DISENTANGLING THE PROSPECTIVE RELATIONS BETWEEN COGNITIVE STYLE AND DEPRESSIVE SYMPTOMS

By

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

Aaron Beck's characterization of depressive cognitive style (Beck, 1963, 1976) laid the foundation for much of the current thought regarding the relations between thoughts and feelings. In particular, his description of maladaptive thought processes and negatively skewed thought content has shaped the way that many researchers and practitioners now conceptualize depressive disorders. One important way in which various current theories of depressive cognition differ from each other is in regard to the sequence with which that relation unfolds. Does a maladaptive cognitive style predispose one for later depression? Is a maladaptive cognitive style a consequence of previous depression? Or do other factors (third variables) better explain the relation between cognitive style and depressive symptoms?

Teasdale (1983a, 1983b) described a reciprocal relation whereby negative cognitions cause and/or maintain depression and depression increases negative cognitions, which then cause further depression, resulting in a vicious cycle. The nature of this reciprocal relation creates an obstacle to examining causation. Assessing these relations during childhood, when individuals are potentially experiencing some of their first symptoms of depression and still developing their cognitive style could shed light on the causal process. The overarching goal of this study was to test and compare these relations in a longitudinal study of children and adolescents.

A broad range of concepts falls under the rubric of cognitive style. In his theory of depression, Beck described three aspects of cognition: surface-level thoughts, schemas, and cognitive errors (Beck et al, 1979). In this study, we will focus on surface-level thoughts. This includes automatic thoughts that contain maladaptive negative content, and what Beck referred to as the cognitive triad: negative views of oneself, one's future, or the world. Some recent studies (e.g., Lewinsohn, Joiner, & Rohde, 2001; Maldonado, Pérez Ocón, & Herrera, 2007) have found support for Beck's cognitive constructs as significant predictors of depressive symptoms in samples where other cognitive diatheses failed to be significant predictors.

Both the adult and child literatures identify a connection between maladaptive cognitive style and the experience of symptoms of depression (e.g., Beck, 1963, 1976; Garber, Quiggle, & Shanley, 1990; Hammen, 1990; Hollon & Kendall, 1980; Kaslow, Stark, Printz, Livingston, & Tsai, 1992). Whereas adult cognitive style is generally regarded as a relatively well-established set of beliefs, childhood cognitive style may still be under development (e.g., Beck et al., 1979; Cole, Jacquez, & Maschman, 2001). Even if maladaptive cognitions and depressive symptoms become woven into a co-occurring phenomenon in adulthood, one process may precede the other during development. Childhood, therefore, presents a potential window during which to observe these processes before they become indistinguishably intertwined. If depression and negative cognitions are causally related, it should be particularly apparent in childhood. Additionally, the more firmly set cognitive style of adulthood is likely more difficult to change than the still-developing cognitive style of childhood. Discovering the early causal processes at work in children would pave the way for prevention and early intervention efforts. For these reasons, this study focuses on children and adolescents.

Studies of depression and maladaptive cognition in children represent a smaller and more recent portion of the literature than that of adults. Nonetheless, as described below, both directions of causation have been investigated to some extent in child and/or adolescent studies.

Maladaptive Cognitions Predicting Depressive Symptoms

The first model suggests that negative cognitive style precedes and predisposes depressive symptoms. We will use the short-hand notation *cognition → depression* to refer to this model. In their sample of 98 middle school students, Reinemann and Ellison (2004) found a *cognition → depression* relation within their mediational model of depression. In their sample of 880 14- to 17- year olds, Greening, Stoppelbein, Dhossche, and Martin (2005) found a significant *cognition → depression* relation while controlling for time 1 depressive symptoms, race, and gender. Further support for the *cognition → depression* relation was found by Kennard et al. (2006) in their sample of 450 14- to 18-year olds.

Studies of the *cognition → depression* relation generally do not report tests of the reverse hypothesis despite having the available data. That is, even when both depressive symptoms and cognitive style were measured at multiple time points – and were significantly correlated from one time to the next for both depression to cognition and cognition to depression – the subsequent regression analyses were only reported for the *cognition → depression* model. Therefore, support for this model does not necessarily mean that the reverse model would not have been supported had the relevant analyses been conducted.

For example, Greening et al. (2005) found correlations of -.58 between time 1 cognitive triad and time 2 depressive symptoms and -.57 between time 1 depressive symptoms and time 2 cognitive triad. The regression analyses, however, only considered the prediction of time 2 depressive symptoms. Similarly, in Kennard et al.'s (2006) study, the *cognition* → *depression* relation was supported, but no test of the reverse relation was reported.

Depressive Symptoms Predicting Maladaptive Cognitions

The second model suggests that depressive symptoms drive future negative cognitive style. This is often referred to as the "scar" hypothesis of depression (Lewinsohn, Steinmertz, Larson, & Franklin, 1981). This model posits that as a result of suffering a depressive episode, a person is left with a depressive cognitive style that persists after the other (physiological and affective) symptoms have abated. This resulting cognitive style could then render individuals more vulnerable to future episodes of depression. We will refer to this model as *depression* → *cognition*.

Timbremont and Braet (2006) found that in both children (93 10- to 11- year olds) and adolescents (69 12- to 15- year olds), depressive symptoms predicted a negative cognitive triad of beliefs one year later. They did not find that cognitive style predicted depressive symptoms in the children and only found evidence of it in the adolescents for the negative view of the future. In their 3-year prospective study of 248 4^{th} graders, McGrath and Repetti (2002) found that depressive symptoms predicted future maladaptive cognitions whereas negative cognition did not predict later depressive symptoms. Additionally, with a sample of 2,272 14- to 18- year olds, Stewart et al.

(2004) found significant predictive relations in both directions. They suggested that the *depression* → *cognition* relation was stronger than the *cognition* → *depression* relation, but did not report a statistical test of that comparison. These studies lend support to the relevance of the scar hypothesis to children and adolescents.

Third Variable(s)

Finally, it could be the case that a third variable is responsible for both depressive symptoms and maladaptive cognitive style. A genetic predisposition, for example, could render an individual susceptible to both depressive symptoms and a maladaptive cognitive style. This relation would manifest itself in a correlation between cognitive style and depressive symptoms without support for either one predicting the other. This model is actually consistent with Beck's early theorizing about cognitive style, which suggested that depressive cognitive schemas are a *part of* depression rather than a risk factor. Whereas much interpretation of Beck's writings has gravitated towards cognitive vulnerability theories, Beck's early conceptualization was more of a simultaneous model. He wrote, "I suggest that cognitive phenomena such as unmitigated negative self-references and expectancies are an *integral part of depression;* consequently, they are hardly capable of causing themselves" (Beck, 1984, p. 1113).

Beck (Beck et al., 1979) used a medical example to illustrate this point: he stated that a patient complaining of chest pain and difficulty breathing is likely to have a lesion in the lungs. Despite the likely primacy of the lesion to the other (more noticeable) symptoms, one would not describe the lesion as the cause of the illness. Beck theorized that the same could be said for depressive cognitions – although they are not the original cause of depression, if they are reduced, so too are the other symptoms (e.g., appetite, sleep disturbance, psychomotor retardation, depressed mood).

Disentangling the Relations

The classic research paradigm for testing longitudinal predictive relations is to measure both constructs of interest at several time points and control for the prior levels of both constructs while testing the ability of each to predict the other. This approach can be problematic when individual differences in the constructs of interest are highly stable over time; predicting change in something that is not changing is inherently difficult. Depressive symptoms and maladaptive cognitive style both exhibit high stability. Stability in this context refers to changes in rank order. A highly stable construct is one where individuals with high levels of the construct compared to the rest of the sample continue to be at the high end at the next time of measurement, irregardless of mean-level changes. Cross-wave correlations for measures of depressive symptoms are large, almost without exception (e.g., .69 over a 6-month interval in Stewart et al., 2004; .61 and .67 over 1-year intervals in Broderick & Korteland, 2004; .69, .65, .65 and .63 over 1-year intervals in Cole et al., 1998). The same is true of measures of maladaptive cognition (e.g., .69 over a 6-month interval in Stewart et al., 2004; .61 over a 1-year interval in Gotlib et al., 1993).

The high levels of stability found in depressive symptoms and cognitive style suggest the existence of a trait-like component of these constructs. As the stability is not 1.0, however, a time-varying component is likely present as well. Thus, measures of depressive symptoms or cognitive style may actually be measuring two separate things: a component with no changes in individual differences over time and a component on which individual differences vary over time. We refer to the perfectly stable component as *trait.* The time-varying component has sometimes been referred to as *state*. In our modeling of this relation – described below – we will adopt the term *occasion* to differentiate this component from what *state* has represented in other trait-state models. The first goal of this study is to test whether or not depressive symptoms and cognitive style have these 2 separate components. We hypothesize that we will be able to identify a perfectly stable trait-like component as well as a component that exhibits changes in individual differences over time.

To partition the trait factor from the occasion factor, we will use a trait-state-occasion (TSO) model first described by Cole, Martin, and Steiger (2005) and later extended by Ciesla, Cole, and Steiger (2007) and LaGrange and Cole (2008). The TSO model extracts a latent *state* factor from multiple indicators, then partitions the variance from the *state* factor into a *trait* factor (the time-invariant portion) and an *occasion* factor (the time-varying portion). The *occasion* factor from each time point is allowed to relate to the subsequent *occasion* factor via an autoregressive path; by definition the *occasion* factors will not have a perfect relation with each other, thus a residual factor is added to each downstream *occasion* variable to account for the variance that is not predicted by the previous *occasion.*

Combining a TSO model of depressive symptoms with a TSO model of cognitive style will allow us to test the reciprocal predictive relations between the time-varying components *(occasions)* of cognition and depression. Cross-lag paths from each cognition *occasion* to the subsequent depression *occasion* (and vice versa) will examine the strengths of these relations. An additional benefit of this model is that it will allow us to test simultaneously the *depression* → *cognition* relation and the *cognition* → *depression* relation.

Developmental Effects

Beck (Beck et al., 1979) theorized that one's cognitive style is derived from early childhood experiences. Information from early childhood crystallizes into schemas that will be used throughout adulthood. We would therefore expect that as childhood unfolds, these cognitions will become more style-like. Related work has found this to hold true for the development of attributional style (Cole et al., 2008) and perceived competence (Cole, Jacquez, & Maschman, 2001). We predict that cognitive style (and possibly depressive symptoms) will become increasingly style-like (i.e., more stable) with age. As the nature of our model defines *trait* to be the component of each construct with *no* changes in individual differences over time, we hypothesize that the increasing stability of the constructs will manifest itself as a stronger relation from one *occasion* to the next for the older children than for the younger children.

If the existence of either a maladaptive cognitive style or depressive symptoms predisposes an individual to the later manifestation of the other, we believe that as children age the likelihood of manifesting both a maladaptive cognitive style *and* depressive symptoms increases – regardless of the order of initial onset. Thus, we predict that as children age and their schema become firmly rooted, the overall relation between cognitive style and depression will become stronger. As we have defined *trait* as a perfectly stable construct, the direct relation between the two *trait* components cannot increase across groups. Thus we predict that a developmental increase in the relation between cognitive style and depressive symptoms will manifest itself as an across-group increase in the strength of the relations between the *occasions*.

The main focus of this study is to examine the directionality of the relation between maladaptive cognitions and depressive symptoms. Specifically, we are concerned with the relation of depressive symptoms to negative cognitive triad and automatic thoughts. Additionally, we expect to find: a trait-like component and a time-varying component of each construct, a developmental increase in the stability of cognitive style and depressive symptoms, and a developmental increase in the relation between cognitive style and depressive symptoms. To examine these relations, we followed three cohorts of children over the course of 4 years. Our use of a large sample of children spanning grades 2 (age 7) through 9 (age 16) allowed us to test our hypotheses over a range of developmental stages.

CHAPTER II

METHOD

Participants

At the beginning of this four-wave longitudinal study, we recruited participants from five public elementary and three public middle schools in a mid-sized southern city. Six hundred sixty (63%) of these students returned the consent form, 556 of which were granted parental permission to participate. The occurrences of children transferring to other schools, being expelled from school, and/or chronically absent led to a further reduction in the sample, leaving 515 participants in the first wave (Wave A).

Each year, we lost students who moved out of the school district and replaced them with new students who moved into the district. Neither the individuals who were lost nor the individuals who were added in subsequent years differed significantly from the rest of the sample on measured variables or demographics. A total of 892 students participated in at least one wave of the study. At Wave A, 161 of the participants were in grade 2 (Group 1); 176 were in grade 4 (Group 2), and 178 were in grade 6 (Group 3). At Wave B, the sample consisted of 173 3rd graders, 146 5th graders, and 136 7th graders. At Wave C, the sample consisted of 164 4th graders, 166 6th graders, and 145 8th graders. At Wave D, the sample consisted of 149 5th graders, 160 7th graders, and 98 9th graders. The sample consisted of 55.5% girls and 44.5% boys. The sample was racially heterogeneous, including 63.5% African American, 28.3% White, 3.6% Latino, 1% Asian American, .4% Native American, and 3.2% “other” or “mixed” race. Annual family incomes ranged from less than $10,000 to more than $120,000 (*M* = $25,000).

Measures

Cognitive Triad Inventory for Children (CTI-C; Kaslow, Stark, Printz, Livingston, & Tsai, 1992). The CTI-C consists of 36 questions that assess a child's view of self, future, and world (see Appendix A). Twelve items tap into each of these three domains, thus creating a sub-scale for each part of the triad. Within each domain, half of the items are positively phrased and half are negatively phrased. Items are assigned scores of 0 ("no"), 1 ("maybe"), or 2 ("yes"), with negatively phrased items reverse-scored, such that higher scores represent the presence of more positive views/less negative views. Sample items include "I am a good person" and "Nothing is likely to work out for me." LaGrange et al. (in press) found support for good convergent and construct validity in the CTI-C's relations to measures of other cognitive constructs. Kaslow et al. (1992) found high full-scale internal consistency reliability of the CTI-C (alpha = .92) and moderate alphas on the individual scales (.83 Self, .85 Future, .69 World). Examining internal reliability of the CTI-C by grade level in the current study revealed no consistent pattern of age-related differences. Cronbach's alphas ranged from .71-.88 on the Self scale, .71-.84 on the Future scale, .69-.84 on the World scale, and .86-.94 on the Total score.

Automatic Thoughts Questionnaire (ATQ; Hollon & Kendall, 1980). The ATQ is a 30-item questionnaire that assesses negative automatic thoughts (see Appendix B). Individuals are asked to rate on a 5-point scale (1 = not at all; 5 = all the time) how often in the past week they have had specific negative thoughts. Scores range from 30 to 150 with higher scores representing higher levels of negative automatic thoughts. Sample items include “Something has to change” and “I don’t think I can go on.” The ATQ was designed to assess spontaneous negative self-statements and intrusive cognitions experienced by depressed adults. Kazdin (1990) assessed the validity of the ATQ in a clinical sample of 250 children (ages 5-13) and found a .96 internal consistency, moderate item-total score correlations (*r*s = .39 - .81), and good convergent and discriminant validity. To assure comprehension of the questions, we used the slight wording changes to a couple of items used by Kazdin in the validation study. Cronbach’s alpha for the ATQ in the current study ranged from .89 to .96, with a slight tendency for higher reliability values for the older grade levels.

Children’s Depression Inventory (CDI; Kovacs, 1981). The CDI is a 27-item self-report questionnaire that assesses the number and severity of depressive symptoms in children (see Appendix C). Each of the items consists of three statements scored from 0 to 2, in order of increasing severity. Children select one sentence from each triad that best describes themselves for the past two weeks (e.g., “I am sad once in a while,” “I am sad many times,” or “I am sad all the time”). Psychometric studies of the CDI have shown high degrees of internal consistency, test-retest reliability, and construct validity, especially in nonclinic populations (Carey, Faulstich, Gresham, & Ruggiero, 1987; Kazdin, French, & Unis, 1983; Kovacs, 1985; Lobovits & Handal, 1985; Saylor, Finch, Spirito, & Bennett, 1984; Smucker, Craighead, Craighead, & Green, 1986). Due to concerns expressed by school administrators, we dropped the suicide item from the questionnaire. This 26-item version of the CDI has shown a high degree of internal consistency in prior research (alpha = .90; Cole, Hoffman, Tram, & Maxwell, 2000). Timbremont, Braet, and Dreessen (2004) found good predictive and discriminant validity of children's CDI scores in predicting depressive disorders in a clinic-referred sample. Cronbach's alpha for the CDI in the current study ranged from .73 to .88, with a tendency for increased reliability with higher grade levels.

Center for Epidemiological Studies - Depression Scale for Children (CES-DC; Weissman, Orvaschel, & Padian, 1980). The CES-DC is a 20-item self-report inventory (see Appendix D) based on the Center for Epidemiological Studies - Depression Scale (CES-D; Radloff, 1977) – with slight modifications to some of the items to ensure understanding of the questions by children. To further aid comprehension, we created a chart to serve as a visual aid to assist the younger children (second through fourth 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 (e.g., "I felt like crying this week"). Weissman et al (1980) provides evidence of convergent validity with a mixed sample of 6- to 17- year olds (correlation with the CDI = .44, $p < .05$). Faulstich, Carey, Ruggiero, Enyart, & Gresham (1986) found good internal consistency (alpha = .86), two-week test-retest reliability (r=.69), and construct validity for psychiatric inpatient adolescents (13- to 17- year olds); for inpatient children (8- to 12- year olds), they found good internal consistency (alpha = .77). Fendrich, Weissman, and Warner (1990) reported an alpha reliability of .78 for 6- to 11-year old children.); furthermore, the measure discriminated between depressed and nondepressed children. Additionally, Hilsman and Garber (1995) found good internal consistency (alphas of .90 to .93) and construct validity (correlations of .61 to .73 with a measure of negative affect) with a sample of 5th and 6th grade students. Examined by individual grade level, Cronbach's alpha for the CES-DC in the current study ranged from .81 to .87, with a tendency for higher values to be associated with higher grade levels.

Negative Life Events Checklist (LEC; Work, Cowen, Parker, & Wyman, 1990). The LEC consists of 30 stressful events (see Appendix E) including some items to specifically address urban stressors. Items ask about events/situations such as having a death in the family, seeing someone get badly hurt, being in a foster home, living in a dangerous neighborhood, and the arrest or incarceration of a close relative. Participants indicated (using a yes–no format) whether they had experienced these events in the past 6 months. Participants also rated the level of distress associated with each event; however, we did not use these ratings because they are confounded with depressed mood (Monroe & Simons, 1991). Examined by individual grade level for each wave, Cronbach's alpha for the LEC in the current study ranged from .74 to .83.

Procedure

Doctoral psychology students and advanced undergraduates administered the questionnaires to participants during regular school hours. The measures included in this study were a subset of instruments from a larger study. The questionnaires were printed on optical scan sheets to allow for computerized scoring. In order to control for order effects, we counterbalanced the order of questionnaires. A research assistant worked one-on-one with each second grader, writing the responses as the child replied verbally or pointed at the answer on various response charts. We met with the third and 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. Research assistants made follow-up visits to the schools to collect data from students that were absent from the group administrations. This procedure was repeated once per year for four consecutive years.

CHAPTER III

RESULTS

We tested our hypotheses with a series of TSO models. We began with four univariate models – one for each of the four measures included in the study. We then modeled each of the two measures of depressive symptoms with each of the cognitive measures, yielding a total of four bivariate models (the CDI with the ATQ; the CDI with the CTI-C; the CES-DC with the ATQ; the CES-DC with the CTI-C). Each model was run as a multi-group analysis with 3 groups corresponding to the 3 cohorts of participants. We used full information maximum likelihood estimation to handle the various patterns of missing data.

Preliminary Analyses

Tables 1a through 1c display the correlations among the four instruments at each wave for each of the 3 groups. The correlations were computed using case-wise deletion. For Group 1, 82 out of 120 correlations were significant (ps < .05). For Group 2, 104 out of 120 correlations were significant (ps < .05). For Group 3, 113 out of 120 correlations were significant (ps < .05). The means for each group at each wave ranged from 7.1 to 10.9 for the CDI, from 13.1 to 24.5 for the CES-DC, from 48.7 to 76.2 for the ATQ, and from 50.7 to 58.9 for the CTI-C.

Table 1a

Correlations, Means, and Standard Deviations for Group 1

Group 1	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
1. CDI Wave A	1															
2. CES-DC Wave A	.35**	1														
3. ATQ Wave A	.37**	.33**	1													
4. CTI-C Wave A	-.22**	-.35**	-.10	1												
5. CDI Wave B	.28**	.10	.18	.08	1											
6. CES-DC Wave B	.26*	.31**	.21*	-.10	.43**	1										
7. ATQ Wave B	.36**	.17	.23*	-.06	.60**	.47**	1									
8. CTI-C Wave B	-.38**	-.24*	-.27**	.06	-.50**	-.67**	-.42**	1								
9. CDI Wave C	.27*	.25*	.18	-.09	.53**	.28**	.30**	-.35**	1							
10. CES-DC Wave C	.24*	.32**	.13	-.23*	.31**	.37**	.20*	-.35**	.52**	1						
11. ATQ Wave C	.19	.16	.24*	-.04	.44**	.33**	.47**	-.41**	.66**	.45**	1					
12. CTI-C Wave C	-.38**	-.21	-.27*	.33**	-.21*	-.26**	-.13	.32**	-.40**	-.56**	-.33**	1				
13. CDI Wave D	.21	.04	-.08	.16	.34*	.19	.26	-.31*	.46**	.47**	.33*	-.16	1			
14. CES-DC Wave D	.37*	-.07	.28	.17	.51**	.21	.47**	-.40**	.29*	.27*	.34*	-.09	.56**	1		
15. ATQ Wave D	.29	.13	-.09	.05	.42**	.35*	.39**	-.42**	.46**	.47**	.41**	-.22	.75**	.68**	1	
16. CTI-C Wave D	-.35*	-.15	-.06	-.12	-.40**	-.13	-.39**	.37**	-.49**	-.37**	-.32*	.23	-.61**	-.50**	-.64**	1
Mean	10.87	22.09	76.17	50.72	8.94	18.25	64.28	54.62	8.30	15.70	57.79	55.90	8.83	21.72	55.36	53.59
SD	6.25	9.95	21.59	15.62	6.22	10.85	22.49	10.69	6.83	11.05	20.75	11.02	7.53	9.78	22.04	11.46

Note. ATQ = Automatic Thoughts Questionnaire; CTI-C = Cognitive Triad Inventory for Children; CDI = Children's Depression Inventory; CES-DC = Center for Epidemiological Studies Depression Scale for Children. * $p < .05$; ** $p < .01$.

Table 1b

Correlations, Means, and Standard Deviations for Group 2

Group 2	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
1. CDI Wave A	1															
2. CES-DC Wave A	.49**	1														
3. ATQ Wave A	.64**	.55**	1													
4. CTI-C Wave A	-.46**	-.52**	-.34**	1												
5. CDI Wave B	.36**	.41**	.35**	-.16	1											
6. CES-DC Wave B	.32**	.42**	.33**	-.21*	.52**	1										
7. ATQ Wave B	.21*	.35**	.37**	-.16	.77**	.48**	1									
8. CTI-C Wave B	-.27**	-.50**	-.29**	.38**	-.55**	-.70**	-.51**	1								
9. CDI Wave C	.28**	.40**	.33**	-.19	.63**	.50**	.57**	-.55**	1							
10. CES-DC Wave C	.28**	.40**	.34**	-.22*	.43**	.49**	.38**	-.46**	.62**	1						
11. ATQ Wave C	.29**	.42**	.30**	-.32**	.46**	.42**	.45**	-.34**	.75**	.58**	1					
12. CTI-C Wave C	-.23*	-.36**	-.27*	.21	-.39**	-.42**	-.38**	.46**	-.63**	-.71**	-.55**	1				
13. CDI Wave D	.33**	.32*	.26*	-.08	.53**	.39**	.51**	-.37**	.60**	.38**	.41**	-.26**	1			
14. CES-DC Wave D	.06	.26*	.18	-.18	.33**	.57**	.29*	-.49**	.40**	.50**	.41**	-.41**	.52**	1		
15. ATQ Wave D	.17	.02	.08	-.06	.19	.29*	.28*	-.22	.44**	.34**	.44**	-.20*	.79**	.49**	1	
16. CTI-C Wave D	-.06	-.28*	-.11	.26*	-.46**	-.44**	-.42**	.63**	-.50**	-.45**	-.38**	.47**	-.62**	-.66**	-.56**	1
Mean	8.37	17.07	62.00	53.88	8.71	13.25	60.27	57.39	7.81	13.14	49.99	57.42	7.06	18.74	48.71	58.92
SD	5.93	10.80	20.48	14.89	7.61	10.47	23.35	10.85	7.37	10.56	18.50	11.62	6.60	9.00	20.19	10.56

Note. ATQ = Automatic Thoughts Questionnaire; CTI-C = Cognitive Triad Inventory for Children; CDI = Children's Depression Inventory; CES-DC = Center for Epidemiological Studies Depression Scale for Children. * $p < .05$; ** $p < .01$.

Table 1c

Correlations, Means, and Standard Deviations for Group 3

Group 3	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
1. CDI Wave A	1															
2. CES-DC Wave A	.58**	1														
3. ATQ Wave A	.67**	.55**	1													
4. CTI-C Wave A	-.41**	-.44**	-.36**	1												
5. CDI Wave B	.52**	.26**	.30**	-.21*	1											
6. CES-DC Wave B	.46**	.51**	.42**	-.26**	.58**	1										
7. ATQ Wave B	.36**	.24*	.29**	-.29**	.78**	.55**	1									
8. CTI-C Wave B	-.42**	-.38**	-.26**	.27**	-.61**	-.72**	-.57**	1								
9. CDI Wave C	.47**	.41**	.32**	-.30**	.70**	.58**	.54**	-.56**	1							
10. CES-DC Wave C	.51**	.51**	.38**	-.51**	.58**	.62**	.47**	-.53**	.64**	1						
11. ATQ Wave C	.44**	.54**	.48**	-.45**	.56**	.56**	.54**	-.49**	.73**	.63**	1					
12. CTI-C Wave C	-.51**	-.43**	-.33**	.47**	-.72**	-.62**	-.56**	.60**	-.78**	-.72**	-.60**	1				
13. CDI Wave D	.46**	.25	.21	-.14	.74**	.49**	.53**	-.55**	.72**	.54**	.52**	-.65**	1			
14. CES-DC Wave D	.42**	.46**	.28	-.28	.47**	.41**	.35*	-.33*	.36**	.69**	.41**	-.45**	.59**	1		
15. ATQ Wave D	.36*	.54**	.49**	-.33*	.42**	.40**	.51**	-.28*	.49**	.42**	.51**	-.45**	.61**	.60**	1	
16. CTI-C Wave D	-.34*	-.30*	-.07	.22	-.53**	-.46**	-.40**	.56**	-.42**	-.45**	-.33**	.64**	-.69**	-.53**	-.40**	1
Mean	9.48	15.26	58.88	56.03	9.19	15.44	55.07	57.07	9.13	14.86	57.11	57.79	9.89	24.49	58.47	55.35
SD	6.58	10.92	23.91	12.93	7.06	11.19	23.68	11.16	7.60	11.28	24.03	11.37	7.25	10.78	22.55	11.63

Note. ATQ = Automatic Thoughts Questionnaire; CTI-C = Cognitive Triad Inventory for Children; CDI = Children's Depression Inventory; CES-DC = Center for Epidemiological Studies Depression Scale for Children. * $p < .05$; ** $p < .01$.

Univariate TSO Models

The creation of univariate models allowed us to examine parameter estimates of each measure on its own. Figure 1 depicts a univariate TSO model applied to four waves of CES-DC data. We tested similar models for the CTI-C, CDI, and ATQ. So as to be able to extract latent variables, we randomly divided each measure in half to form two parcels. We formed different randomly split halves for each wave. In Figure 1, the two parcels of CES-DC items are shown loading onto the latent state depression variable at each of the four time points corresponding to our four waves of data collection (*State 1 Depression* through *State 4 Depression)*. The variance for each of these four state variables is then partitioned into that which is explained by a time-invariant trait factor and a time-varying occasion factor (*Occasion 1 Depression* through *Occasion 4 Depression*). The autoregressive paths (*a1* through *a3*) connecting the occasion factors represent the predictive relations from each occasion to the next. The variance of *Occasion t* that is not predicted by *Occasion t-1* is explained by the residuals.

We set the loading of the item parcels onto the corresponding latent state variables to 1.0. Similarly, the loadings of the state variables onto the trait and occasion variables were all set to 1.0. We constrained the trait variance to be equal across groups.[1] This constraint, along with the 1.0 trait loadings, allowed us to define trait variance as the portion of the total variance that is completely stable over time – both across waves and across groups.

Our first set of models had freely varying autoregressive paths. In order to reach a proper solution, the ATQ model required that the error variance of one of the disturbance terms be set at 0. The other 3 models converged without requiring such constraints. All

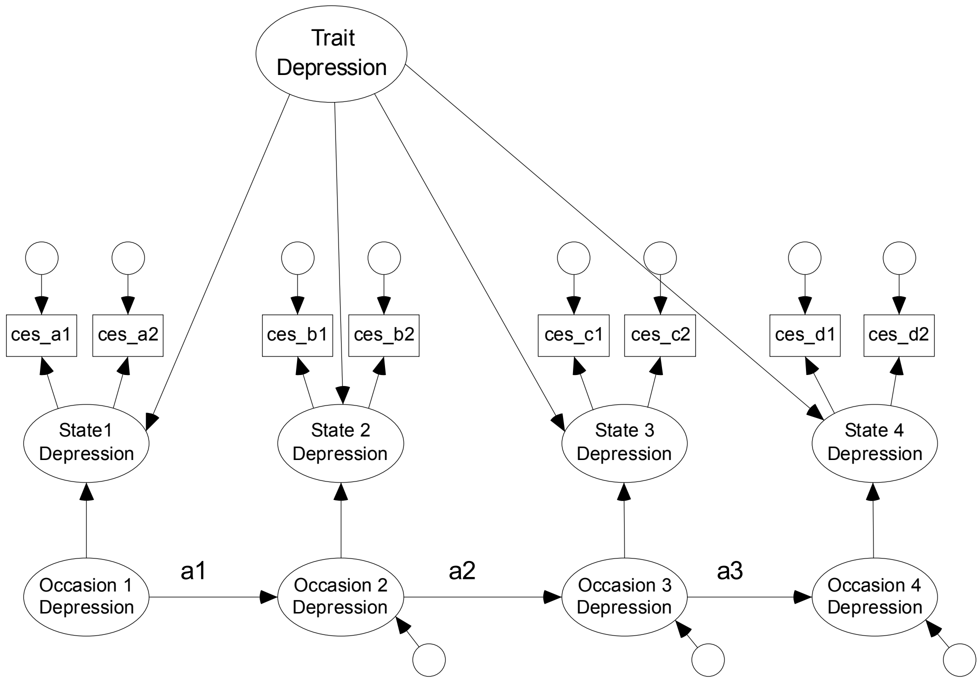

Figure 1. Univariate TSO model of depressive symptoms. CES = Center for Epidemiological Studies Depression Scale for Children.

four models fit the data well. Table 2 displays the relevant fit indices of this "free" version of the models, as well as the more constrained versions tested next. In some cases the chi-square was significant. This is not surprising considering the relatively large sample size. Large samples can generate a significant chi-square when the actual discrepancies between the model and the data are small (Bentler & Bonett, 1980). We therefore used additional criteria to judge the fit of the model, including the root-mean-square-error of approximation (RMSEA; Steiger & Lind, 1980), the Tucker-Lewis index (TLI; Tucker & Lewis, 1973) and the comparative fit index (CFI; Bentler, 1990). RMSEA values less than .06 indicate a good fit (Hu & Bentler, 1999). TLI and CFI values greater than .95 indicate a good fit (Hu & Bentler, 1999).

Table 2

Fit of Nested Univariate Models

Model	DF	χ^2	$\Delta\chi^2$	RMSEA (90% conf. interval)	TLI	CFI
		ATQ				
Free autoregressive paths	63	85.0^{*}	--	.020 (.006-.030)	.99	.99
Autoregressive paths constrained within group (Δ 6 df)	69	89.4	4.4	.018 (.000-.028)	.99	.99
Autoregressive paths constrained across groups (Δ 2 df)	71	91.3	1.9	.018 (.000-.028)	.99	.99
		CTI-C				
Free autoregressive paths	62	100.1^{**}	--	.026 (.016-.036)	.97	.98
Autoregressive paths constrained within group (Δ 6 df)	68	108.4^{**}	7.3	.026 (.016-.035)	.97	.98
Autoregressive paths constrained across groups (Δ 2 df)	70	118.8^{***}	10.4^{**}	.028 (.019-.037)	.97	.98
		CDI				
Free autoregressive paths	62	88.0^{*}	--	.022 (.010-.032)	.97	.99
Autoregressive paths constrained within group (Δ 6 df)	68	97.2^{*}	9.2	.022 (.011-.031)	.97	.98
Autoregressive paths constrained across groups (Δ 2 df)	70	101.1^{**}	3.9	.022 (.012-.032)	.97	.98
		CES-DC				
Free autoregressive paths	62	79.0	--	.018 (.000-.028)	.98	.99
Autoregressive paths constrained within group (Δ 6 df)	68	80.8	1.8	.015 (.000-.026)	.99	.99
Autoregressive paths constrained across groups (Δ 2 df)	70	91.6^{*}	10.8^{**}	.019 (.000-.028)	.98	.99

Note. ATQ = Automatic Thoughts Questionnaire; CTI-C = Cognitive Triad Inventory for Children; CDI = Children's Depression Inventory; CES-DC = Center for Epidemiological Studies Depression Scale for Children; TLI = Tucker Lewis Index; CFI = Comparative Fit Index; RMSEA = Root Mean Squared Error of Approximation.
* $p < .05$, ** $p < .01$, *** $p < .001$.

Next, we added within-group constraints on the autoregressive paths (*a1* = *a2* = *a3*). This constraint did not perturb the fit of any of the models and resulted in an increase in the reliability of the parameter estimates. Thus, we used this model to examine the parameter estimates of interest. Table 3 displays the trait variance, occasion variance (at Wave 1), and the autoregressive path coefficients for each model. We found significant trait variance with all measures except for the CDI. Significant occasion variance was found for all groups with all four measures. The proportion of trait variance to total variance for Groups 1, 2, and 3, respectively was .32, .35, .28 on the ATQ; .23, .24, .34 on the CTI-C; .42, .38, .36 on the CES-DC; .16, .13, .10 on the CDI. The model of the CDI had a significant autoregressive path for all 3 age-groups, with standardized estimates ranging from .44 to .79 (M = .62, SD = .14). The models of the other 3 measures had more modest autoregressive coefficients with only a few reaching significance (ATQ for Group 2; CTI-C for Group 1; CES-DC for Group 3).

Table 3

Estimates for Univariate Models

Group	Trait σ^2	Occasion σ^2	Autoregressive Path	Standardized Autoregressive Paths
		ATQ		
1	36.82^{***}	77.96^{***}	.11	.11, .13, .09
2	36.82^{***}	68.95^{***}	$.28^{**}$	.23, .39, .24
3	36.82^{***}	96.48^{***}	.14	.14, .15, .15
		CTI-C		
1	13.61^{***}	46.69^{***}_{a}	$-.20^{**}_{a}$	-.40, -.18, -.19
2	13.61^{***}	42.61^{***}_{a}	$.08_{b}$	.19, .06, .11
3	13.61^{***}	26.55^{***}_{b}	.05	.07, .05, .05
		CDI		
1	0.93	4.79^{**}	$.55^{***}$	.44, .52, .47
2	0.93	6.44^{***}	$.70^{***}$	.48, .76, .75
3	0.93	8.19^{***}	$.74^{***}$	.65, .73, .79
		CES-DC		
1	9.48^{***}	13.05^{***}	$.06_{a}$	.06, .06, .05
2	9.48^{***}	15.48^{***}	$.14_{a}$	.16, .13, .18
3	9.48^{***}	16.60^{***}	$.51^{***}_{b}$	.46, .55, .57

Note. Estimates with differing subscripts within a panel are significantly different from one another ($p < .05$). ATQ = Automatic Thoughts Questionnaire; CTI-C = Cognitive Triad Inventory for Children; CDI = Children's Depression Inventory; CES-DC = Center for Epidemiological Studies Depression Scale for Children.
$^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

Developmental Hypotheses

Our 3-group model allowed us to examine developmental differences in the relevant estimates by imposing various equality constraints across the groups and testing the change in fit. The final constraint summarized in Table 2 required the autoregressive paths to be equal both within groups and across groups. We hypothesized that cognitive style (and possibly depressive symptoms) will exhibit higher stability for the older groups than for the younger groups. We tested this hypothesis by examining the change in chi-square associated with imposing this equality constraint. In the case of the CTI-C and CES-DC models, the chi-square increased significantly with this additional constraint. For the CTI-C, Group 2 had significantly higher stability than Group 1 ($p < .05$). For the CES-DC, Group 3 had significantly higher stability than Group 1 ($p < .01$) and Group 2 ($p < .01$).

We also tested for a developmental shift in the amount of occasion factor variance present in each construct. For the CTI-C, Group 3 had a significantly lower level of occasion variance than did Group 1 ($p < .01$) and Group 2 ($p < .05$). We found no such differences in the models of the other 3 measures.

Bivariate TSO Models

After testing each of the four univariate TSO models, we paired each of the cognitive measures with each of the measures of depressive symptoms to form 4 bivariate models. Figure 2 represents a combination of the ATQ univariate model depicted in Figure 1 with a similar model of the CES-DC. The cross-lag paths (*c1* through *c3* and *d1* through *d3*) represent the predictive relations of construct *x* at *Occasion t-1* on construct *y*

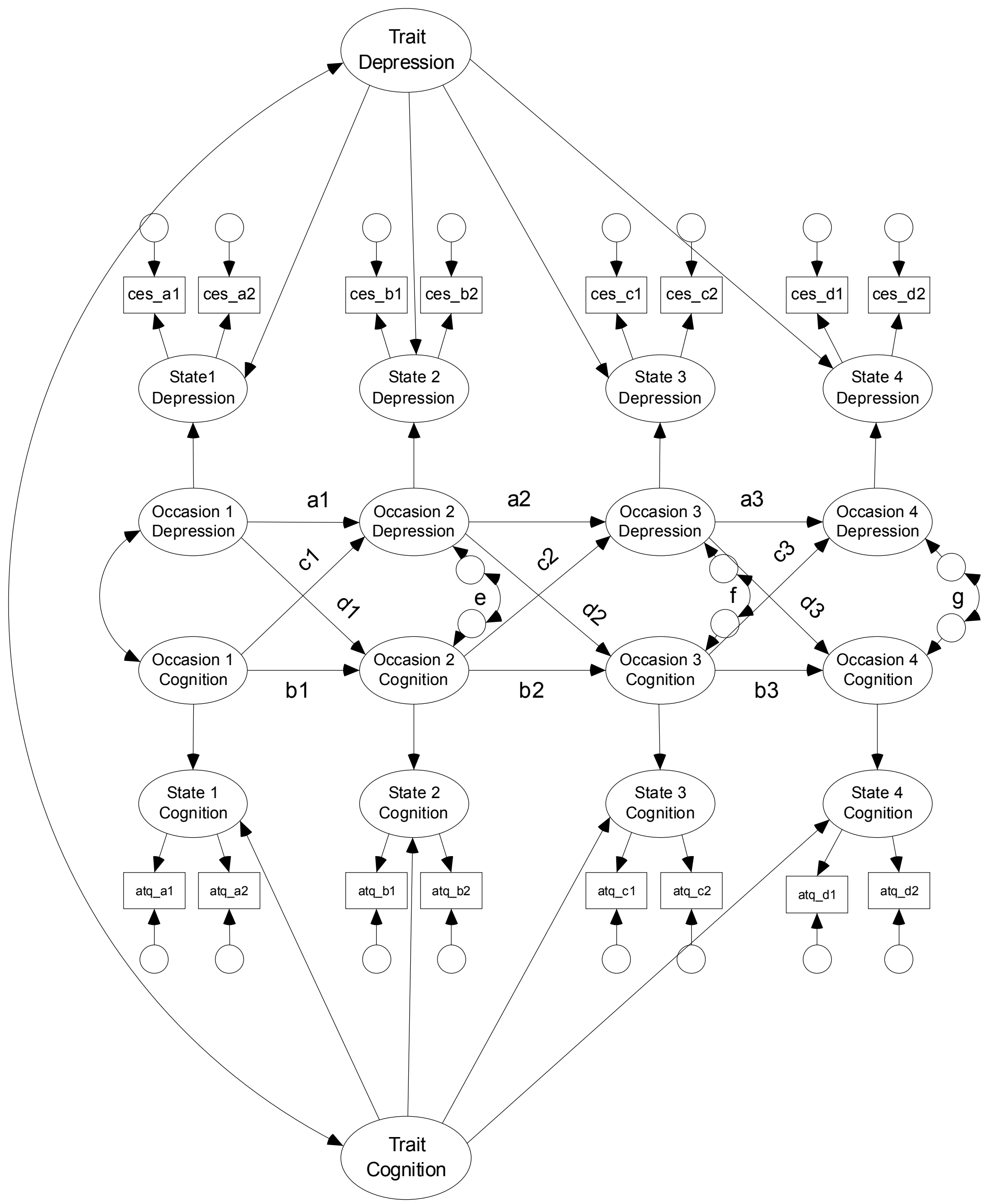

Figure 2. Bivariate TSO model depicting relations between depressive symptoms and cognitive style. ATQ = Automatic Thoughts Questionnaire; CES = Center for Epidemiological Studies Depression Scale for Children.

at *Occasion t* while controlling for *y* at *Occasion t-1* and the trait-like aspect of each construct. We allowed the residual of each construct to correlate with the same-wave residual of the other construct (paths *e, f,* and *g*). A correlation was also allowed between the two *Occasion 1* factors and the *Trait* factors.

In addition to the parameterization described for the univariate models, the covariance of the latent trait cognition variable with the latent trait depression variable was constrained across groups to aid convergence. One change was required in one of the models – possibly resulting from an apparent lack of trait variance associated with the CDI. This lack of variance can render a TSO model over-parameterized and lead to convergence problems. Although we were able to model the full CDI TSO model with the CTI-C, we needed to remove the CDI trait variable from the CDI/ATQ model in order to converge on a proper solution.

Our first version of these models had no equality constraints on the autoregressive paths. The cross-lag paths were left free as well. This "free" version of all 4 bivariate models fit the data well. Table 4 displays the relevant fit indices of this version of the models, as well as a more constrained version. Before adding the within group constraints, however, we tested for a cohort effect by constraining the equivalent grade transitions to be equal. That is, Group 1, Wave 3 → 4 and Group 2, Wave 1 → 2 both represent the transition from grade 4 to grade 5; Group 2, Wave 3 → 4 and Group 3, Wave 1 → 2 both represent the transition from grade 6 to grade 7. In none of the 4 models did the chi-square significantly increase with the addition of these equality constraints. Thus, we found no support for such a cohort effect.

Next, we added within-group equality constraints on the autoregressive paths and cross-lag paths (e.g., $a1 = a2 = a3$ and $c1 = c2 = c3$). This constraint did not perturb the fit of any of the models (see Table 4) and resulted in an increase in the reliability of the

Table 4

Fit of Nested Bivariate Models

Model	DF	χ^2	$\Delta\chi^2$	RMSEA (90% conf. interval)	TLI	CFI
		CDI/ATQ				
Free autoregressive/ cross-lag paths	287	407.2***	--	.022 (.017-.026)	.97	.98
Autoregressive/ cross-lag paths constrained within group (Δ 24 df)	311	443.6***	36.4	.022 (.017-.026)	.97	.98
		CDI/CTI-C				
Free autoregressive/ cross-lag paths	285	391.9***	--	.021 (.015-.025)	.97	.98
Autoregressive/ cross-lag paths constrained within group (Δ 24 df)	309	433.3***	41.4	.021 (.016-.026)	.97	.97
		CES-DC/ATQ				
Free autoregressive/ cross-lag paths	285	425.1***	--	.024 (.019-.028)	.96	.97
Autoregressive/ cross-lag paths constrained within group (Δ 24 df)	309	449.9***	24.8	.023 (.018-.027)	.97	.97
		CES-DC/CTI-C				
Free autoregressive/ cross-lag paths	285	424.7***	--	.023 (.019-.028)	.96	.97
Autoregressive/ cross-lag paths constrained within group (Δ 24 df)	309	450.8***	26.1	.023 (.018-.027)	.96	.97

Note. ATQ = Automatic Thoughts Questionnaire; CTI-C = Cognitive Triad Inventory for Children; CDI = Children's Depression Inventory; CES-DC = Center for Epidemiological Studies Depression Scale for Children; TLI = Tucker Lewis Index; CFI = Comparative Fit Index; RMSEA = Root Mean Squared Error of Approximation.
* $p < .05$, ** $p < .01$, *** $p < .001$.

parameter estimates. Thus, we used this model to examine the parameter estimates of interest. Table 5 displays estimates of the cross-lag path coefficients, autoregressive path coefficients, and covariances of the corresponding trait variables, residuals, and time 1 occasion variables for each model.

Table 5

Estimates for Bivariate Models (Standardized Estimates in Parentheses)

Group	Cognition → Depression	Depression → Cognition	Depression → Depression	Cognition → Cognition	Covariances of: trait dep, trait cog	Covariances of: occas 1dep, occas 1 cog	Covariances of occasion residuals: time 2	time 3	time 4
				CDI/ATQ					
1	-.03	1.91***	.67***	-.05	--	11.30$^{***}_{a}$	14.49$^{***}_{a}$	13.50***	22.35$^{***}_{a}$
	(-.09, -.08, -.07)	(.45, .58, .56)	(.56, .63, .58)	(-.05, -.05, -.04)		(.50)	(.66)	(.70)	(.85)
2	.02	1.17$^{**}_{a}$	.67***	.13	--	20.63$^{***}_{b}$	28.75$^{***}_{b}$	9.53***	17.11$^{***}_{a}$
	(.04, .05, .04)	(.29, .52, .42)	(.50, .73, .42)	(.11, .17, .12)		(.78)	(.88)	(.72)	(.95)
3	-.10**	2.71$^{***}_{b}$	1.04***	-.32*	--	26.80$^{***}_{c}$	20.20***	13.51***	7.41$^{*}_{b}$
	(-.33, -.33, -.32)	(.74, .88, .89)	(.93, 1.03, 1.08)	(-.32, -.34, -.32)		(.80)	(.87)	(.71)	(.52)
				CDI/CTI-C					
1	.10*	-.39$_{a}$	.56***	-.19**	-3.75***	-.77$_{a}$	-3.39*	-2.38	-6.85***
	(.25, .13, .12)	(-.21, -.25, -.26)	(.41, .54, .47)	(-.36, -.17, -.19)	(-.90)	(-.06)	(-.44)	(-.25)	(-.60)
2	.03	-.51$^{***}_{a}$	.70***	.03	-3.75***	-9.08$^{***}_{b}$	-6.01***	-5.45***	-3.51**
	(.06, .04, .05)	(-.36, -.38, -.45)	(.50, .76, .75)	(.06, .03, .04)	(-.90)	(-.53)	(-.59)	(-.58)	(-.52)
3	.05	-.90$^{***}_{b}$	.76***	-.15	-3.75***	-5.48**	-4.14**	-5.32***	-5.81***
	(.08, .06, .06)	(-.58, -.76, -.64)	(.66, .74, .82)	(-.18, -.17, -.12)	(-.90)	(-.37)	(-.46)	(-.80)	(-.77)
				CES-DC/ATQ					
1	-.04	.07	.05$_{a}$	.18	15.49***	6.06	14.33**	12.15**	29.64$^{***}_{a}$
	(-.08, -.09, -.07)	(.03, .03, .03)	(.04, .04, .04)	(.16, .21, .15)	(.88)	(.19)	(.41)	(.39)	(.74)
2	.07	.40*	.14$_{a}$	.25**	15.49***	17.64***	11.63**	9.63**	10.76$^{**}_{b}$
	(.16, .18, .16)	(.16, .20, .18)	(.15, .14, .17)	(.21, .34, .22)	(.88)	(.52)	(.35)	(.41)	(.45)
3	-.00	.31	.49$^{***}_{b}$	.14	15.49***	18.07**	18.93***	13.97***	14.37**
	(-.01, -.01, -.01)	(.12, .15, .15)	(.43, .52, .52)	(.14, .16, .15)	(.88)	(.46)	(.47)	(.45)	(.52)
				CES-DC/CTI-C					
1	.11	-.08	.13$_{a}$	-.18*	-9.36***	-7.10*	-9.74***	-8.03***	-9.49**
	(.19, .10, .10)	(-.08, -.08, -.07)	(.12, .13, .11)	(-.35, -.16, -.18)	(-.83)	(-.29)	(-.78)	(-.52)	(-.55)
2	-.05	-.30**	.07$_{a}$	.01	-9.36***	-13.44***	-6.84***	-13.00***	-4.72**
	(-.09, -.04, -.08)	(-.42, -.22, -.33)	(.08, .06, .09)	(.03, .01, .02)	(-.83)	(-.52)	(-.78)	(-.76)	(-.52)
3	.08	-.41***	.54$^{***}_{b}$	-.04	-9.36***	-7.19*	-11.81***	-7.35***	-4.43
	(.09, .08, .08)	(-.39, -.49, -.41)	(.48, .60, .57)	(-.05, -.05, -.04)	(-.83)	(-.34)	(-.74)	(-.63)	(-.35)

Note. Estimates with differing subscripts within a panel are significantly different from one another ($p < .05$). ATQ = Automatic Thoughts Questionnaire; CTI-C = Cognitive Triad Inventory for Children; CDI = Children's Depression Inventory; CES-DC = Center for Epidemiological Studies Depression Scale for Children. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

The Question of Prediction

The focal question of the current study was whether or not maladaptive cognitive style and depressive symptoms prospectively predict one another after controlling for the completely stable portions of the variance of each construct. The first 2 columns of Table 5 address this question. These values are the estimates of the cross-lag path coefficients from the 4 models. Looking at the first column, we see no support for the hypothesis that prior maladaptive cognition predicts later depressive symptoms. Two of the 12 path coefficients reached a level of significance, but they are actually in a direction opposite to that which we expected. That is, the CDI, ATQ, and CES-DC are all scored in the same direction whereas the CTI-C is scored in the reverse direction, such that high scores represent a healthy, adaptive cognitive style. Thus, in the 1st and 3rd panels, coefficients with a positive sign support the predictive relation proposed by theory; in the 2nd and 4th panels, coefficients with a negative sign support such a relation.

The 2nd column of Table 5 displays estimates of the relation between prior depressive symptoms and later maladaptive cognitions. Eight out of 12 of these estimates reached significance. Additionally, the estimates in this column are all in the direction predicted by theory (i.e., increased depressive symptoms predicted increased negative cognitions). The standardized estimates ranged from absolute values of .03 to .58 (*M* = .22, *SD* = .21) for Group 1, .16 to .52 (*M* = .33, *SD* = .12) for Group 2, and .12 to .89 (*M* = .52, *SD* = .28) for Group 3.

The last 5 columns of Table 5 display the relevant covariance estimates. The covariances between the trait variables were all significant at the .001 level. Standardized estimates ranged from absolute values of .83 to .90 (*M* = .87, *SD* = .04). The covariances between the occasion variables (wave 1) or residuals of the occasion variables (waves 2 through 4) reached significance in 44 out of 48 instances. The standardized estimates ranged from absolute values of .06 to .85 (*M* = .50, *SD* = .22) for Group 1, .35 to .95 (*M* = .62, *SD* = .17) for Group 2, and .35 to .87 (*M* = .58, *SD* = .18) for Group 3.

Developmental Hypotheses Revisited

We have already described (in the univariate section) tests of developmental differences in the stability of each construct. The bivariate models allowed for another look at the differences in stability, as well as tests of developmental differences in the predictive relations. When included in the bivariate models, the group differences in the stability estimates of the CTI-C no longer reached significance. The CES-DC, however, exhibited the same pattern of developmental differences as described in the univariate section (Group 3 had significantly higher stability than Group 1 ($p < .01$) and Group 2 ($p < .05$) in the CES-DC/ATQ model; Group 3 had significantly higher stability than Group 1 ($p < .05$) and Group 2 ($p < .01$) in the CES-DC/CTI-C model).

Tests of the cross-lag path coefficients identified significant developmental shifts in the prediction of cognition by prior depressive symptoms in 2 of the 4 models. In the CDI/ATQ model, Group 3 had a significantly greater *depression* → *cognition* path estimate than did Group 2 ($p < .05$). In the CDI/CTI-C model, Group 3 had significantly greater *depression* → *cognition* path estimates than did either Group 1 or Group 2 (*p*s< .05). The pattern of larger *depression* → *cognition* path coefficients for the older groups than for the younger groups held true for the other 2 models, but did not reach statistical significance.

Redundant Items

As the measures included in these analyses included some overlap in symptom assessment, we were concerned about artificial inflation of the relations between the measures. Thus, we re-ran the analyses with the redundant items removed from each instrument. Seven raters identified pairs of items from the depression measures and cognitive measures that were very close duplicates of each other. If the pair of items assessed cognitive style, we removed the redundant item from the depression measure; if the pair of items assessed a non-cognitive symptom of depression, we removed the redundant item from the cognitive measure. The raters reached a consensus to remove 4 items from the CTI-C, 2 items from the ATQ, 8 items from the CDI, and 5 items from the CES-DC. The removed items are listed in Appendix F.

We re-created random parcels of items for each measure (an additional item was removed from the CES-DC to keep the same amount of items in each CES-DC parcel) and re-ran the bi-variate models. The models fit the data well. Appendix G1 displays the relevant fit statistics. We found the same pattern of results as previously described using the full measures. Standardized path coefficients for the cross-lag paths were close to those in the original models (on average, +/- .04). None of the cross-lag paths that were significant in the original analyses became nonsignificant, or vice versa. In all cases, the direction of the effects remained the same. The interested reader is referred to Appendix G2.

Diathesis-Stress Model

Diathesis-stress theories of depression (e.g., Abramson, Metalsky, & Alloy, 1989; Clark, Beck, & Alford, 1999) suggest that activation of the negative cognitive schema is necessary in order to observe the relation between cognitive style and depressive symptoms. The extant research examining the diathesis-stress theory in children has found little to no support for the interaction of life events with cognitive diatheses (Abela & Sullivan, 2003; Cole et al., 2008; Lewinsohn et al., 2001; Ostrander, Weinfurt, & Nay, 1998; Turner & Cole, 1994; see Lakdawalla, Hankin, & Mermelstein, 2007 for a review). Nonetheless, to test whether the presence of major life stressors would affect the observed relations, we re-ran our bivariate models on a dataset with only those participants that endorsed at least three major stressors (as measured by the LEC) at every wave of the study.

In one out of the four bivariate models (CDI/CTI-C), modifications were necessary in order to converge on a proper solution. Whereas the lack of depression trait variance exhibited by the CDI had not created a problem for this model in the previous analyses, the depression trait variable needed to be removed for this analysis. The reduction in sample size (from 892 to 766) likely contributed to the need for this modification. With a smaller sample size, it becomes more difficult to make distinctions between a trait and a highly stable state. Additionally, the variance of one CTI-C disturbance term needed to be set at 0. The other 3 models converged without any alterations. All four models fit the data well (see Appendix H1).

We found the same pattern of results as previously described using the full measures. As we were concerned about the effect of negative life events on the relations between the constructs, the cross-lag path estimates were our main interest. Standardized path coefficients for the cross-lag paths were close to those in the original models (on average, +/- .07). Very few of the paths that were significant in the original analyses became nonsignificant, or vice versa. Thus, even when analyzing data from only those individuals reporting major stressors, we found no support for negative cognitions predicting later depressive symptoms. The interested reader is referred to Appendix H2.

CHAPTER IV

DISCUSSION

Three major findings derived from this study. First, we identified trait-like and state-like components of cognitive style and depressive symptoms. Second, we found support for the prediction of maladaptive cognitive style by prior depressive symptoms. Third, we found evidence that instruments purportedly measuring the same construct can produce rather discrepant results. Implications of these findings, as well as limitations and suggestions for future research, are described below.

Our first finding was that cognitive style (as measure by both the CTI-C and the ATQ) and depressive symptoms (when measured by the CES-DC, but not when measured by the CDI) consist of a time-invariant, trait-like component and a time-varying component. In the case of depressive symptoms as measure by the CDI, the presence of a very stable autoregressive path compensated for a lack of significant trait variance, suggesting the presence of an almost trait-like component. Thus, we discovered a highly stable component of each construct; with all four measures, either significant trait variance or a highly stable autoregressive path emerged. The time-varying component (the *occasion* factor), however, accounted for the majority of the variance in all four measures.

The existence of time-invariant and time-varying components of depressive symptoms and cognitive style could predicate the need for differing interventions. Factors that engender individual differences on a trait-like construct are likely to be enduring and fairly constant aspects of one's life (e.g., genes or long-standing environmental factors).

Interventions might need to be aimed at brain chemistry or parenting style, for example, in order to affect a trait-like component. The time-varying component, however, may be affected by relatively short-term influences and thus may be more amenable to skills building or problem solving approaches.

Our second finding was that depressive symptoms predicted later maladaptive cognitive style. Three out of four of our bivariate models provided strong evidence for this relation; the fourth model provided modest support. This finding lends some support for the scar hypothesis of depression (Lewinsohn et al., 1981). Although the scar hypothesis typically refers to a residual negative cognitive style after a major depressive episode, we found support for this type of effect even following the experience of depressive symptoms. During middle childhood and early adolescence, one's cognitive style and self-concept are still being formed (Beck et al., 1979; Cole, 1996; Cole, Jacquez, & Maschman, 2001; Erikson, 1968). During these phases of development, individuals may be particularly vulnerable to forming beliefs and schemas that will prove difficult to alter once in place. The experience of depressive symptoms during these phases seems to be one factor having a deleterious effect on future cognitive style.

A parallel explanation for the influences of adolescent depressive symptoms on cognitive style exists on the physiological level. Adolescence is a time of significant prefrontal cortical development (Giedd et al., 1999; Paus, 2005) and maturation of the dopaminergic reward system (Anderson, 2003; Spear, 2000), both of which are implicated in the physiological processes underlying depression (Davidson et al., 2002; Henriques & Davidson, 1991; Mayberg et al., 1999). Davey, Yücel, and Allen (2008) hypothesize that as the development of the prefrontal cortex increases the ability to make complex decisions involving future consequences, a heightened vulnerability to depression may arise when the dopaminergic reward system is suppressed due to the non-attainment of anticipated rewards (i.e., failure or rejection). Furthermore, they suggest that biochemical changes accompanying a strong reaction to an experience of failure or loss may leave residual effects in the developing adolescent brain that increase vulnerability to future depressive episodes.

Whether conceptualized as a depressive cognitive style or a faulty dopaminergic reward system, preventive interventions targeted at adolescents reporting depressive symptoms could interrupt the development of a depressive vulnerability before it becomes part of the more complex diathesis-stress model of depression (e.g., Brown, Hammen, Craske, & Wickens, 1995; Joiner, Metalsky, Lew, & Klocek, 1999) that emerges in adulthood. Cognitive interventions would likely be helpful in re-framing the interpretations of the disappointments typically experienced during adolescence and normalizing the experience of transient unhappiness. Such interventions are not likely to be useful for younger children, however, as they may lack the metacognitive skills necessary to notice and examine their thoughts.

Interpersonal and competence theories of depression suggest that when faced with a failure or rejection experience, the existence of multiple meaningful relationships and/or competencies may buffer the impact and render the individual less vulnerable to depressive reactions than individuals with fewer relationships or perceived abilities (Cole, 1990, 1991; Patterson & Stoolmiller, 1991; Schwartz, Gorman, Duong, & Nakamoto, 2008). Interventions such as behavioral activation (in this case, aimed at increasing domains of perceived competence) or interpersonal therapy (aimed at building the skills necessary to increase both the quantity and quality of meaningful relationships) could be useful both during childhood and adolescence – and could potentially prevent the normative disappointments and rejections of adolescence from leading to an ongoing depressive vulnerability.

Whereas depressive symptoms predicted later maladaptive cognitive style, the reverse relation was not found: cognitive style did not predict later depressive symptoms – not even among participants who reported relatively chronic or recurring stressful life events. As described above, growing evidence suggests that the relevant aspects of depressive cognitive style are still in development throughout adolescence. As cognitive style does not appear to be driving depressive symptoms at this stage in development, assessment of – and/or interventions focused on – maladaptive cognitions in children do not seem likely to be a wise allocation of resources.

Our third finding was the existence of measurement-specific effects in some of our analyses, particularly with our measures of depressive symptoms. For example, we found developmental differences in the stability of depressive symptoms with one measure (CES-DC), but not with the other. Likewise, we found developmental differences in the relation between depressive symptoms and cognitive style with the bivariate models involving one of the depression measures (CDI) but not in the models using the other depression measure. Although the CDI and CES-DC were moderately to highly correlated for all groups at all waves (*r*s ranging from .35 to .64, all *p*s $< .01$) and both purport to assess symptoms of depression, we end up with different stories depending on which results we choose to believe. Considering that most studies use only one measure of each construct, this finding is a bit worrisome.

The creation of latent variables based on multiple measures is an effective method to eliminate measurement-specific noise. That methodology, however, requires that the instruments are indeed tapping into a clear unified construct. Sometimes, as in the current study, seemingly similar measures will not lend themselves to the creation of latent variables. Based on the differential findings, the possibility emerges that the measures are in actuality tapping into slightly different aspects of depression. Nonetheless, we cannot rule out the possibility of these disparate findings being caused by arbitrary differences in the measures. Thus, considering that many studies are limited to the use of one measure of each construct, comparing findings across studies employing different – but similar - measures could help to weed out some of the measurement-specific effects. Ultimately we do not care about the relations among specific measures; we care about the relations among the general constructs they purport to measure. In the current study, we have effectually conducted such replications so that despite the inability to use latent variables, we are able to sort the consistent findings from the less interpretable measurement-specific findings.

The discovery of measurement specific findings led us to inspect our instruments for any important differences in content or style. Our measures of depressive symptoms differed from each other both in the degree to which different aspects of depression are assessed and in the overall format. Whereas the CDI has more items measuring the cognitive symptoms of depression than does the CES-DC (6 versus 4), the CES-DC has more items tapping into affective symptoms (7 versus 5). Further, the CDI has 12 items that assess symptoms that are not included in the DSM-IV diagnosis of depression (e.g., hopelessness, social withdrawal, perceived competence); the CES-DC has 6 such items.

(The measures have equal numbers of items tapping into the physiological symptoms.) Thus, overall, the CDI puts a stronger emphasis on cognitive aspects of depression than does the CES-DC. Further, the CDI's format of providing three sentences to choose amongst could pull for slightly different responses than the CES-DC's format of rating the frequency of experiencing each symptom. Also different is the length of time upon which one is asked to reflect. Whereas the CDI asks about the past 2 weeks, the CES-DC asks about only the past week. These differences in content and format may have contributed to our differential findings.

Certain limitations of the current study suggest avenues for future research. First, we assume the model works the same for all participants in the sample. In reality, the effects could be much stronger for some subgroups and weaker for others. Although we tested for differential effects for participants with numerous stressful life events, we did not examine other potential moderators that have been previously linked to a depressive cognitive style in children such as hostile and/or coercive parenting (Bruce et al., 2006), children's level of perceived competence (Cole, 1990, 1991), or the mental health of the child's parent(s) (Goodman & Gotlib, 2002).

Second, the one year time lag used in this study could have been too long to catch some short-term temporal relations. In that time span, changes could transpire for an individual on both constructs. At the next assessment, the individual could score higher (or lower) on both constructs with no indication of which came first. A study examining the development of a maladaptive style with frequent, closely spaced assessments could shed more light on how children learn to think this way. Whereas in-person data collection is costly, time-consuming, and a potential burden to the schools involved, use of internet technology could facilitate frequent assessments.

Third, our sample was limited to relatively non-depressed individuals. Although these findings shed light on the early stages of negative cognitive style and depressive symptoms, we cannot assume that the relations we found would be the same in a depressed sample. Furthermore, as we relied on self-report of symptoms rather than performing actual clinical diagnoses, we do not know the actual rate of MDD in our sample. Epidemiological studies have discovered relatively low rates of MDD during this period of development: from a 1-month prevalence of 2% in late childhood (Costello et al., 2002; Rutter, 1994) to a 1-month prevalence of 6% during late adolescence (Blazer, Kessler, McGonagle, & Swartz, 1994). Diagnostic interviews with a high-risk sub-sample of our participants (n = 52) uncovered only an 8% prevalence of MDD (Cole et al., 2008). Nonetheless, the findings would have been enriched by knowing the diagnostic status of the full sample. A replication of this study using diagnostic clinical interviews at each interval could help clarify whether or not the relations we discovered for the overall sample are applicable to children already suffering from MDD. Even better might be a follow-up study with the current sample as they enter their twenties. Lifetime prevalence rates have been estimated to be as high as 1 in 4 by the mid-twenties (Angst & Dobler-Mikola, 1984; Kessler, Avenevoli, & Ries Merikangas, 2001; Lewinsohn, Rohde, & Seeley, 1998). Few if any studies have connected the dots between the development of a depressive cognitive style in childhood/early adolescence and the eventual likelihood of MDD in early adulthood. Diagnostic data would clarify the relative importance of the early manifestation of depressive symptoms and maladaptive cognitive style in the prediction of full-blown MDD and could help target early intervention and prevention efforts.

Finally, we used paper and pencil self-report measures of stressful life events. A depressed mood increases the accessibility of negative memories and can lead to reporting more negative events than one would report when not experiencing a depressed mood (Clark & Teasdale, 1982; Teasdale & Taylor, 1981). Furthermore, depressive cognitive distortions could lead to the exaggeration of negative events (e.g., reporting that one does not have enough food or clothes when in actuality one has enough but does not always get the things one wants). Interview-based assessments of life events (e.g., Life Event and Difficulty Schedule: Brown & Harris, 1978) provide a more contextual and objective approach but were impractical in the current study due to time constraints.

In sum, the current study adds to our understanding of the relations between Beckian aspects of cognitive style (i.e., automatic thoughts and negative views of oneself, the world, and the future) and depressive symptoms throughout childhood and early adolescence. We found strong evidence for the prediction of maladaptive cognitive style by prior depressive symptoms. In contrast, we found no evidence to support the prediction of depressive symptoms by prior cognitive style. Our use of a prospective cohort-longitudinal design provided a unique opportunity to test potential developmental effects over a broad age span. The application of a bivariate trait-state-occasion model allowed us to separate the completely stable trait-like component from the time-variant state-like component of each construct. Thus, the relations between the portions of each construct that changed over time could be observed.

The current findings support the concentration of early intervention or prevention efforts on individuals manifesting sub-syndromal depressive symptoms rather than searching out individuals with early signs of maladaptive cognitive style. Cognitive interventions during adolescence, when cognitive style appears to be under development, may prove beneficial in the prevention of MDD. Interventions targeted at younger children, however, should focus on more proximal (and comprehendible) issues such as developing healthy interpersonal relationships and identifying/building on potential areas of strength.

Footnotes

[1] Although this across-group constraint led to a significant change in chi square for two of the models, it was a necessary constraint for the convergence of another model. The desire to use comparable models, as well as the overall goodness-of-fit of the ultimate models, led us to go ahead with this constraint. If the data were represented by a single model spanning from grade 2 to grade 9, Trait would indeed be equal throughout. Further, it would seem a bit arbitrary in our 3-group model to use Trait to denote the stable portion of the variance across waves within each group – but not extend the equality to the overlapping grades across groups.

Appendix A

Here is a list of things that kids sometimes think or feel. How do you feel right now? Today, do you think…

	Yes	Maybe	No
1. I do well at many different things.	___	___	___
2. Schoolwork is no fun.	___	___	___
3. Most people are friendly and helpful.	___	___	___
4. Nothing is likely to work out for me.	___	___	___
5. I am a failure.	___	___	___
6. I like to think about the good things that will happen for me in the future.	___	___	___
7. I do my schoolwork okay.	___	___	___
8. The people I know help me when I need it.	___	___	___
9. I think that things will be going well for me a few years from now.	___	___	___
10. I have messed up almost all the friendships I have ever had.	___	___	___
11. Lots of fun things will happen for me in the future.	___	___	___
12. The things I do every day are fun.	___	___	___
13. I can't do anything right.	___	___	___
14. People like me.	___	___	___
15. There is nothing left in my life to look forward to.	___	___	___
16. My problems and worries will never go away.	___	___	___
17. I am as good as other people I know.	___	___	___
18. The world is a very mean place.	___	___	___
19. There is no reason for me to think that things will get better for me.	___	___	___
20. The important people in my life are helpful and nice to me.	___	___	___
21. I hate myself.	___	___	___
22. I will solve my problems.	___	___	___
23. Bad things happen to me a lot.	___	___	___
24. I have a friend who is nice and helpful to me.	___	___	___
25. I can do a lot of things well.	___	___	___
26. My future is too bad to think about.	___	___	___
27. My family doesn't care what happens to me.	___	___	___
28. Things will work out okay for me in the future.	___	___	___
29. I feel guilty for a lot of things.	___	___	___
30. No matter what I do, other people make it hard for me to get what I need.	___	___	___
31. I am a good person.	___	___	___
32. There is nothing to look forward to as I get older.	___	___	___
33. I like myself.	___	___	___
34. I am faced with many difficulties.	___	___	___
35. I have problems with my personality.	___	___	___
36. I think that I will be happy as I get older.	___	___	___

Appendix B

Below are listed some thoughts that kids sometimes have. Please read each thought and mark how often this thought has occurred to you in the past week.

	Not at all	Not often	Sometimes	Frequently	All the time
1. The world doesn't like me.	1	2	3	4	5
2. I'm no good.	1	2	3	4	5
3. Why can't I do anything right?	1	2	3	4	5
4. No one understands me.	1	2	3	4	5
5. I have let people down.	1	2	3	4	5
6. I don't think I can go on.	1	2	3	4	5
7. I wish I were a better boy/girl.	1	2	3	4	5
8. I'm not strong at all.	1	2	3	4	5
9. My life is not going the way I want it to.	1	2	3	4	5
10. I'm so disappointed in myself.	1	2	3	4	5
11. Nothing feels good anymore.	1	2	3	4	5
12. I can't stand this anymore.	1	2	3	4	5
13. I can't get anything started.	1	2	3	4	5
14. What's wrong with me?	1	2	3	4	5
15. I wish I were somewhere else.	1	2	3	4	5
16. I can't get things together (I can't get my act together)	1	2	3	4	5
17. I hate myself.	1	2	3	4	5
18. I'm not worth anything.	1	2	3	4	5
19. I wish I could just disappear.	1	2	3	4	5
20. What's the matter with me?	1	2	3	4	5
21. I'm a loser.	1	2	3	4	5
22. My life is a mess.	1	2	3	4	5
23. I can't do anything well.	1	2	3	4	5
24. I feel so helpless.	1	2	3	4	5
25. I'll never make it.	1	2	3	4	5
26. Something has to change.	1	2	3	4	5
27. There must be something wrong with me.	1	2	3	4	5
28. When I grow up, things will be bad.	1	2	3	4	5
29. It's just not worth it.	1	2	3	4	5
30. I can't finish anything.	1	2	3	4	5

Appendix C

Pick one sentence from each group that best fits you for the past two weeks. There are no right or wrong answers. Just be as honest as possible.

1. ___ I am sad once in a while
___ I am sad many times
___ I am sad all the time

2. ___ Nothing will ever work out for me
___ I am not sure if things will work out for me
___ Things will work out for me O.K.

3. ___ I do most things O.K.
___ I do many things wrong
___ I do everything wrong

4. ___ I have fun in many things
___ I have fun in some things
___ Nothing is fun at all

5. ___ I am bad all the time
___ I am bad many times
___ I am bad once in a while

6. ___ I think about bad things happening to me once in a while
___ I worry that bad things will happen to me
___ I am sure that terrible things will happen to me

7. ___ I hate myself
___ I do not like myself
___ I like myself

8. ___ All bad things are my fault
___ Many bad things are my fault
___ Bad things are not usually my fault

9. ___ I feel like crying everyday
___ I feel like crying many days
___ I feel like crying once in a while

10. ___ Things bother me all the time
___ Things bother me many times
___ Things bother me once in a while

11. ___ I like being with people
___ I do not like being with people many times
___ I do not want to be with people at all

12. ___ I cannot make up my mind about things
___ It is hard to make up my mind about things
___ I make up my mind about things easily

13. ___ I look O.K.

___ There are some bad things about my looks
___ I look ugly

14. ___ I have to push myself all the time to do my schoolwork
___ I have to push myself many times to do my schoolwork
___ Doing schoolwork is not a big problem

15. ___ I have trouble sleeping every night
___ I have trouble sleeping many nights
___ I sleep pretty well

16. ___ I am tired once in a while
___ I am tired many days
___ I am tired all the time

17. ___ Most days I do not feel like eating
___ Many days I do not feel like eating
___ I eat pretty well.

18. ___ I do not worry about aches and pains
___ I worry about aches and pains many times
___ I worry about aches and pains all the time

19. ___ I do not feel alone
___ I feel alone many times
___ I feel alone all the time

20. ___ I never have fun at school
___ I have fun at school only once in a while
___ I have fun at school many times

21. ___ I have plenty of friends
___ I have some friends but I wish I had more
___ I do not have any friends

22. ___ My schoolwork is alright
___ My schoolwork is not as good as before
___ I do very badly in subjects I used to be good in

23. ___ I can never be as good as other kids
___ I can be as good as other kids if I want to
___ I am just as good as other kids

24. ___ Nobody really loves me
___ I am not sure if anybody loves me
___ I am sure that somebody loves me

25. ___ I usually do what I am told
___ I do not do what I am told most times
___ I never do what I am told

26. _____ I get along with people
_____ I get into fights many times
_____ I get into fights all the time

Appendix D

Think about how you have been feeling for this last week. For each sentence, mark how often you have felt this way for the past week.

(0 = Almost none of the time; 1 = Some of the time; 2 = A lot of the time; 3 = Almost all of the time)

1. I was bothered by things that usually don't bother me.
2. I did not feel like eating; I wasn't very hungry.
3. I wasn't able to feel happy, even when my family or friends tried to help me feel better.
4. I felt like I was just as good as other kids.
5. I felt like I couldn't pay attention to what I was doing this week.
6. I felt down and unhappy this week.
7. I felt like I was too tired to do things this past week.
8. I felt like something good was going to happen.
9. I felt like things I did before didn't work out right.
10. I felt scared this week.
11. I didn't sleep as well as I usually sleep this week.
12. I was happy this week.
13. I was more quiet than usual this week.
14. I felt lonely, like I didn't have any friends.
15. I felt like kids I knew were not friendly or that they didn't want to be with me.
16. I had a good time this week.
17. I felt like crying this week.
18. I felt sad.
19. I felt people didn't like me this week.
20. It was hard to get started doing things this week.

Appendix E

Here are some things that sometimes happen to families. Please tell me whether or not each has happened to your family **in the past 6 months**.

How much did this upset you?

Did this happen to you?			Not Much	Some	A Lot
Yes	No	1. A close family member was away from home a lot.	1	2	3
Yes	No	2. Your family had to move a lot.	1	2	3
Yes	No	3. A close family member was sick, or had an accident and was in the hospital.	1	2	3
Yes	No	4. A close family member was very sick or badly hurt but not in the hospital.	1	2	3
Yes	No	5. A close family member was arrested or in jail.	1	2	3
Yes	No	6. A case worker came to your home.	1	2	3
Yes	No	7. You were upset by family arguments.	1	2	3
Yes	No	8. A close family member was robbed.	1	2	3
Yes	No	9. A pet you loved very much died.	1	2	3
Yes	No	10. You saw someone get badly hurt.	1	2	3
Yes	No	11. One of your parents lost their job, or has not had a job.	1	2	3
Yes	No	12. A close family member had a drinking or drug problem.	1	2	3
Yes	No	13. Mom or dad has been sad a lot.	1	2	3
Yes	No	14. Your family had serious problems with money.	1	2	3
Yes	No	15. A close family member is handicapped.	1	2	3
Yes	No	16. You have been involved in serious family fights.	1	2	3
Yes	No	17. A parent, brother, or sister died.	1	2	3
Yes	No	18. Another relative, who you were very close to died.	1	2	3
Yes	No	19. Sometimes your family has little food to eat.	1	2	3
Yes	No	20. Different people have moved in and out of your home.	1	2	3
Yes	No	21. Close family members have yelled at each other.	1	2	3
Yes	No	22. Sometimes you have had few clothes to wear.	1	2	3
Yes	No	23. You have had to take care of others in your family.	1	2	3
Yes	No	24. You have been in a foster home.	1	2	3
Yes	No	25. Your parents aren't together anymore.	1	2	3
Yes	No	26. You had to live with a relative or friend for a while.	1	2	3
Yes	No	27. You have been very crowded where you live.	1	2	3
Yes	No	28. It hasn't been safe around where you live.	1	2	3
Yes	No	29. Your best friend moved away.	1	2	3
Yes	No	30. You have been upset by people getting hurt around where you live.	1	2	3

Appendix F

Redundant Items Removed in Follow-Up Analyses

<u>Center for Epidemiological Studies Depression Scale for Children</u>
I felt like I was just as good as other kids.
I felt like something good was going to happen.
I felt like things I did before didn't work out right.
I felt like kids I knew were not friendly or that they didn't want to be with me.
I felt people didn't like me this week.
I felt lonely, like I didn't have any friends.*

<u>Children's Depression Inventory</u>
Nothing will ever work out for me.
I do everything wrong.
I am bad all the time.
I am sure that terrible things will happen to me.
I hate myself.
All bad things are my fault.
I can never be as good as other kids.
Nobody really loves me.

<u>Cognitive Triad Inventory for Children</u>
Schoolwork is no fun.
I do my schoolwork okay.
The things I do every day are fun.
Bad things happen to me a lot.

<u>Automatic Thoughts Questionnaire</u>
Nothing feels good anymore.
I can't get anything started.

* Removed to keep the same amount of items in each parcel.

Appendix G1

Fit of Bivariate Models with Redundant Items Removed

Model	DF	χ^2	RMSEA (90% conf. interval)	TLI	CFI
CDI/ATQ	311	428.3^{***}	.021 (.016-.025)	.97	.98
CDI/CTI-C	309	364.0^{*}	.014 (.006-.020)	.98	.99
CES-DC/ATQ	$310^{\dagger}$	403.8^{***}	.018 (.013-.023)	.97	.98
CES-DC/CTI-C	309	418.2^{***}	.020 (.015-.025)	.97	.98

Note. ATQ = Automatic Thoughts Questionnaire; CTI-C = Cognitive Triad Inventory for Children; CDI = Children's Depression Inventory; CES-DC = Center for Epidemiological Studies Depression Scale for Children; TLI = Tucker Lewis Index; CFI = Comparative Fit Index; RMSEA = Root Mean Squared Error of Approximation. † As in the univariate model, the ATQ portion of this model required that the error variance of one of the disturbance terms be set at 0 in order to reach a proper solution. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

Appendix G2

Estimates for Bivariate Models with Redundant Items Removed (Standardized Estimates in Parentheses)

Group	Cognition → Depression	Depression → Cognition	Depression → Depression	Cognition → Cognition	Covariances of:		Covariances of occasion residuals:		
					trait dep, trait cog	occas 1dep, occas 1 cog	time 2	time 3	time 4
				CDI/ATQ					
1	-.02	2.48***	.65***	-.07	--	8.53***	10.12***	8.64***	14.33***
	(-.06, -.06, -.05)	(.49, .62, .58)	(.56, .64, .58)	(-.06, -.07, -.06)		(.50)	(.64)	(.66)	(.82)
2	-.02	1.79**	.79***	.07	--	15.44***	19.50***	6.85***	11.39***
	(-.08, -.09, -.07)	(.36, .59, .49)	(.62, .86, .79)	(.06, .09, .06)		(.80)	(.93)	(.72)	(.88)
3	-.09**	3.48***	1.11***	-.30†	--	17.77***	13.15***	6.88***	5.10*
	(-.36, -.37, -.36)	(.72, .89, .86)	(.96, 1.14, 1.16)	(-.29, -.32, -.29)		(.79)	(.84)	(.68)	(.63)
				CDI/CTI-C					
1	.08*	-.42	.48***	-.21**	-3.24***	.10	-2.37*	-.85	-3.48**
	(.25, .15, .13)	(-.18, -.23, -.23)	(.34, .49, .40)	(-.36, -.20, -.21)	(-.85)	(-.01)	(-.44)	(-.14)	(-.51)
2	.04	-.54**	.68***	.04	-3.24***	-5.87***	-3.11**	-3.60***	-2.60**
	(.10, .06, .08)	(-.32, -.31, -.37)	(.54, .73, .72)	(.07, .03, .05)	(-.85)	(-.54)	(-.51)	(-.58)	(-.56)
3	.07	-1.25***	.83***	-.21**†	-3.24***	-2.55†	-2.25*	-2.66***	-3.99***
	(.15, .13, .12)	(-.56, -.83, -.63)	(.67, .84, .91)	(-.24, -.24, -.16)	(-.85)	(-.30)	(-.39)	(-.82)	(-.89)
				CES-DC/ATQ					
1	-.03	.28	.11	.14	9.58***	4.39	11.89***	8.33**	16.96***
	(-.09, -.09, -.08)	(.08, .10, .10)	(.09, .10, .11)	(.13, .17, .12)	(.85)	(.22)	(.50)	(.38)	(.72)
2	.03	.62*	.26*†	.25**	9.58***	11.46**	9.21**	6.05**	5.98**
	(.09, .11, .10)	(.19, .25, .21)	(.27, .27, .30)	(.21, .33, .22)	(.85)	(.49)	(.39)	(.39)	(.38)
3	.00	.45	.48***	.14	9.58***	11.58**	14.77***	9.9***	14.65***
	(.01, .01, .00)	(.14, .18, .17)	(.42, .52, .46)	(.14, .16, .15)	(.85)	(.42)	(.51)	(.46)	(.65)
				CES-DC/CTI-C					
1	.11	-.16	.22	-.20*	-5.61***	-5.11*	-6.19***	-4.06**	-5.09**
	(.23, .13, .14)	(-.12, -.13, -.13)	(.19, .22, .23)	(-.36, -.19, -.20)	(-.81)	(-.35)	(-.72)	(-.40)	(-.51)
2	-.04	-.53***	.30*†	-.01	-5.61***	-8.70***	-4.51***	-7.35***	-2.27*
	(-.08, -.04, -.07)	(-.54, -.32, -.45)	(.34, .29, .37)	(-.02, -.01, -.02)	(-.81)	(-.51)	(-.73)	(-.68)	(-.38)
3	-.01	-.51***	.52***	-.00	-5.61***	-4.76*	-9.26***	-4.30***	-2.13
	(-.01, -.01, .-01)	(-.36, -.50, -.40)	(.45, .58, .49)	(-.00, -.00, -.00)	(-.81)	(-.33)	(-.75)	(-.55)	(-.20)

Note. ATQ = Automatic Thoughts Questionnaire; CTI-C = Cognitive Triad Inventory for Children; CDI = Children's Depression Inventory; CES-DC = Center for Epidemiological Studies Depression Scale for Children. * $p < .05$, ** $p < .01$, *** $p < .001$. † Change in significance from analyses based on full measures.

Appendix H1

Fit of Bivariate Models for Participants with High Negative Life Events

Model	DF	χ^2	RMSEA (90% conf. interval)	TLI	CFI
CDI/ATQ	311	451.07***	.024 (.019-.029)	.96	.97
CDI/CTI-C	312†	461.11***	.025 (.020-.030)	.95	.96
CES-DC/ATQ	309	424.8***	.022 (.017-.027)	.96	.97
CES-DC/CTI-C	309	449.7***	.024 (.019-.029)	.95	.96

Note. ATQ = Automatic Thoughts Questionnaire; CTI-C = Cognitive Triad Inventory for Children; CDI = Children's Depression Inventory; CES-DC = Center for Epidemiological Studies Depression Scale for Children; TLI = Tucker Lewis Index; CFI = Comparative Fit Index; RMSEA = Root Mean Squared Error of Approximation. †In order to converge on a proper solution, it was necessary to remove the depression trait variable and set the variance of one CTI-C disturbance term at 0. * $p < .05$, ** $p < .01$, *** $p < .001$.

Appendix H2

Estimates for Bivariate Models for Participants with High Negative Life Events (Standardized Estimates in Parentheses)

Group	Cognition → Depression	Depression → Cognition	Depression → Depression	Cognition → Cognition	Covariances of:		Covariances of occasion residuals:		
					trait dep, trait cog	occas 1dep, occas 1 cog	time 2	time 3	time 4
				CDI/ATQ					
1	-.04	1.81***	.63***	-.08	--	9.82***	14.06***	14.39***	23.19***
	(-.12, -.12, -.10)	(.44, .55, .53)	(.53, .59, .55)	(-.07, -.08, -.07)		(.46)	(.64)	(.69)	(.85)
2	-.02	1.32**	.77***	.03	--	20.84***	31.24***	10.62***	15.14***
	(-.05, -.07, -.06)	(.33, .58, .48)	(.56, .86, .83)	(.03, .04, .03)		(.77)	(.89)	(.75)	(.94)
3	-.13**	3.06***	1.13***	-.42*	--	28.19***	17.88***	14.91***	9.55*
	(-.44, -.40, -.41)	(.86, .95, .97)	(1.01, 1.07, 1.14)	(-.44, -.42, -.41)		(.82)	(.82)	(.74)	(.57)
				CDI/CTI-C					
1	.07†	-.39***†	.64***	-.16†	--	-5.01**†	-4.95***	-4.80***†	-8.33***
	(.17, .10, .10)	(-.45, -.50, -.53)	(.54, .58, .55)	(-.25, -.15, -.16)		(-.33)	(-.55)	(-.45)	(-.67)
2	.03	-.69***	.76***	.05	--	-11.97***	-8.50***	-5.48***	-4.28***
	(.07, .04, .06)	(-.45, -.51, -.56)	(.56, .84, .85)	(.08, .04, .06)		(-.57)	(-.70)	(-.61)	(-.69)
3	.04	-1.18***	.81***	-.14	--	-8.71***	-4.92**	-6.62***	-7.62***
	(.07, .06, .05)	(-.67, -.88, -.83)	(.71, .78, .85)	(-.15, -.16, -.13)		(-.50)	(-.46)	(-.93)	(-1.00)
				CES-DC/ATQ					
1	-.08	.03	.13	.17	11.76***	3.59	14.36**	11.47*	32.89***
	(-.17, -.19, -.15)	(.01, .02, .01)	(.12, .12, .12)	(.15, .19, .15)	(.96)	(.11)	(.39)	(.34)	(.78)
2	-.01	.74***	.49***†	.14†	11.76***	21.54***	16.28**	9.31*	10.42**
	(-.02, -.02, -.02)	(.31, .41, .37)	(.49, .48, .59)	(.12, .19, .13)	(.96)	(.55)	(.43)	(.35)	(.44)
3	-.01	.36	.58***	.20*†	11.76***	21.71**	18.81**	17.96***	14.39*
	(-.03, -.03, -.03)	(.15, .17, .18)	(.54, .58, .68)	(.20, .22, .21)	(.96)	(.46)	(.45)	(.48)	(.51)
				CES-DC/CTI-C					
1	.08	-.11	.13	-.17†	-8.14***	-8.63**	-10.41***	-9.57***	-8.76**
	(.13, .08, .07)	(-.11, -.11, -.11)	(.13, .13, .12)	(-.29, -.16, -.17)	(-.82)	(-.38)	(-.76)	(-.63)	(-.51)
2	-.02	-.32**	.25	.06	-8.14***	-15.29***	-8.30***	-13.30***	-5.85**
	(-.04, -.02, -.03)	(-.43, -.25, -.37)	(.30, .22, .34)	(.13, .04, .08)	(-.82)	(-.50)	(-.88)	(-.75)	(-.64)
3	.06	-.46***	.57***	-.06	-8.14***	-8.33*	-14.11***	-9.65***	-1.54
	(.06, .06, .06)	(-.40, -.55, -.51)	(.51, .59, .66)	(-.07, -.08, -.06)	(-.82)	(-.36)	(-.76)	(-.73)	(-.14)

Note. ATQ = Automatic Thoughts Questionnaire; CTI-C = Cognitive Triad Inventory for Children; CDI = Children's Depression Inventory; CES-DC = Center for Epidemiological Studies Depression Scale for Children. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$. † Change in significance from analyses based on full database.

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