global self-worth. Items are scored on 4-point rating scales such that high scores reflect greater self-perceived competence. The subscales have good internal consistency with alphas ranging from .71 to .90 for children in grades 4 through 9 (Harter, 1985; Hoffman, Cole, Martin, Tram, & Seroczynski, 2000). The SPPC has a highly interpretable factor structure (Harter, 1985) and high test-retest reliability (.70 to .87; Harter, 1982). In our sample, subscale alphas ranged from .64 to .88.

Depressive symptoms—We obtained two measures of depressive symptoms. One was the Center for Epidemiological Studies Depression Scale for Children (CES-DC; Weissman, Orvaschel, & Padian, 1980), a 20-item self-report inventory. To aid comprehension, we created a chart to serve as a visual aid to assist the younger children (fourth- and fifth-graders) in answering the questions. On a 3-point scale (0 = *rarely or none of the time*; 3 = *most or all of the time*), participants rate how often they experienced each symptom during the past week. Evidence of validity and reliability derives from child and adolescent studies by Faulstich, Carey, Ruggiero, Enyart, and Gresham (1986), Fendrich, Weissman, and Warner (1990), Hilsman and Garber (1995), and Weissman et al. (1980). In our sample, Cronbach’s alphas ranged from .81 to .87.

We also used the Children’s Depression Inventory (CDI; Kovacs, 1985). The CDI is a 27-item self-report on which children report about their experience of affective, cognitive, and behavior symptoms of depression over the last 2 weeks. The suicide item was not included. The CDI has acceptable levels of reliability and validity especially in community samples (Carey, Faulstich, Gresham, Ruggierro, & Enyart, 1987; Kazdin, French, & Unis, 1983; Saylor, Finch, Spirito, & Bennett, 1984). Cronbach’s alphas for the CDI in the current study ranged from .87 to .90.

Procedures

Doctoral psychology students and advanced undergraduates administered the questionnaires to the participants during regular school hours. The measures included in this study were a subset of instruments from a larger study. To control for order effects, we counterbalanced the presentation of the questionnaires. We met with the fourth graders in small groups (3–4 students) and the fifth through ninth graders in large groups (20–30 students). In each case, a research assistant read the items aloud, requiring all students to proceed at the same pace. In the large groups, additional research assistants circulated around the classroom answering questions that arose. This procedure was repeated once per year for four consecutive years.

Results

Testing Means

We examined Gender and Grade effects on means using latent growth curve analysis, extracting a latent slope and intercept. On athletic competence boys had higher intercepts than girls in both cohort 1 (18.85 vs. 17.10, $\Delta\chi^2_{(1)}=9.05$) and cohort 2 (18.85 vs. 17.10, $\Delta\chi^2_{(1)}=12.88$ *ps* <.003), with boys regarding themselves as more competent than did girls more in both cohorts. In cohort 1, girls showed significant linear increases over time on positive cognitions on the CTI-C (β = 0.99, *SE* = 0.26), scholastic competence (β = 0.28, *SE* = 0.20), and social acceptance (β = 0.94, SE = 0.22), as well as a significant decrease in negative cognitions on the CTI-C (β = 0.69, *SE* = 0.30), *ps* <.05. In cohort 1, boys showed significant increases in scholastic competence (β = 0.41, *SE* = 0.19) and athletic competence (β = 0.44, *SE* = 0.18), *ps* <.05. In cohort 2, girls continued to show significant decreases in negative cognitions on the CTI-C (β = 0.61, SE = 0.31, *p* <.04).[1]

Relation to Depressive Symptoms

To verify the connection of the cognitive variables to depressive symptoms, we computed correlations of CTI-C and SPPC subscales with the CDI-C (Fig. 1) and the CES-DC (Fig. 2). These correlations are broken down by gender and grade level. All correlations were statistically significant at the .05 level. The correlations between the CTI-C negative cognitions subscale and the CDI-C were significantly different across grade level, $\Delta\chi^2_{(1)}=22.01$ (*p* <.01), increasing with age. The correlations between the CTI-C positive cognitions subscale and the CDI-C also differed across grade level, $\Delta\chi^2_{(1)}=26.90$ (*p* <.01), becoming stronger (but negative) with age. Gender differences between the correlations were all nonsignificant (*ps*>.15).

Longitudinal Structure

To examine the longitudinal structure of positive and negative cognitions, we used confirmatory factor analysis to test a series of trait-state-occasion models (Ciesla et al., 2007; Cole et al., 1005; Lagrange & Cole, 2008). The general form of this model is depicted in Figure 3. In this figure, the rectangles represent manifest measures of the four targeted latent constructs, one per wave of the longitudinal design. As the same three measures are repeated at all waves, we allowed for shared method variance using the correlated disturbance method, analogous to that described by Kenny and Kashy (1992) for multitrait-multimethod designs and recommended by LaGrange and Cole (2008) for TSO models. The curved double-headed arrows at the bottom of the figure represent these correlations. Each of the four latent variables (generically labeled Cog 1–4 in the figure) is the result of two qualitatively different processes. One process involves a *time-invariant* (or “*trait*”)

[1]Means and standard deviations are available from the first author upon request.

construct, a single latent variable representing that part of the targeted construct that is 100% stable over time. By definition, this process affects the targeted construct equally at all waves. This fact is modeled by constraining the unstandardized path coefficients from the trait factor to the targeted latent variable to equal unity. The second process is the result of four time-varying *occasion* factors, one per wave. These factors can be connected to one another in an auto-regressive model, signifying that they can predict each other to some degree over time. In this manner the variance of the target construct at each wave is partitioned into two parts: that due to the time-invariant factor and that due to the occasion factor.

In the current article, we tested this model simultaneously in four groups: cohort 1 boys, cohort 1 girls, cohort 2 boys, and cohort 2 girls. Within each group, we constrained the factor loadings, auto-regressive paths, and the occasion factor variances to be equal to their counterparts across waves. We further constrained the factor loadings to be equal to their counterparts *across groups*.[2] This approach enabled us not only to partition the variance of the targeted construct *within each group* but to test the equivalence of these variance components *across* groups. We conducted eight sets of analyses, one for type of cognitive variable. In every analysis, we used full information maximum likelihood estimation, a procedure that makes fewer assumptions than most other methods for handling missing data (Widaman, 2006).

Positive and negative cognitions on the CTI-C

The first two analyses focused on positive and negative cognitions, as measured by the CTI-C. We constructed six subscales from the CTI-C, three representing negative cognitions about self, world, and future and three representing positive cognitions about self, world, and future. We used the three negative subscales in the first analysis and the three positive subscales in the second. Goodness-of-fit information for these two initial models appears in Table 1 in the rows entitled "Base model." The chi-square tests were significant (*ps* <.001); however, with large sample sizes, small discrepancies can be statistically significant. For both models, the comparative fit index (CFI) and the incremental fit index (IFI) were relatively large, indicating that the models explained a large proportion of the available information. Also, the root mean squared error of approximation (RMSEA) was less than .05 for both models, indicating that discrepancies between the models and the data were small. Consequently, we deemed both models as good fits to the data.

We then proceeded with follow-up model comparisons designed to test key hypotheses about the cross-group equivalence of the trait factor variances. (We also tested the cross-group equivalence of the occasion factor variances.) In each test, we compared a restricted model to the base model described above (see Table 1). In cohort 2 (but not cohort 1), both negative and positive cognitions comprised more trait variance for girls than for boys (*ps* > .01). That is, negative and positive cognitions reflected more stable, trait-like processes for older girls than for older boys. This pattern of results is displayed in the bar graphs shown in

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[2]In a series of nested model comparisons, we formally tested whether each of these within- or across-group constraints perturbed the fit of our models. In every case, the change in chi-square associated with the imposition of these constraints was nonsignificant (*ps* > .10)

Figure 4. Other significant gender differences emerged on the occasion factor variances: Boys had more occasion variance than girls on negative cognitions in cohort 2 and on positive cognitions in cohort 1 (*ps*> .01).

Subscales of the SPPC

The next six analyses focused on domains of self-perceived competence and global self-worth as measured by the SPPS. To work with more continuous and more normally distributed data, we constructed three two-item parcels to serve as manifest variables in each TSO model. As noted by Little, Cunningham, Shahar, and Widaman (2002), the use of parcels is advisable only under limited conditions, most importantly the unidimensionality of the items. Not only do previous studies attest to the extremely clean factor structure of the SPPC, but our own factor analyses confirmed this. Specifically, we conducted separate principal axis factor analyses for each set of six items. For every set of items, only one eigenvalue exceeded unity. Consequently, we deemed parceling of the SPPC subscales to be justified.

Goodness-of-fit information for the six initial models appears in Table 1. The χ^2 tests were all significant (*ps* <.001); however, the CFI and IFI were relatively large, indicating that the models explained a large proportion of the available information. Also, the RMSEA was less than .05 in all analyses, indicating that discrepancies between the models and the data were quite small. We regarded the models as good fits to the data.

Results of follow-up model tests comparisons are also presented in Table 1, and variance estimates are depicted in Figure 4. Gender differences in trait factor variance emerged for self-perceived physical attractiveness in cohort 1 and for global self-worth in both cohort 1 and 2. These constructs had a stronger trait component for girls than for boys. Other significant gender differences emerged on the occasion factors: Girls had more occasion variance than boys on social acceptance, physical appearance, and global self-worth in cohort 1 and on scholastic competence, and athletic competence in cohort 2.

Discussion

Three main results emerged from this study. First, the longitudinal structure of depressive cognitions reliably and consistently consisted of a time-invariant (trait-like) component and a time-varying (occasion-specific) factor, using Cole et al.’s (2005) trait-state-occasion structural equation model. Second, on four key sets of depression-related cognitions, the trait-like factor was stronger for girls than for boys. And third, on two of these four cognitive variables, gender differences in the strength of the trait factor emerged in our younger cohort. We discuss the implications of these results for the design of longitudinal studies and for the clinical selection of intervention versus prevention programs for depression in children and adolescents.

Our first finding was that over-time correlations of depressive cognitive variables are attributable to two types of longitudinal factors, a single time-invariant “trait-like” factor and a set of time-varying “occasion” factors. We submit that the time-invariant factors represent those parts of depressive cognitions that have become stable and “style-like.” This implies that even as early as grades 4 through 7, children already have established relatively stable individual differences in their baseline levels of positive and negative cognitions. When these “styles” are positive, theory and data would suggest they protect individuals from depression. When they are negative, however, such cognitive styles predispose the onset and recurrence of the disorder. Each these types of cognitions also had reliable time-varying components. That is, they varied from time to time around the time-invariant baseline level. These variations were reliable and not attributable to random error variance. Presumably, these variations reflect the impact of occasion-specific factors. On the one hand, such factors may include internal factors like depression itself, reflecting the possibility that depression is both cause and effect of negative cognitions. On the other hand, such factors may also include external events, even cognitive interventions. This implies that such interventions could positively affect children’s cognitions at a particular point in time without moving the child’s longitudinal baseline or affecting the child’s long-term cognitive “style.”

Second, four of the depressive cognitive constructs were more trait-like for girls than for boys. On negative and positive cognitions as measured by the CTI-C and on self-perceived physical appearance and global self-worth as measured by the SPPC, scores were more trait-like for girls. Interestingly, three of these four cognitive constructs (negative cognitions, positive cognitions, and global self-worth) were the most highly correlated with measures of depressive symptoms. That is, the three sets of cognitions that were most strongly related to depression were more trait-like for girls than for boys.

We wish to emphasize that mean levels of these constructs did not differentiate girls from boys. Likewise, these variables did not correlate more strongly with depression for one gender or the other. The key gender difference lay in the degree to which individual differences in these depressive cognitions were completely stable and trait-like over time. This implies that, compared with girls, boys were more affected by situational factors. Conversely, girls’ cognitions were more like personological characteristics, perhaps because the circumstances that generate such cognitions were themselves more persistent over time. Taken together, these findings support the idea that the emergent gender difference in depression could be due to the greater persistence of negative cognitions in girls, not to their greater elevation or their stronger relation to depression.

Our third finding was that gender differences in the degree to which self-perceived physical appearance and global self-worth were trait-like emerged prior to the age at which gender differences in depression emerge. Our differences were evident in our younger cohort (grades 4–7). Only by the end of the study were they 13 years old, when gender differences in depression begin to emerge (Nolen-Hoeksema, 1987, 1990). This observation suggests that middle childhood may be a kind of critical period. We speculate that adverse feedback about ones physical appearance coupled with societal messages about the importance of physical attractiveness are processes that start earlier and are more persistent for girls than for boys. Girls who develop feelings of low self-worth and perceive themselves as physically unattractive during this period may be those who are at particular risk for later depression.

These results have implications for the design of longitudinal studies involving child and adolescent depressive cognitions. Longitudinal studies are often concerned with the prediction of *change* in the targeted construct over time. When the targeted construct is highly stable (or trait-like, in the sense used in the current paper), there is no *change* to predict. During childhood and early adolescence, the cognitive variables examined in the current study are approximately 50% the result of completely time-invariant, trait-like constructs. That is, about half of what these constructs are does not change. Consequently, predicting change in this half of these variables is not possible. In conventional studies, the trait- and occasion-components of these variables are completely confounded. Structural equation approaches like our TSO model, however, enable researchers to disentangle that which is completely time-invariant from that which varies over time. Expanded versions of the TSO model can be used to control for the trait component, while predicting change in that which actually changes (see Cole, Nolen-Hoeksema, Girgus, & Paul, 2006).

The TSO model also allows for the possibility that qualitatively different variables are related to the trait and occasion components of children's depressive cognitions. In this article, "trait-like" simply means "completely stable over time." We must ask, what causes individual differences in a psychological construct to be completely time-invariant? We suggest that the answer is "other time-invariant variables." Certainly, these might include various unchanging biological and genetic factors. However, environmental conditions such as poverty, discrimination, various types of maltreatment, and even the perceptions by and feedback from others can be highly stable over time. Factors such as these may underlie the more trait-like aspects of depressive cognitions. Conversely, the causes of the time-varying components may themselves be time-varying. These include time-limited negative life events and various psychological conditions (including depression).

Clinical implications also emerge from these results, especially regarding the implementation of prevention versus interventions programs. When cognitive diatheses for depression are completely under construction, prevention efforts make sense. When such diatheses become stable, trait-like characteristics, the time for prevention alone may be past. Interventions designed to dismantle well-established patterns of maladaptive thinking become increasing important parts of the clinical enterprise. The optimal degree of prevention versus intervention may vary with age, gender, and type of cognitive diathesis. For example, self-perceived physical appearance is 61–75% trait-like in older boys and girls, potentially requiring greater focus on the deconstruction of negative self-image. Alternatively, positive cognitions as measured by the CTI-C are only 33–50% trait-like, opening the door for efforts that focus on the construction of positive cognitive style.

Several caveats and shortcomings about the current study suggest important avenues for future directions. First, our measures of depressive symptoms were limited to paper-and-pencil self-reports. Scores on such questionnaires are subject to social desirability and other biasing factors. Utilization of clinical interviews in longitudinal research would strengthen these results. Second, we utilized a community-based sample of elementary and middle school students, in which the base rate of major depression was relatively low. Despite the wide range of scores on our depression measures, relatively few (probably only 2–4%) would meet clinical criteria for major depression. In future studies, focusing on at-risk populations could enhance the generalizability and clinical relevance of the results. Finally, the oldest participants in the current study were in grade nine. Extending such studies to older adolescents and young adults may reveal that cognitive diatheses become even more trait-like with age.

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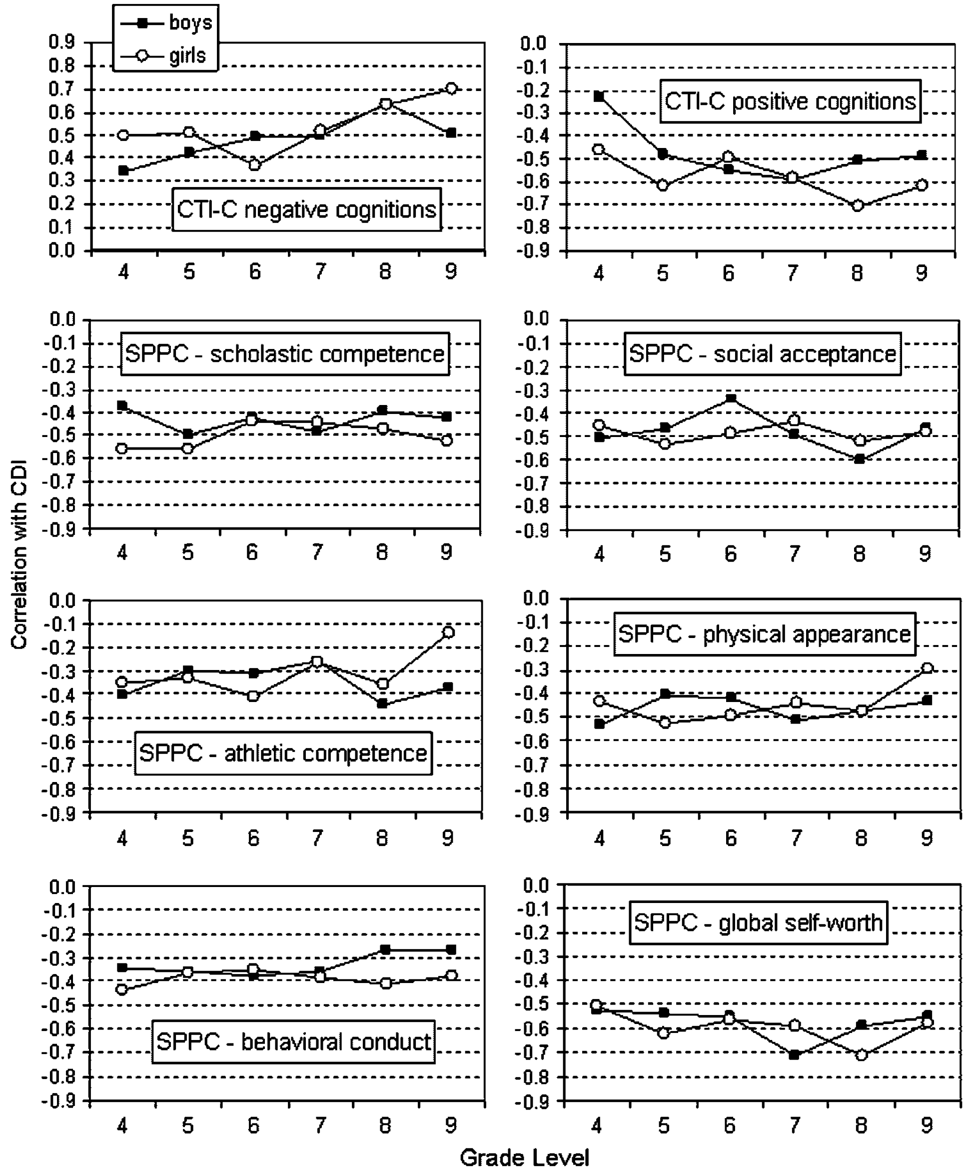

Figure 1.
Correlations between cognitive measures and the CDI, broken down by grade and gender.

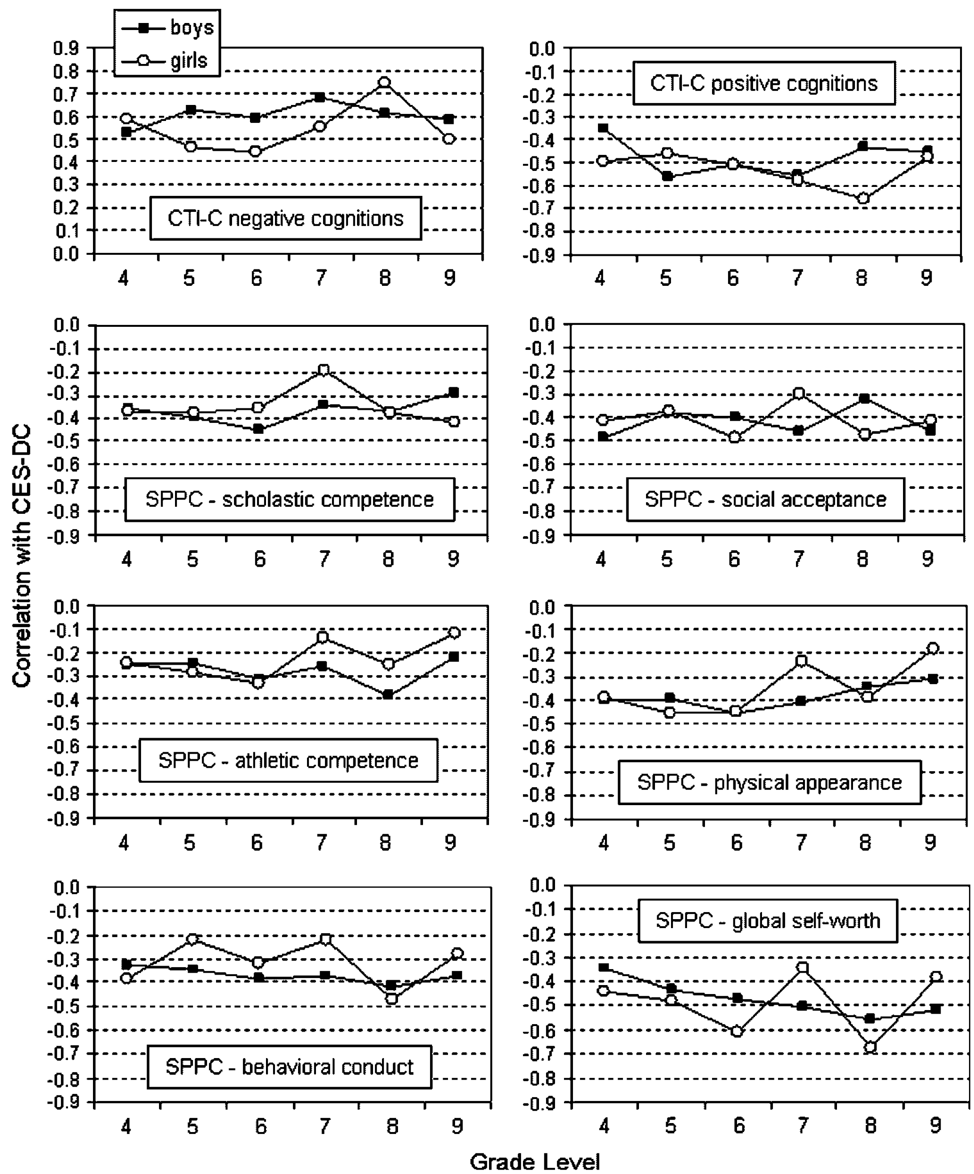

Figure 2.
Correlations between cognitive measures and the C, broken down by grade and gender.

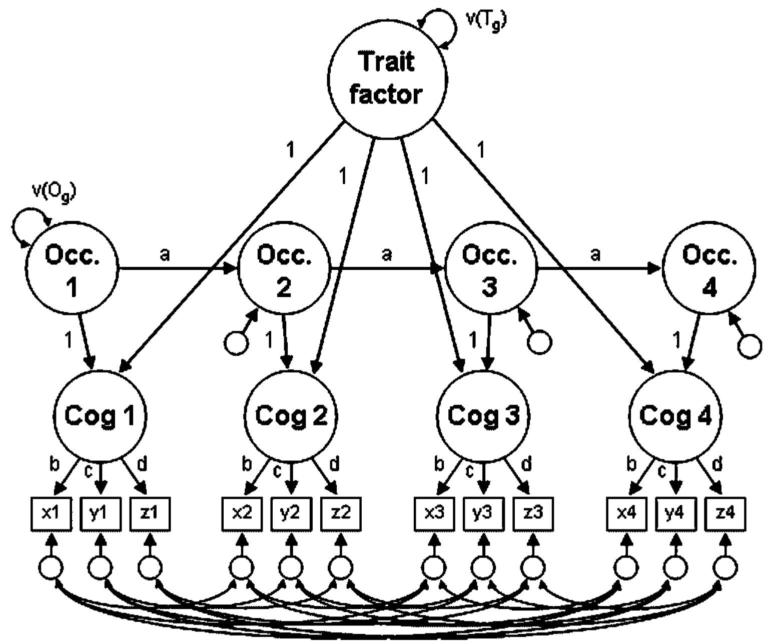

Figure 3.
Generic path diagram for Trait-State-Occasion models.

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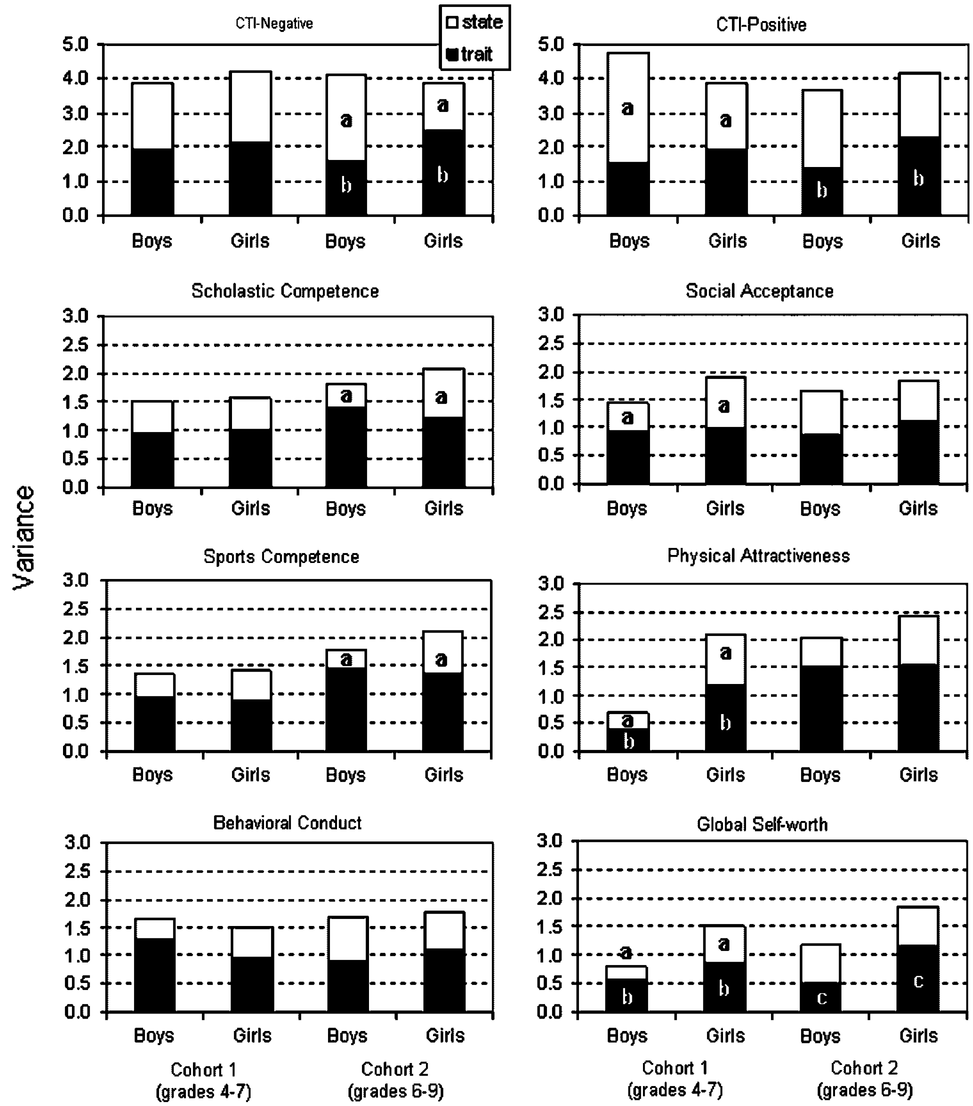

Figure 4.

Variance due to time-invariant (trait) factors and time-varying (state) factors broken down by gender, cohort, and type of cognition.

Table 1

Goodness-of-Fit Statistics for TSO Models (N=593)

Model	χ^2	*df*	*p*	$\Delta\chi^2$	Δ *df*	*p* Δ	CFI	IFI	RMSEA
CTI-C negative cognitions									
Base model	214.82	136	0.000				0.95	0.95	0.031
Cohort 1: boys=girls on v(T)	215.11	137	0.000	0.29	1	0.590	0.95	0.95	0.031
Cohort 2: boys=girls on v(T)	221.91	137	0.000	7.09	1	0.008	0.95	0.95	0.032
Cohort 1: boys=girls on v(O)	216.81	137	0.000	1.99	1	0.158	0.95	0.95	0.031
Cohort 2: boys=girls on v(O)	221.46	137	0.000	6.64	1	0.010	0.95	0.95	0.032
CTI-C positive cognitions									
Base model	218.98	136	0.000				0.96	0.96	0.032
Cohort 1: boys=girls on v(T)	221.26	137	0.000	2.28	1	0.131	0.96	0.96	0.032
Cohort 2: boys=girls on v(T)	224.97	137	0.000	5.99	1	0.014	0.96	0.96	0.033
Cohort 1: boys=girls on v(O)	226.85	137	0.000	7.87	1	0.005	0.96	0.96	0.033
Cohort 2: boys=girls on v(O)	222.09	137	0.000	3.11	1	0.078	0.96	0.96	0.032
SPPC scholastic competence									
Base model	238.98	136	0.000				0.93	0.92	0.036
Cohort 1: boys=girls on v(T)	241.22	137	0.000	2.24	1	0.134	0.93	0.92	0.036
Cohort 2: boys=girls on v(T)	242.32	137	0.000	3.34	1	0.068	0.93	0.92	0.036
Cohort 1: boys=girls on v(O)	241.97	137	0.000	2.99	1	0.084	0.93	0.92	0.036
Cohort 2: boys=girls on v(O)	245.23	137	0.000	6.25	1	0.012	0.93	0.92	0.036
SPPC social acceptance									
Base model	209.65	136	0.000				0.95	0.94	0.030
Cohort 1: boys=girls on v(T)	210.51	137	0.000	0.86	1	0.354	0.95	0.94	0.030
Cohort 2: boys=girls on v(T)	210.66	137	0.000	1.01	1	0.315	0.95	0.94	0.030
Cohort 1: boys=girls on v(O)	214.16	137	0.000	4.51	1	0.034	0.95	0.94	0.031
Cohort 2: boys=girls on v(O)	213.18	137	0.000	3.53	1	0.060	0.95	0.94	0.031
SPPC athletic competence									
Base model	249.65	136	0.000				0.93	0.92	0.038
Cohort 1: boys=girls on v(T)	250.76	137	0.000	1.11	1	0.292	0.93	0.92	0.037
Cohort 2: boys=girls on v(T)	250.62	137	0.000	0.97	1	0.325	0.93	0.92	0.037
Cohort 1: boys=girls on v(O)	252.26	137	0.000	2.61	1	0.106	0.93	0.92	0.038
Cohort 2: boys=girls on v(O)	256.43	137	0.000	6.78	1	0.009	0.92	0.91	0.038
SPPC physical appearance									
Base model	260.25	136	0.000				0.93	0.92	0.039
Cohort 1: boys=girls on v(T)	269.29	137	0.000	9.04	1	0.003	0.92	0.91	0.040
Cohort 2: boys=girls on v(T)	260.92	137	0.000	0.67	1	0.413	0.93	0.92	0.039
Cohort 1: boys=girls on v(O)	266.53	137	0.000	6.28	1	0.012	0.92	0.92	0.040
Cohort 2: boys=girls on v(O)	263.02	137	0.000	2.77	1	0.096	0.93	0.92	0.039
SPPC behavioral conduct									
Base model	253.37	136	0.000				0.92	0.91	0.038
Cohort 1: boys=girls on v(T)	255.59	137	0.000	2.22	1	0.136	0.92	0.91	0.038

Model	χ^2	***df***	***p***	$\Delta\chi^2$	**Δ *df***	***p* Δ**	**CFI**	**IFI**	**RMSEA**
Cohort 2: boys=girls on v(T)	255.7	137	0.000	2.33	1	0.127	0.92	0.91	0.038
Cohort 1: boys=girls on v(O)	254.86	137	0.000	1.49	1	0.222	0.92	0.91	0.038
Cohort 2: boys=girls on v(O)	255.52	137	0.000	2.15	1	0.143	0.92	0.91	0.038
SPPC global self-worth									
Base model	221.64	136	0.000				0.94	0.93	0.033
Cohort 1: boys=girls on v(T)	225.61	137	0.000	3.97	1	0.046	0.93	0.93	0.033
Cohort 2: boys=girls on v(T)	228.47	137	0.000	6.83	1	0.009	0.93	0.92	0.034
Cohort 1: boys=girls on v(O)	226.1	137	0.000	4.46	1	0.035	0.93	0.93	0.033
Cohort 2: boys=girls on v(O)	223.79	137	0.000	2.15	1	0.143	0.94	0.93	0.033

Note. v(T)=variance of the time-invariant (or “trait”) factor; v(O)=variance of the time-varying (“occasion”) factor.