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Stephanie Winkeljohn Black
University of Louisville

Patrick Pössel
University of Louisville

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Integrating Beck's Cognitive Model and the Response Style Theory in an Adolescent Sample

Stephanie Winkeljohn Black & Patrick Pössel

Department of Educational & Counseling Psychology, Counseling, and College Student Personnel, University of Louisville, Louisville, KY, USA

Corresponding author:

Patrick Pössel, Dr. rer. soc.

Dep. of Educational & Counseling Psychology, Counseling, and College Student Personnel

University of Louisville

2301 S. Third Street

Louisville, KY 40292

USA

+1-(502)852-0623 (office)

+1-(502)852-0629 (fax)

e-mail: patrick.possel@louisville.edu

Abstract

Depression becomes more prevalent as individuals progress from childhood to adulthood. Thus, empirically supported and popular cognitive vulnerability theories to explain depression in adulthood have begun to be tested in younger age groups, particularly adolescence, a time of significant cognitive development. Beck's cognitive theory and the response style theory are well known, empirically supported theories of depression. The current, two-wave longitudinal study (N = 462; mean age = 16.01 years; SD = 0.69; 63.9% female) tested various proposed integrative models of Beck's cognitive theory and the response style theory, as well as the original theories themselves, to determine if and how these cognitive vulnerabilities begin to intertwine in adolescence. Of the integrative models tested – all with structural equation modeling in AMOS 21 - the best-fitting integrative model was a moderation model wherein schemata influenced rumination, and rumination then influenced other cognitive variables in Beck's model. Findings revealed that this integrated model fit the data better than the response style theory and explained 1.2% more variance in depressive symptoms. Additionally, multigroup analyses comparing the fit of the best-fitting integrated model across adolescents with clinical and subclinical depressive symptoms revealed that the model was not stable between these two subsamples. However, of the hypotheses relevant to the integrative model, only 1 of the 18 associations was significantly different between the clinical and subclinical samples. Regardless, the integrated model was not superior to the more parsimonious model from Beck's cognitive theory. Implications and limitations are discussed.

Keywords: adolescents; depression; cognitive theory; response style theory; rumination; brooding and reflection.

Introduction

Depression is a developmental phenomenon (Hankin, 2008; Lakdawalla, Hankin, & Mermelstein, 2007). Rates of depression increase significantly from childhood to adolescence, and most depressed adults experienced their first depressive episode in adolescence (Kessler, Avenevoli, & Merikangas, 2001). Moreover, adolescents with depressive symptoms experience more risk factors and consequences compared to adolescents without depressive symptoms (e.g., interpersonal problems, suicidal ideation, substance abuse; Marttunen, Haarasilta, Aalto-Setälä, & Pelkonen, 2003). A clearer, more comprehensive understanding of the onset of adolescent depression is necessary to decrease the prevalence of negative incidents in adolescents (e.g., suicidal ideation) as well as depression in adulthood.

Researchers have examined how cognitive vulnerabilities to depression emerge and develop during adolescence as a means of explaining the increase and expression of depressive symptoms and episodes from childhood to adulthood (Cole et al., 2008; Turner & Cole, 1994). For example, depression is expressed with different symptoms during childhood compared to adolescence and adulthood (e.g., emergence of hopelessness and suicidality during adolescence; Weiss & Garber, 2003). However, much is unknown about how and when cognitive vulnerabilities begin to interact. A clearer, more comprehensive understanding of the onset of and pathways to adolescent depressive symptoms is necessary to decrease the prevalence of negative depression-related incidents in adolescents (e.g., suicidal ideation) as well as to deter the continuation of depressive symptoms into adulthood. Cognitive vulnerability theories of depression assert that how individuals interpret and recall life experiences, particularly negative experiences, determine the likelihood of developing depressive symptoms. Beck's cognitive theory (Beck, 1976), the hopelessness theory (Abramson, Metalsky, & Alloy, 1989) and the

response style theory (Nolen-Hoeksema & Morrow, 1991) are the most researched cognitive theories of depression. All three models provide a theoretical basis for mechanisms underlying the development and maintenance of depression in adults and they are supported by a variety of empirical studies (for reviews see Abramson et al., 2002; Thomsen, 2006).

In their review of adolescent cognitive vulnerabilities to depression, Lakdawalla and associates (2007) noted that, while there is empirical support for the hopelessness theory, there has not been enough study of Beck's (1967) theory or the response style theory in adolescent populations. Moreover, Hankin (2008) found that the constructs in Beck's theory and response style theory are less stable in adolescence compared to the constructs in the hopelessness theory. Thus, an understanding of how these constructs might predict depressive symptoms in adolescence is needed to understand how and when these constructs begin to reliably predict depressive symptoms as they do in adulthood.

Researchers have begun integrating constructs from different theories of cognitive vulnerability to depression into a single model. In adult populations, it has been shown that various integrations of cognitive constructs for Beck's theory, the hopelessness theory, and the response style theory predict depressive symptoms (e.g., Ciesla & Roberts, 2007; Lyubomirsky & Nolen-Hoeksema, 1995; Pössel, 2011; Pössel & Knopf, 2011; Pössel & Thomas, 2011; Robinson & Alloy, 2003). However, much less work has been done on integrating cognitive vulnerability models in adolescent samples, and the existing evidence appears mixed. Rood, Roelofs, Bögels, and Meesters (2012) found that stress reactive rumination and negative cognitive style (hopelessness theory) better predicted depressive symptoms as separate constructs – the interaction effect of the two vulnerability constructs did not predict greater levels of depressive symptoms than the two constructs on their own. However, Abela and Hankin (2011)

found that cognitive factors become more interrelated in adolescence, which would suggest that interaction effects between cognitive vulnerability constructs would predict higher levels of depressive symptoms than the main effects alone. Thus, further research is needed on how cognitive constructs interact in adolescence to better understand the developmental trajectory of cognitive constructs related to depressive symptoms. The current study sought to replicate Pössel's (2011) longitudinal study that investigated which integrative model of cognitive vulnerability constructs best predicted depressive symptoms in an adult sample. The current study sought to determine how well Pössel's (2011) findings would replicate in a different age group, particularly an age group during which many developmental changes related to cognitions and depressive symptoms are occurring.

Beck's Cognitive Theory

Beck's (1967) cognitive theory consists of four constructs: schemata, cognitive errors, the cognitive triad, and automatic thoughts. Originally, the four constructs were conceptualized as elements along a causal pathway, beginning with schemata and ending with automatic thoughts. Schemata, cognitive structures that organize existing information and incoming experiences, can become rigid and hold negative content. These negative and absolute schemata are referred to as depressogenic schemata. When an adolescent experiences stress, the depressogenic schemata can activate cognitive errors, which negatively distort the adolescent's perception of experiences and surroundings. Consequently, the adolescent adopts a negative view of the self, the world, and the future based upon these negative distortions. These three negative views are known as the cognitive triad. The negative cognitive triad is expressed through negative automatic thoughts – temporary, conscious mental events. Beck's theory has been largely supported in adult populations (see for reviews Abramson et al., 2002).

Studies on Beck's theory with adolescent populations have focused almost exclusively on dysfunctional attitudes, thereby leaving out the majority of the model's constructs (e.g., Abela & Skitch, 2007; Hankin, 2008, 2009; Hankin, Wetter, Cheely, & Oppenheimer, 2008). One longitudinal study has found support that Beck's constructs relate to one another through partial mediations in adolescents (Barnard & Pössel, 2013). Given how few studies have investigated how all of the constructs from Beck's theory relate to depressive symptoms in an adolescent sample, Lakdawalla and associates (2007) have called for additional research on this theory in adolescents.

Response Style Theory

The response style theory (Nolen-Hoeksema & Morrow, 1991) states that individuals will either distract or ruminate when in a depressed mood. Adolescents who repetitively think about their negative mood are said to engage in a ruminative response style and are more likely to experience depression compared to adolescents who distract themselves from their depressed mood. Numerous studies have found that a ruminative response style predicted depressive symptoms in adolescent samples (Abela & Hankin, 2011; Hilt, McLaughlin, & Nolen-Hoeksema, 2010; Jose & Brown, 2008; Skitch & Abela, 2008).

Treynor, Gonzalez, and Nolen-Hoeksema (2003) found that rumination can be subdivided into three components: brooding, reflection, and depression-related. The depression related subtype is regarded often as depressive symptoms, rather than a separate ruminative response style and therefore will not be assessed in the current study. Ruminative brooding involves passive and moody thinking, whereas ruminative reflection involves an active, problem-solving approach toward understanding a depressed mood. Although these two subtypes are related to one another, only ruminative brooding is a consistent predictor of depressive

symptoms (e.g., Treynor et al., 2003). Multiple studies have supported this finding with adolescent samples (for longitudinal studies see Cox, Funasaki, Smith, & Mezulis, 2012; Winkeljohn Black & Pössel, 2013).

Integrating Beck's Cognitive Theory and the Response Style Theory

One proposal for integrating Beck's (1967) theory and the response style theory comes from Nolen-Hoeksema and Lyubomirsky (1993; 1995). The authors proposed a moderation model wherein an individual's schemata (Beck's theory) influence their ruminative response style (response style theory). In turn, their ruminative style influences other cognitive variables in Beck's theory. This integrated model has yielded some empirical support in an adult sample. Lyobormirsky and Nolen-Hoeksema (1995) found that rumination increased cognitive errors (second study reported) and negative views about the future (first study reported) in a college student sample. However, Lyobomirsky and Nolen-Hoeksema (1995) only included cognitive errors and negative views about the future in their integrated models, but not the other cognitive constructs from Beck's theory. Further, the authors only tested the model that they had proposed. Analyses that include and compare other variations of Lyubomirsky and Nolen-Hoeksema's (1993, 1995) model to test which integration fits the data best would allow for a stronger conclusion about which integrative model is best to conceptualize cognitive pathways to depressive symptoms.

Ciesla and Roberts (2007) tested a moderation model integrating constructs from Beck's theory and the response style theory to predict depressive symptoms in young adults. The researchers found that rumination (response style theory) exacerbated the effects of depressogenic schema (Beck's theory) on depressive symptoms. Moreover, the authors found that it was ruminative brooding, and not ruminative reflection, that interacted with depressogenic

schema to predict depressive symptoms (Ciesla & Roberts, 2007, third study reported). Similar effects have been seen in longitudinal study with adolescents - Winkeljohn Black and Pössel (2013) found a moderation model integrating depressogenic schema with rumination predicted the onset of depressive symptoms in adolescents. Moreover, only the interaction effects of ruminative brooding and depressogenic schema significantly predicted depressive symptoms – the interaction of ruminative reflection and depressogenic schema did not (Winkeljohn Black & Pössel, 2013). However, these two studies included only depressogenic schema in their integrated models, but not the other cognitive constructs of Beck's theory. Thus, additional analyses with all necessary constructs from Beck's theory are required to determine the validity of Ciesla and Roberts' (2007) proposed integration.

Despite evidence that rumination can be divided into components (brooding and reflection), not all of the above integrated models have tested for differences among the ruminative subtypes (i.e., Lyobormirsky & Nolen-Hoeksema 1995). Given that brooding has been shown to have a stronger relationship to later depressive symptoms than reflection in adults and adolescents (Treynor et al., 2003; Winkeljohn Black & Pössel, 2013), it can be expected that an integrated model that only takes brooding, rather than brooding and reflection, into account may be a better predictor of later depressive symptoms in adolescents.

In a longitudinal study with young adults, Pössel (2011) addressed these limitations by testing various integrated models of Beck's theory and the response style theory, including Ciesla and Roberts (2007) and Nolen-Hoeksema and Lyubormirsky's (1995) proposed integration models and a newly proposed integration where schemata influenced rumination, which then influenced other variables in Beck's theory. Pössel measured all four of the constructs from Beck's theory (schemata, cognitive errors, the cognitive triad, and automatic

thoughts) and rumination (separated into brooding & reflection). Path modeling analyses demonstrated that the Nolen-Hoeksema and Lyubomirsky's (1995) integrated model fit the data better than the other proposed integrations and better than the response style theory model alone. However, the model representing Beck's theory fit the data equally as well as Nolen-Hoeksema and Lyubomirsky's (1995) integrated model and was more parsimonious; therefore, Beck's model was retained. Moreover, contrary to prior findings (e.g., Treynor et al., 2003; Winkeljohn Black & Pössel, 2013), Pössel (2011) found in a young adult sample that the best-fitting integrated model allowed both brooding and reflection, instead of only brooding, to influence other cognitive variables in the model. These mixed findings with adult samples only emphasize the need to study these models further in all age groups, including adolescents.

While neither Beck's (1967) theory nor the response style theory (Nolen-Hoeksema & Morrow, 1991) specify differences between individuals with clinical or subclinical depressive symptoms across their respective cognitive constructs, Pössel (2011) found that the best-fitting integrative model of these two theories was not stable between participants with clinical depressive symptoms and participants with subclinical depressive symptoms. However, only one of the associations relevant to the integrative hypotheses (i.e., associations which include variables from both Beck's theory and the response style theory) was significantly different between the subsamples.

Current Study

In a 2007 review of cognitive models and depression in children and adolescents, Lakdawalla and colleagues called for further research on cognitive models, originally developed for adults, in adolescent and child samples. The current, longitudinal study tested three proposed integrations of Beck's theory and the response style theory (Ciesla & Roberts, 2007;

Lyubomirsky & Nolen-Hoeksema, 1993; 1995; Pössel, 2011) in an adolescent sample. The longitudinal design will allow for conclusions to be drawn about how these cognitive constructs impact depressive symptoms over time, in addition to replicating Pössel's (2011) methods. We hypothesized that Pössel's (2011) findings with an adult sample would be replicated with adolescents – Lyubomirsky and Nolen-Hoeksema's (1993, 1995) theory would be the best fitting model. That is, we expected that participants' schemata would impact their response style, which in turn would affect all other variables in Beck's model to predict depressive symptoms at a later time point. However, we were also mindful of the substantial body of literature on the development of cognitions, cognitive patterns, and depressive symptoms throughout adolescence (e.g., Garber, 2000; Kaslow, Adamson, & Collins, 2000) that may impact this study's analyses. Determining, whether and how various cognitive constructs from Beck's theory and the response style theory integrate in adolescents to later predict depressive symptoms will clarify the literature's current mixed results (e.g., Abela & Hankin, 2011; Rood et al., 2012) on how various cognitive vulnerabilities may become intertwined during this developmental period. Regarding differences in the best-fitting integrative model between adolescents with clinical and subclinical depressive symptoms, given Pössel's (2011) unexpected findings and the lack of empirical evidence for differences between adolescents with clinical and subclinical depressive symptoms on integrating cognitive constructs, we did not create a priori hypotheses. Overall, determining whether Pössel's (2011) findings are mirrored in an adolescent sample will provide information about when these cognitive constructs emerge and interact with one another, which can inform preventions and interventions for adolescents.

Methods

Participants

Adolescents (N = 462; M = 16.01 years; SD = 0.69; 63.9% female) were recruited from ninth grade classes at a Midwestern, partially suburban, public high school (total school population = 1,700) in the United States. The sample was largely European American (73.4%; followed by 14.5% African-American, 5.6% Latino, 3.9% mixed race/ethnicity, 0.9% Native American, and 0.6% identified as "other"). Almost one third of the students was eligible for free or reduced price lunch programs; the school serves predominantly working to middle class families. By the second time point, 16 participants had dropped out of the study. This attrition is discussed further in the Data Analysis section below.

Measures

Depressive Symptoms. The Center for Epidemiological Studies – Depression Scale (CES-D; Radloff, 1977) is a 20-item self-report measure of depressive symptoms. The CES-D has been repeatedly used in adolescent samples (e.g., Roberts, Andrews, Lewinsohn, & Hops, 1990). Items are rated on a 4-point Likert scale (0 = *rarely or none of the time*; 3 = *most of the time*; e.g., "I was bothered by things that usually don't bother me."). The scale ranges from 0-60; total scores of 16 or higher indicate clinically significant depressive symptoms. For the analyses of integrated models four items were removed because the items measured aspects of the cognitive triad (Items 4, 8, 9, 15). In the current sample, 164 participants met the criteria for clinically significant depressive symptoms at time one; 158 participants met the criteria at time two. The full CES-D scale, was used to determine how many participants had clinically significant symptoms (i.e., Items 4, 8, 9, 15). The internal consistency of the measure was good (time one α = .91; time two α = .92).

Depressogenic Schemata. The Dysfunctional Attitudes Scale (DAS; Weissman & Beck, 1978) is a 40-item self-report measure of depressive beliefs as described in Beck's theory (1976).

In the current study, a version with modified wording of some items to increase the readability and comprehension for a younger age group was used (Garber, Weiss, & Shanley, 1993). Items are rated on a 7-point scale (1 = *totally disagree*; 7 = *totally agree*; "I should be happy all the time.") and are summed to create a total, full-scale score. The internal consistency of the measure was acceptable (time one $\alpha = .85$; time two $\alpha = .86$).

Cognitive Errors. The Children's Negative Cognitive Error Questionnaire (CNCEQ; Leitenberg, Yost, & Carroll-Wilson, 1986) is a 24-item self-report measure of cognitive distortions (catastrophizing, overgeneralizing, personalizing, and selective abstraction). In the current study, the full scale (rather than the subscales) was used in analyses. Participants are presented with scenarios and assess the probability of responding cognitively in a particular way (e.g., "You invite one of your friends to stay overnight at your home. Another of your friends finds out about it. You think, 'S/he will be really mad at me for not asking him/her and will never want to be friends again.'"). Items are rated on a 5-point scale (1 = *almost exactly like I would think*; 5 = *not at all like I would think*) and are summed to create a total score. The internal consistency of the measure was excellent (at both times $\alpha = .96$).

Cognitive Triad. The Cognitive Triad Inventory for Children (CTI-C; Kaslow, Stark, Printz, Livingston, & Tsai, 1992) is a 36-item self-report measure of the three domains of the cognitive triad: view of self (e.g., "I can do a lot of things well."), world (e.g., "The world is a very hostile place."), and future (e.g., "There is nothing to look forward to in the years ahead."). Each domain is measured with ten items and the remaining six statements are unscored filler items. All items are rated on a 3-point scale (*yes/true, maybe/sometimes true and sometimes not true, no/not true*). Higher total scores indicate positive views in each domain, while lower scores indicate negative views. It should be noted that the subscales, rather than the full scale, were

used in all analyses. Internal consistencies of the three domains were adequate (self: $\alpha = 0.83$, 0.84; world: $\alpha = 0.76$, 0.77; future: $\alpha = 0.86$, 0.86, at time one and time two, respectively).

Automatic Thoughts. The Automatic Thoughts Questionnaire-Revised (ATQ-R; Kendall, Howard, & Hays, 1989) is a 40-item self-report measure of automatic thoughts as described in Beck's theory (1976). The ATQ-R has been used with children as young as 6 years (Bruce, Cole, Dallaire, Jacquez, Pineda, & LaGrange, 2006). The scale includes negative self-statements (30 items; e.g., "I wish I were a better person.") and positive self-statements (10 items; e.g., "I'm proud of myself."). All items are rated on a 5-point Likert scale (1 = *not at all*; 5 = *all the time*) and are summed to create a total score. The current study only assessed the negative self-statements subscale. Internal consistency of this subscale in the current study was excellent ($\alpha = 0.97$ at both time points).

Rumination. The Ruminative Responses Scale (RRS; Nolen-Hoeksema, Parker, & Larson, 1994) of the Response Styles Questionnaire (RSQ) is a self-report measure of ruminative styles. The RSQ has been repeatedly used in adolescent samples (e.g., Jose & Brown, 2008). The RRS has three subscales: brooding, depression-related, and reflection (Treynor et al., 2003). To complete the measure, participants are asked to think about a time when they were sad and remember how they acted during that moment. In the current study, the brooding (e.g., "What did I do to deserve this?") and reflection (e.g., "Write down what you are thinking and analyze it") subscales were used, rather than the full scale. Both subscales are calculated by summing their five respective items measured on a 4-point Likert scale (1 = *almost never*; 4 = *almost always*). Internal consistency in the current sample was adequate for both brooding (time 1 $\alpha =$ 0.78; time 2 $\alpha = 0.76$) and reflection (time 1 $\alpha = 0.73$; time 2 $\alpha = 0.68$).

Procedure

Parents of all 10th grade students at a high school in the Southern United States were sent letters about the study inviting their children to participate. If the parents consented, the student was invited to participate in the study. After giving their assent, participants completed the measures in a group setting at two time points (three-month intervals) during the school day. As school administrators oversaw the data collection and the IRB allowed for a consent process without duty to document, the ratio of students invited to students who participated is unknown. The Institutional Review Board at the University of Louisville approved this study.

Data Analysis

Structural equation models were constructed and analyzed using the maximum likelihood method in AMOS 21; missing data were handled with the Full-Information Maximum Likelihood (FIML) method (Arbuckle, 1999), which allows datasets with missing data (for example, due to attrition) to be run without imputing data. Many of the models tested include moderation. To calculate these moderation effects, the two main effect variables were grand mean centered and then combined, so that the product of the two mean-centered variables served as the moderation variable. The moderation variables were then placed into the structural equation model alongside the other variables to be tested.

The goodness of fit of each model was tested with χ^2 (Kline, 2005; Ullman, 1996). Statistically nonsignificant values of χ^2 indicate a good fit of the data to the model. However, the χ^2 is sensitive to sample size. Thus, additional goodness of fit indices were used to evaluate the models, including the Comparative Fit Index (CFI; Bentler, 1990), Tucker-Lewis Index (TLI; Tucker & Lewis, 1973), and root mean squared of the residuals (RMSEA; Steiger & Lind, 1980). CFI and TLI values of 1.00 demonstrates a perfect model fit to the data, values of $\geq .95$ demonstrates good model fit, and values of $\geq .90$ are considered acceptable (Hu & Bentler,

1999). An RMSEA value of .00 demonstrates a perfect model fit to the data, and values of < .05 are considered a good model fit, though values of < .08 are regarded as acceptable (Hu & Bentler, 1999).

Four indices were used to compare the models. First, ΔCFI was calculated by subtracting the CFI value of one model from the CFI value of the compared model. If the ΔCFI of the two models is > .002, the model with the higher CFI value fits the data better. If the ΔCFI of the two models is less than or equal to .002, both models statistically fit equally well, and therefore the simpler model should be retained (Meade, Johnson, & Braddy, 2008). Second, the Akaike Information Criterion (AIC) was used to assess each model's parsimony while adjusting the model's χ^2. The AIC demonstrates the difference between model-implied and observed covariance matrices. When comparing models, a lower AIC indicates a better fit to the data (Akaike, 1974). Third, nested models were compared with the χ^2 difference test. The χ^2 value from one model was subtracted from the χ^2 value in the compared model, as are the degrees of freedom of each model. A significant $\Delta\chi^2$, based upon the Δdf, indicates that the models are significantly different from each other. Finally, the percent of explained variance in depressive symptoms in each model was evaluated to see whether the integrated models had more predictive value than either Beck's theory (Beck, 1976) or the response style theory (Nolen-Hoeksema & Morrow, 1991) alone.

Hypotheses were formed regarding differences in the final integrated model between adolescents with clinical versus subclinical depressive symptoms. Thus, the final model was tested between clinical and subclinical adolescents in the sample. The multigroup analyses were calculated using the maximum likelihood method in AMOS 21. The final integrative model was analyzed with no between-group constraints. This unconstrained model was used to test for

equivalence between groups when additional constraints were imposed. χ^2 tests were run to compare the first, unconstrained model with additional models that had increasing number of constraints imposed. Constraints were added to the models in order: measurement weights, measurement intercepts, structural weights, structural covariances, structural residuals, and measurement residuals. If the final, fully constrained model (i.e., all constraints through measurement residuals) is not significantly different from the first, unconstrained model using the $\Delta\chi^2$ test, then equivalence between the two groups is supported. In this case, the groups should be analyzed together. Results of the multigroup analyses, including parameter estimates and their significance, are reported for all groups from the unconstrained final integrative model.

Results

Correlations and descriptive data for all measures at both time points are shown in Table 1. All of the variables correlated with one another.

Identification of the Best Model

Models were created to represent various proposed integrations in the field (e.g., Ciesla & Roberts, 2007; Lyubomirsky & Nolen-Hoeksema, 1993; 1995; Pössel, 2011). These 11 models are best conceptualized in five sets. The first set of models contains three models. The first model represents Beck's (1967) cognitive theory (Beck's model), the second is the response style theory with both brooding and reflection predicting depressive symptoms (RST – Brooding & Reflection model), and the third is the response style theory with only brooding predicting depressive symptoms (RST – Brooding only model). In the next two models (i.e., the second set of models; Figure 1), constructs from both Beck's theory and the response style theory were placed in the same model to predict later depressive symptoms, but there were no pathways connecting constructs from the two different models together. The first model of this set

(Beck/RST – Brooding & Reflection model) allowed both brooding and reflection to predict depressive symptoms, whereas the second model (Beck/RST – Brooding only model) only allowed brooding to predict depressive symptoms. The remaining three sets of models represent various integrations of Beck's theory and the response style theory. Two models (i.e., set 3) represent Lyubomirsky and Nolen-Hoeksema's (1995) hypothesis that schemata influence rumination (Figure 2). One model (Schema interaction – Brooding & Reflection model) allowed both brooding and reflection to interact with schemata and predict depressive symptoms, whereas the next model (Schema interaction – Brooding only model) only allowed brooding to do so. The next set of models represent Ciesla and Roberts' (2007) moderation model; one model (Brooding & Reflection interaction model) allowed both brooding and reflection to interact with other variables, whereas the second (Brooding only interaction model) only allowed brooding to do so. Finally, in the last set of models Lyubomirsky and Nolen-Hoeksema's (1995) and Cielsa and Roberts' (2007) integrative hypotheses were combined to predict depressive symptoms (Figure 4). As before, the first model (Full Integrative Model – Brooding & Reflection model) allowed both brooding and reflection to interact with other variables, whereas the second (Full Integrative Model – Brooding only model) only allowed brooding to do so.

Of the first three models (i.e., the first set), only Beck's model had excellent fit indices for the CFI, TLI, and RMSEA, as well as a nonsignificant χ^2 (Table 2). The RST – Brooding & Reflection and RST – Brooding only models had significant χ^2 and unacceptable RMSEA and TLI values, though both had good CFI values. When comparing these RST models it was found that there were no significant differences between the models (ΔCFI = 0.002, ΔAIC = 0.587),

$\Delta\chi^2$ (1, N = 462) = 2.587, p = .133. Therefore, the more parsimonious RST – Brooding only model was retained.

All of the remaining models had significant χ^2 values; however, the models also had excellent to acceptable CFI values. The Schema Interaction – Brooding & Reflection, the Brooding Only Interaction model, and both Full Integrative models had excellent TLI values, while the Beck/RST models, the Schema Interaction – Brooding only model, and the Brooding & Reflection Interaction model had good TLI values. The Schema Interaction – Brooding & Reflection model and both Full Integrative models had good RMSEA values and both Beck/RST models, the Schema Interaction – Brooding only model, the Brooding & Reflection Interaction model, and the Brooding Only Interaction model had adequate RMSEA values.

First, all of the sets of nested models were compared to each other. When comparing the models that do not allow variables from Beck's theory and the response style theory to interact, there was no significant difference between the Beck/RST – Brooding & Reflection model and the Beck/RST – Brooding Only model (ΔCFI = 0.000, ΔAIC = 1.277), $\Delta\chi^2$ (1, N = 462) = 0.723, p = .442). Thus, the more parsimonious Beck/RST – Brooding Only model was retained. When comparing the integrated models from Lyubomirsky and Nolen-Hoeksema (1995), the Schema Interaction – Brooding & Reflection model fit the data significantly better than the Schema Interaction – Brooding Only model (ΔCFI = 0.004, ΔAIC = 11.941; $\Delta\chi^2$ (7, N = 462) = 25.941, p = .001). Therefore, the Schema Interaction – Brooding & Reflection model was retained. Comparisons of the models representing Ciesla and Roberts' (2007) theory demonstrated no significant difference between the Brooding & Reflection Interaction model and the Brooding Only Interaction model on two comparison indices (ΔCFI = 0.000, $\Delta\chi^2$ (7, N = 462) = 8.11, p = .190) but a significant difference in ΔAIC (85.111). Given that the majority of the fit indices

indicated no significant differences and that they two models explained nearly the same amount of variance in depressive symptoms (33.1 % and 33%), the more parsimonious Brooding Only Interaction model was retained. Finally, comparisons between models combining Lyubomirsky and Nolen-Hoeksema (1995) and Ciesla and Roberts' (2007) proposed integrated models were compared. The Full Integrative Model – Brooding & Reflection model was significantly different from the Full Integrative Model – Brooding Only model (ΔCFI = 0.003, ΔAIC = 14.042), $\Delta\chi^2$ (3, N = 462) = 20.042, $p < .001$). Therefore, the Full Integrative Model – Brooding & Reflection model was retained.

After comparing the nested models, the remaining four, non-nested models were compared using CFIs and AICs. According to the CFIs, the Schema Interaction – Brooding & Reflection model fit the data significantly better than the Beck/RST – Brooding Only model (ΔCFI = .008) and the Brooding Only Interaction model (ΔCFI = .006). The CFIs for the Schema Interaction – Brooding & Reflection model and the Full Integrative Model – Brooding & Reflection model were not significantly different (ΔCFI = .001), and therefore the more parsimonious Schema Interaction – Brooding & Reflection model was retained. According to the AICs, the Schema Interaction – Brooding & Reflection model fit the data better than the other three models (ΔAIC = 27.06, 270.875, and 148.903, respectively), which confirms the findings of the CFI comparisons. However, an inspection of the associations of this model reveals that schemata were associated with brooding and reflection three months later at time point 2, but neither of the response styles was associated with any other cognitive variable of Beck's model or with depressive symptoms.

The Schema Interaction – Brooding & Reflection model fit the data very well. Additionally, it explained more variance in depressive symptoms than the RST – Brooding Only

model (the best-fitting response styles theory model; 35.8% compared to 34.1%). However, it should be noted that the ΔAIC indicated that the RST – Brooding Only model fit the data better than the Schema Interaction – Brooding & Reflection model. Nevertheless, there are three fit indices that indicated the Schema Interaction – Brooding & Reflection model is superior (ΔCFI (.016), TLI and RMSEA indices are preferable). However, the Schema Interaction – Brooding & Reflection model differed significantly from Beck's model based on the ΔCFI (.004). Additionally, the ΔAIC (147.63) indicated that Beck's model fit the data better. Moreover, Beck's model and the Schema Interaction – Brooding & Reflection model explained about the same amount of variance in depressive symptoms at time two (37.3% and 35.8%, respectively). Thus, Beck's model was retained.

Multigroup Analyses

Multigroup analyses comparing adolescents with clinical (n = 298) and subclinical (n = 164) depressive symptoms demonstrate that the Schema Interaction – Brooding & Reflection model was not stable across depressive symptom severity, $\chi^2_{\text{unconstrained}}$ (40, N = 462) = 78.698, p < .001, CFI (0.988), TLI (0.901), AIC (754.698); $\chi^2_{\text{fully constrained}}$ (209, N = 462) = 1035.7, p < .001, CFI (0.753), TLI (0.596), AIC (1373.7). Nevertheless, upon inspecting the subgroups further, only 1 of the 18 paths relevant for the hypotheses had significant differences between the clinical and subclinical subsamples. The association between depressogenic schemata at time 1 and reflection at time 2 was significantly different between the clinical and subclinical depressive symptom samples. In the clinical sample, this association was positive and significant, whereas the association was not significant in the subclinical sample.

Discussion

Much research has been done on identifying cognitive vulnerability models to depression in both adolescent and adult samples. Less work has been done to determine how these models may interact, and whether these interactions may heighten depressive symptoms more than one model alone. While some of these interactions have been explored with adult samples (e.g., Pössel, 2011), how these cognitive models to depression integrate in adolescents is largely unknown. This study sought to determine whether and how Beck's (1967) cognitive theory and the response style theory (Nolen-Hoeksema & Morrow, 1991) could be integrated to explain the development of depressive symptoms in adolescents, a developmental time during which depressive symptoms become more prevalent (Kessler et al., 2001) and cognitive development is not finished. Several integrated models of cognitive vulnerabilities to depression were analyzed and compared (Ciesla & Roberts, 2007; Lyumbomirsky & Nolen-Hoeksema, 1993, 1995; Pössel, 2011). It was expected that Pössel's (2011) findings with an adult sample would be replicated here, where Lyobimirsky and Nolen-Hoeksema's (1993; 1995) proposed integration would be the best fitting, integrative model. Finally, an exploratory analysis compared the best-fitting integrative model across adolescents with clinical and subclinical depressive symptoms.

Consistent with Pössel's (2011) findings in an adult sample, the best-fitting integrated model Lyubomirsky and Nolen-Hoeksema's (1993; 1995): schemata influenced rumination (brooding *and* reflection), and then rumination influenced the other cognitive constructs from Beck's theory. While the integrated model fit the data better and explained more variance in depressive symptoms than the response style theory alone, Beck's theory (without rumination) fit the data equally well, explained approximately the same amount of variance in depressive symptoms, and was more parsimonious compared to the integrated model. In addition, only schemata were associated with brooding and reflection to a later time point, but neither of the

response styles was associated with any other cognitive variable of Beck's theory or with depressive symptoms. Thus, analyses related to determining the best-fitting integrative model in the current study were identical to Pössel's (2011) findings.

Regarding the multigroup analyses, only one pathway relevant to the Schema Interaction – Brooding & Reflection model's hypotheses was different between the clinical and subclinical subsamples. Depressogenic schemata at time one and reflection at time two were significantly, positively associated in the clinic sample but were not associated in the subclinical sample. Further inspection revealed that the clinical subsample's association between these two variables matched the findings of the total sample. Pössel (2011) found similar results for this pathway when comparing clinical and subclinical subsamples in his adult sample. However, this was the only difference relevant to the integrative hypotheses found between the subsamples.

The findings in this study, while replicating the results Pössel's (2011) study, are contrary to other previous studies (Ciesla & Roberts, 2007; Lyubomirsky & Nolen-Hoeksema, 1995; Treynor et al., 2003; Winkeljohn Black & Pössel, 2013). However, one must consider that both Beck's theory and the response are vulnerability-stress models, whereby stressful events activate cognitive constructs associated with depression. Pössel (2011) suggested that these unexpected findings may be due to the fact that stress was not accounted for in the integrated models in both the current study and his 2011 study. This may have led to an underestimation of the associations of cognitive constructs with depressive symptoms in both samples. Thus, future research integrating different cognitive theories should include highly stressed individuals (e.g., adolescents transitioning from middle to high-school, families with significant conflict) and include measures of various stressors.

While analyses from both Pössel's (2011) young adult sample and the current adolescent sample demonstrated that the best-fitting integrative model explained more variance in depressive symptoms compared to the response style theory alone, there was a notable difference between the two studies in the amount of variance explained. Several researchers assert that depressive symptoms may manifest in different ways depending on the individual's developmental level (Cole et al., 2008; Turner & Cole, 1994; Weiss & Garber, 2003; Weitlauf & Cole, 2012). In their study with 8-16 year olds, Weitlauf and Cole (2012) found that only when cognitive development was controlled for could their cognitive vulnerability to depression model be confirmed in the child/adolescent sample. This could explain why in Pössel's (2011) adult sample the same, best-fitting integrated model explained 9.7% more variance than the response style theory, whereas in this sample the integrated model only explained 1.2% more variance in depressive symptoms compared to the response style theory. This difference may suggest that cognitive vulnerability constructs are only just beginning to interact in mid-adolescence.

Before implications of the findings are discussed, it is important to consider the study's limitations. First and as already mentioned above, stress was not measured in the model, which may have masked the results. Second, it is likely that there is a mono-method bias for all the analyzed constructs. Moreover, these constructs were assessed with self-report measures. For certain constructs, such as depressogenic schemata and cognitive errors, it is likely that individuals are not fully aware of their cognitive style (see Scher, Ingram, & Segal, 2005), regardless of age and/or developmental level. If this study were replicated, an information-processing methodology would be superior to the self-report measurements used here (however, an information-processing measure of cognitive errors has yet to be developed; Gotlib & Neubauer, 2000). Further, as stated above, a replication of this study in a child or adolescent

sample should consider assessing and controlling for participants' developmental/cognitive levels (Weitlauf & Cole, 2012). Related to this issue, as girls are ahead of boys in their development during adolescence (Ge, Conger, & Elder, 2001) and the trajectories (Castelao & Kröner-Herwig, 2013) as well as risk factors (Ferreiro, Seoane, & Senra, 2012) of depressive symptoms are different in girls and boys, future studies should include enough participants of both sexes to analyze the associations between the studies' variables separated for girls and boys. Similarly, as some studies found differences in the depression rates between European American and minority adolescents (Brown, Meadows, & Elder, 2007; Miller & Taylor, 2012; for an example of a study that did not find such differences see Waschbusch, Sellers, LeBlanc, & Kelley, 2003), authors of future studies may consider to include enough minority adolescents to analyze associations between cognitive variables separated by race/ethnicity. However, so far, there is no evidence that cognitive variables are less relevant in the development and maintenance of depressive symptoms in adolescents from different races/ethnicities (Grant et al., 2004). Finally, one might see the time lag between the two time points of three-months as too short or too long. For example, Hollon, DeRubeis, and Evans (1996) suggested that while dysfunctional attitudes are relatively stable over time, negative automatic thoughts fluctuate on a moment-to-moment basis. This is supported by Pössel and Knopf (2008), who argued that the activation of dysfunctional attitudes triggers negative automatic thoughts within seconds, which cause immediately depressed mood. Thus, the selected time lag of three months between time points may not be optimal to represent the full effect of one variable on another (Cole & Maxwell, 2003). Nevertheless, it is noteworthy that Beck's model and the Schema Interaction – Brooding & Reflection model (Lyubomirsky and Nolen-Hoeksema's proposed integrative model, 1993, 1995) both had good model fit. Thus, if the time lag was not optimal for all

variables in the tested models to develop their full effect on the other variables, this problem seemed to have had limited impact.

Despite the above limitations, the current study contributes significantly to theory development and has important clinical implications. The findings highlight that an integrated cognitive theory fit the data better than the response style theory and it explained 1.2% more variance of depressive symptoms. However, the integrated model was not superior to Beck's theory regarding model fit and explained variance in depressive symptoms. Thus, one could conclude that interventions to change cognitive vulnerabilities based on Beck's theory are more effective than interventions based on the response style theory alone. Nonetheless, Lyobomirsky and Nolen-Hoeksema's (193, 1995) model did fit the data well, indicating that researchers and psychotherapists should not discount the importance of response style in predicting depressive symptoms in adolescents. Clearly, rumination still plays an important role in the development of depressive symptoms. The present findings should be seen as the beginning, rather than the end, of research about integrated cognitive models of depression in adolescents. In addition, the integration of additional cognitive constructs into one model in order to better explain the development and maintenance of depression in adolescents should be considered. Constructs already considered in adult samples include self-esteem (Metalsky, Joiner, Hardin, & Abramson, 1993), and cognitive style (Hankin, Lakdawalla, Latchis Carter, Abela, & Adams, 2007; Pössel & Knopf, 2011; Pössel & Thomas, 2011) as Abramson and colleagues (1989) proposed with the hopelessness theory.

In summary, the 2-wave longitudinal study revealed that Lyubomirsky and Nolen-Hoeksema's (1993, 1995) proposal for a model integrating Beck's (1967) cognitive theory and the response style theory in which schemata influence rumination (brooding *and* reflection) and

rumination influences the other cognitive constructs from Beck's theory fit the data better than the other tested integrated models. However, an inspection of the associations in this model revealed that, while schemata were associated with brooding and reflection three months later, neither of the response styles was associated with any other cognitive variable or with depressive symptoms. Moreover, compared to Beck's (1967) more parsimonious cognitive model, this integrated model did not fit the data better, nor did it explain more variance in depressive symptoms. Compared to the original response style theory, however, the integrated model fit the data better and it explained 1.2% more variance in depressive symptoms. Interestingly, the explanation of 1.2% of the variance in depressive symptoms was notably lower than the variance accounted for in Pössel's (2011) same model with young adults (9.7%). As discussed above, it is possible that the developmental level of adolescent participants' in the current study is responsible for this difference (e.g., Weitlauf & Cole, 2012). Further studies may consider designs that allow researchers to determine whether cognitive constructs gradually account for more depressive symptoms as adolescents reach adulthood in a linear fashion, or if there is a unique growth pattern. The current study calls attention to this need for further research to understand how cognitive vulnerabilities to depression may stabilize, as adolescents grow older. This study also provides insight into how adolescent depressive symptoms can be conceptualized.

Conclusion

Altogether, the findings in this adolescent sample are remarkable similar to findings in a young adult sample (Pössel, 2011). This is consistent with the general picture that cognitive vulnerabilities and depressive symptoms often develop during adolescence (Cole et al., 2008; Hankin, 2008; Kessler et al., 2001; Lakdawalla et al., 2007; Turner & Cole, 1994). However, not

much research exists about the *relationships* between the individual cognitive vulnerabilities proposed in Beck's (1967) cognitive model and the response style theory (Nolen-Hoeksema & Morrow, 1991) in adolescence. Thus, as far as we know, the present research is the first allowing us to compare the interplay between the studied cognitive variables in adolescents and young adults. This comparison demonstrates remarkably similar associations. One possible explanation for this similarity in the associations is that the age group we selected in the current study (M = 16.01 years; SD = 0.69) is similar developmentally to young adults (M = 23.27 years; SD = 6.57; Pössel, 2011). Studies regarding the expression of depression support this hypothesis (for a review see Weiss & Garber, 2003).

In addition to the remarkable similarities in the findings with adolescent and early adult (Pössel, 2011) individuals, there are a few differences. The main difference is that dysfunctional attitudes were associated with brooding and reflection in young adults with subclinical depressive symptoms but not in adolescents with subclinical depressive symptoms, while both associations were significant in the clinical young adults and adolescent subgroups. Thus, it is important to consider the differences between adolescents and young adults with subclinical depressive symptoms. As stated above, many individuals develop their first depressive episode in adolescence (Kessler et al., 2001). Therefore, it seems likely that the adolescents with subclinical depressive symptoms had not yet experienced clinical depressive symptoms. However, at least some young adults who reported currently only subclinical depressive symptoms already had experienced clinically depressive symptoms in the past. Thus, it is possible that the association of dysfunctional attitudes with brooding and reflection is strengthened by the experience of clinically depressive symptoms. To test this hypothesis a

longitudinal study with adolescents that develop clinically depressive symptoms and adolescents that do not develop such symptoms is necessary.

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Author Contributions

SWB drafted the manuscript and performed the statistical analyses. PP conceived, designed, and coordinated the study. Both authors interpreted the data. All authors read and approved the final manuscript.

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Table 1 *Descriptive Data and Correlations between All Instruments at Both Waves*

Measure	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. DEPt1																		
2. DEPt2	.61																	
3. DAt1	.43	.30																
4. DAt2	.28	.36	.61															
5. CEt1	.54	.42	.41	.35														
6. CEt2	.43	.44	.41	.39	.70													
7. CT-St1	-.56	-.40	-.38	-.18	-.52	-.40												
8. CT-Wt1	-.59	-.41	-.36	-.22	-.53	-.43	.74											
9. CT-Ft1	-.44	-.27	-.30	-.16	-.46	-.37	.75	.67										
10. CT-St2	-.39	-.52	-.32	-.32	-.45	-.56	.57	.51	.50									
11. CT-Wt2	-.50	-.58	-.36	-.36	-.48	-.55	.58	.64	.50	.76								
12. CT-Ft2	-.29	-.44	-.21	-.23	-.36	-.49	.45	.44	.55	.75	.68							
13. ATt1	.71	.52	.47	.33	.67	.51	-.66	-.65	-.60	-.54	-.55	-.44						
14. ATt2	.48	.65	.40	.47	.52	.59	-.49	-.50	-.43	-.66	-.67	-.57	.63					
15. BRt1	.55	.44	.35	.31	.44	.34	-.33	-.36	-.22	-.27	-.36	-.17	.50	.41				
16. REt1	.49	.39	.32	.26	.40	.30	-.32	-.33	-.23	-.23	-.32	-.14	.48	.39	.68			
17. BRt2	.47	.53	.36	.47	.39	.44	-.35	-.37	-.25	-.38	-.47	-.27	.46	.59	.51	.44		
18. REt2	.38	.42	.33	.42	.36	.41	-.32	-.29	-.20	-.41	-.42	-.25	.41	.53	.41	.50	.69	
Mean	12.70	12.30	98.73	97.54	53.27	53.20	16.15	14.55	16.23	15.84	14.36	16.09	57.46	56.98	2.06	2.00	2.01	1.93
SD	9.74	10.03	17.69	18.90	21.34	21.60	3.98	3.87	4.18	4.14	3.94	4.29	25.73	25.14	0.77	0.66	0.73	0.64

Note. N = 462 for all variables. All correlations are significant on a 5% level. DEP = Center for Epidemiological Studies – Depression Scale without items that overlap with the cognitive triad; DA = Dysfunctional Attitude Scale; CE = Children's Negative Cognitive Error Questionnaire; CT-S = Cognitive Triad Inventory for Children, view of the self; CT-W = Cognitive Triad Inventory for Children, view of the world; CT-F = Cognitive Triad Inventory, view of the future; AT = Automatic Thoughts Questionnaire – Revised, negative self-statements; BR = Response Style Questionnaire, brooding; RE = Response Style Questionnaire, reflection; t1= time 1; t2 = time 2

Table 2

Indices of Goodness of Fit and Parsimony of the Tested Models (N = 462)

Model	*df*	X^2	*p*	CFI	TLI	RMSEA	AIC	Explained Variance
1. Beck's model	6	12.352	0.055	0.999	0.974	0.048	238.352	37.3%
2. RST – Brooding & Reflection model	2	23.762	>.001	0.981	0.798	0.154	73.762	34.6%
3. RST – Brooding Only model	3	26.349	>.001	0.979	0.856	0.13	74.349	34.1%
4. Beck/RST – Brooding & Reflection model	32	100.319	>.001	0.987	0.932	0.068	414.319	33.3%
5. Beck/RST – Brooding Only model	33	101.042	>.001	0.987	0.934	0.067	413.042	33.0%
6. Schema Interaction – Brooding & Reflection model	20	47.982	>.001	0.995	0.955	0.055	385.982	35.8%
7. Schema Interaction – Brooding Only model	27	73.923	>.001	0.991	0.945	0.061	397.923	34.7%
8. Brooding & Reflection Interaction model	44	109.746	>.001	0.989	0.939	0.057	571.746	33.1%
9. Brooding Only Interaction model	51	117.857	>.001	0.989	0.946	0.053	656.857	33.0%
10. Full Integrative Model – Brooding & Reflection model	42	68.885	0.006	0.996	0.974	0.037	534.885	35.7%
11. Full Integrative Model – Brooding Only model	45	88.927	>.001	0.993	0.962	0.046	548.927	34.8%

Note. CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root-mean-squared error of approximation; explained variance = percentage of explained variance in depressive symptoms; Beck = Beck's cognitive theory; RSQ = Response Style Questionnaire – brooding and reflection; RSQb = Response Style Questionnaire, brooding; CES-D = Center for Epidemiological Studies – Depression Scale; DAS = Dysfunctional Attitudes Scale.

Table 3

Regression Weights for Associations Between Waves and Z-Scores for Comparisons Between Subsamples

Measure at T1	Measure at T2	All participants	Subclinical (*N* = 298)	Clinical (*N* = 164)	Z-score
DAt1	DAt2	.601***	0.597***	0.592***	0.08
CEt1	CEt2	.608***	0.56***	0.625***	-1.02
CT-St1	CT-St2	.235***	0.213*	0.356***	-1.59
CT-Wt1	CT-Wt2	.377***	0.38***	0.258**	1.39
CT-Ft1	CT-Ft2	.442***	0.43***	0.372***	0.71
BRt1	BRt2	.326***	0.251***	0.343***	-1.03
REt1	REt2	.390***	0.457***	0.238**	2.56*
DEPt1	DEPt2	.395***	0.333**	0.204**	1.42
DAt1	CEt2	.164***	0.163**	0.074	0.92
DAt1	CT-St2	-.084	0.083	-0.09	1.77
DAt1	CT-Wt2	-.103*	0.028	-0.064	0.94
DAt1	CT-Ft2	-.020	0.097	-0.024	1.24
DAt1	DEPt2	.022	0.025	0.027	-0.02
CEt1	CT-St2	-.078	-0.075	-0.113	0.39
CEt1	CT-Wt2	-.069	-0.119	-0.067	-0.54
CEt1	CT-Ft2	-.055	-0.037	-0.054	0.17
CEt1	DEPt2	.045	-0.022	0.035	-0.58
CT-St1	CT-Wt2	.124*	0.142	0.27**	-1.37
CT-St1	CT-Ft2	-.035	-0.065	0.179	-2.51*
CT-St1	DEPt2	-.104	0.075	-0.152	2.33*
CT-Wt1	CT-St2	.088	-0.076	0.058	-1.37
CT-Wt1	CT-Ft2	.072	-0.006	0.011	-0.17
CT-Wt1	DEPt2	.017	0.024	0.021	0.03
CT-Ft1	CT-St2	.109	0.262**	-0.011	2.85**
CT-Ft1	CT-Wt2	.062	0.012	0.037	-0.26
CT-Ft1	DEPt2	.114	0.037	0.113	-0.78
BRt1	REt2	.056	-0.115	0.251**	-3.80***
BRt1	DEPt2	.097	0.047	0.117	-0.72
REt1	BRt2	.132*	0.103	0.138	-0.36
REt1	DEPt2	.056	0.029	0.037	-0.08
CEt1	DAt2	.133**	0.117	0.05	0.69
CT-St1	CEt2	.066	-0.007	0.07	-0.79
CT-St1	DAt2	.168**	0.262***	0.123	1.48
CT-Wt1	CEt2	-.065	0.003	-0.089	0.94
CT-Wt1	DAt2	-.007	0.019	-0.042	0.62
CT-Ft1	CEt2	-.072	-0.083	-0.075	-0.08
CT-Ft1	DAt2	-.013	-0.205**	0.006	-2.18*
ATt1	ATt2	.296***	0.343***	0.236**	1.19
ATt1	CT-Ft2	-.118	-0.245***	-0.01	-2.45*
ATt1	CT-Wt2	-.024	-0.028	-0.008	-0.20

ATt1	CT-St2	-.167**	-0.207**	-0.12	-0.91
ATt1	CEt2	-.050*	-0.02	-0.029	0.09
ATt1	DAt2	.009	-0.08	0.044	-1.27
DAt1	ATt2	.145	0.055	0.174*	-1.23
CEt1	ATt2	.098	0.023	0.11	-0.89
CT-St1	ATt2	-.018	0.155	-0.102	2.64**
CT-Wt1	ATt2	-.076	-0.125	-0.022	-1.06
CT-Ft1	ATt2	-.051	-0.184*	-0.026	-1.63
ATt1	DEPt2	.090	0.177*	0.056	1.25
DAt1	BRt2	.200***	0.099	0.25***	-1.59
BRt1	ATt2	.059	0.013	0.051	-0.39
BRt1	CT-Ft2	.002	0.035	0.072	-0.38
BRt1	CT-Wt2	-.076	-0.011	-0.138	1.31
BRt1	CT-St2	-.002	0.021	-0.012	0.34
BRt4	CEt2	.017	-0.034	0.041	-0.77
DAt1	REt2	.189***	0.021	0.272***	-2.63**
REt1	ATt2	.072	0.039	0.133	-0.97
REt1	CT-Ft2	.063	0.044	0.093	-0.50
REt1	CT-Wt2	-.015	0.016	0.005	0.11
REt1	CT-St2	.039	0.027	0.082	-0.56
REt1	CEt2	-.001	-0.023	-0.051	0.29

Note. DEP = Center for Epidemiological Studies – Depression Scale without items that overlap with the cognitive triad; DA = Dysfunctional Attitude Scale; CE = Children's Negative Cognitive Error Questionnaire; CT-S = Cognitive Triad Inventory for Children, view of the self; CT-W = Cognitive Triad Inventory for Children, view of the world; CT-F = Cognitive Triad Inventory, view of the future; AT = Automatic Thoughts Questionnaire – Revised, negative self-statements; BR = Response Style Questionnaire, brooding; RE = Response Style Questionnaire, reflection; t1= time 1; t2 = time; *$p < .05$, **$p < .01$, ***$p < .001$

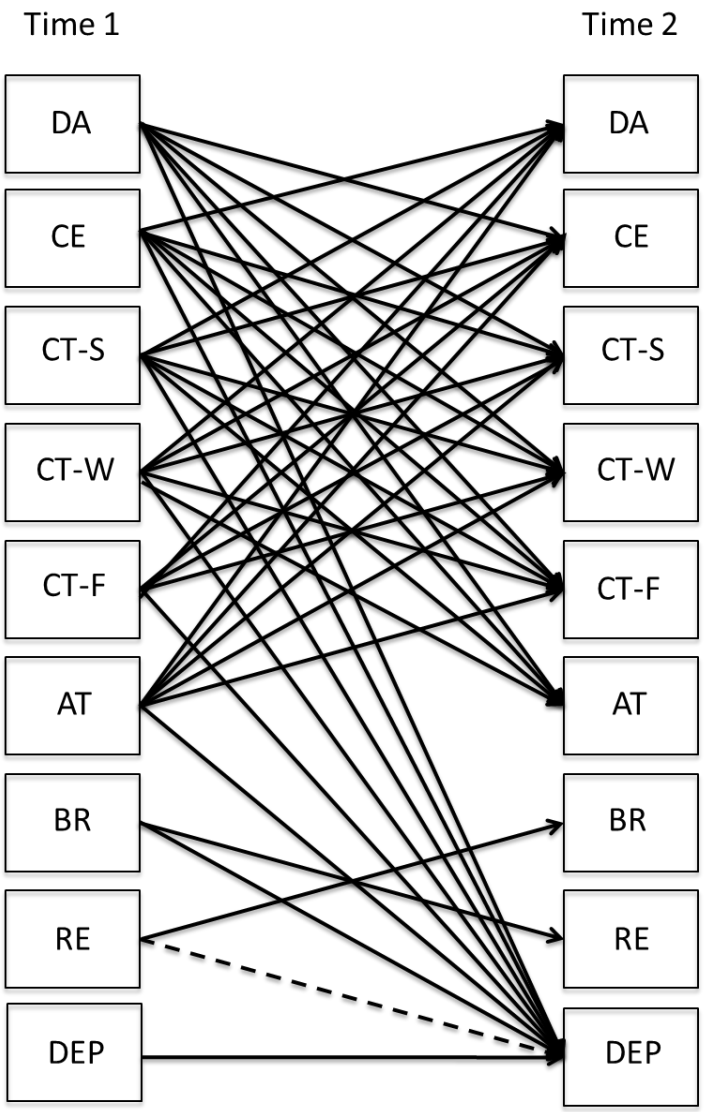

Figure 1. Representing the Beck/RST – Brooding & Reflection and Beck/RST – Brooding Only models. Autoregressive associations were calculated in the model but are not shown for the sake of clarity. The dotted line shows paths that exist the Beck/RST – Brooding & Reflection model and not the Beck/RST – Brooding Only model. DA = dysfunctional attitudes; CE = cognitive errors; CT-S = cognitive triad – self; CT-W = cognitive triad – world; CT-F = cognitive triad – future; AT = automatic thoughts; BR = brooding; RE = reflection; DEP = depressive symptoms.

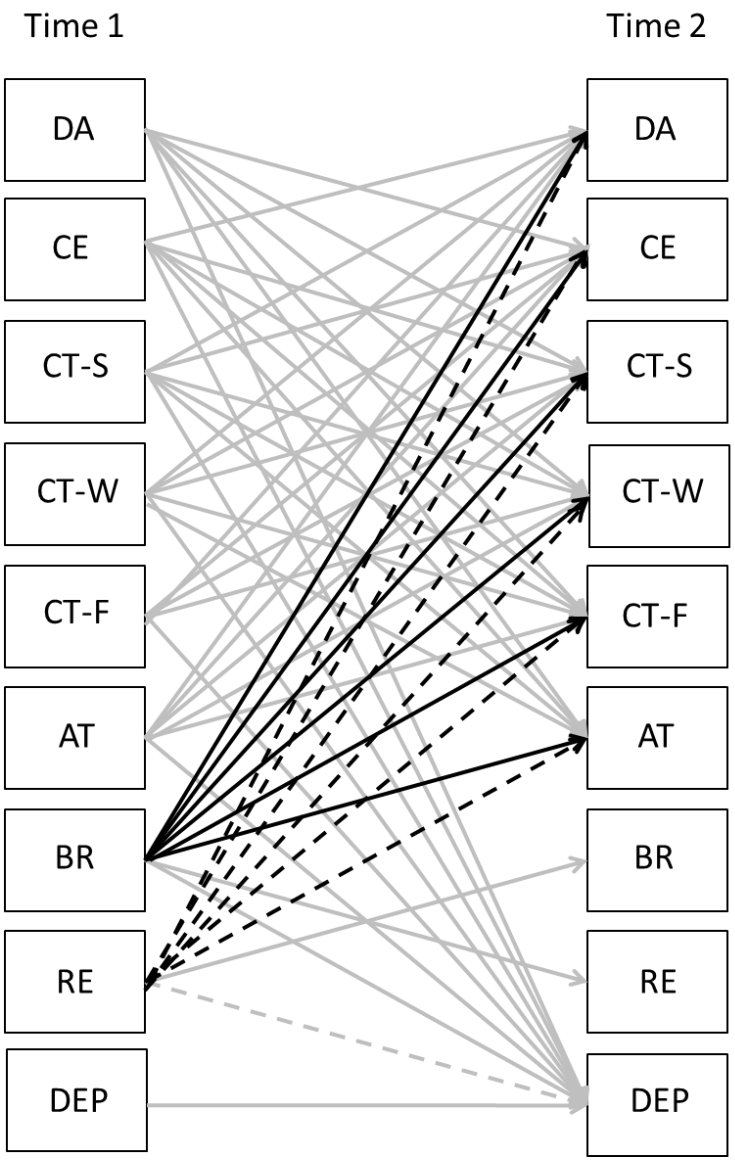

Figure 2. Representing Schema Interaction – Brooding & Reflection and Schema Interaction – Brooding Only models. Autoregressive associations were calculated in the model but are not shown for the sake of clarity. Grey lines represent pathways included in previous models and the current model; black lines represent pathways unique to the Schema Interaction – Brooding & Reflection and Schema Interaction – Brooding Only models. The dotted line shows paths that exist in the Brooding & Reflection model and not the Brooding Only model. DA = dysfunctional attitudes; CE = cognitive errors; CT-S = cognitive triad – self; CT-W = cognitive triad – world; CT-F = cognitive triad – future; AT = automatic thoughts; BR = brooding; RE = reflection; DEP = depressive symptoms.

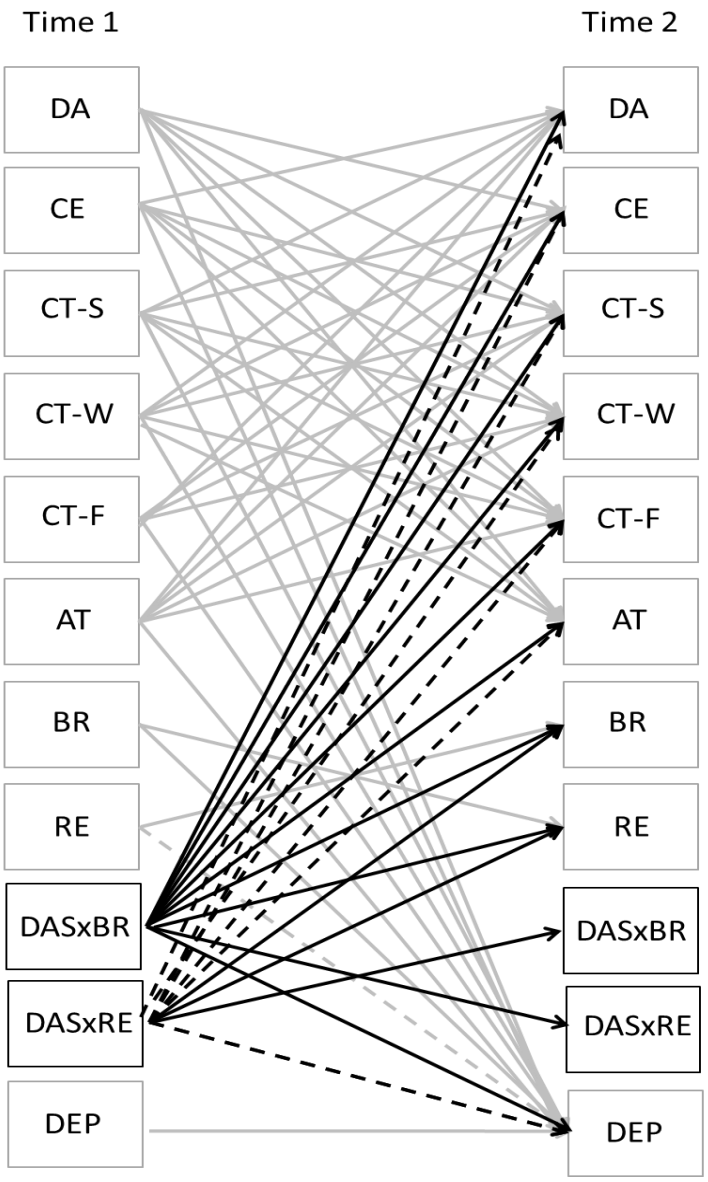

Figure 3. Representing the Brooding & Reflection Interaction model and Brooding Only Interaction model. Autoregressive associations were calculated in the model but are not shown for the sake of clarity. Grey lines represent pathways included in previous models and the current model; black lines represent pathways and constructs unique to the Interaction models. The dotted line shows paths that exist in the Brooding & Reflection Interaction model and not the Brooding Only Interaction model. DA = dysfunctional attitudes; CE = cognitive errors; CT-S = cognitive triad – self; CT-W = cognitive triad – world; CT-F = cognitive triad – future; AT = automatic thoughts; BR = brooding; RE = reflection; DEP = depressive symptoms.

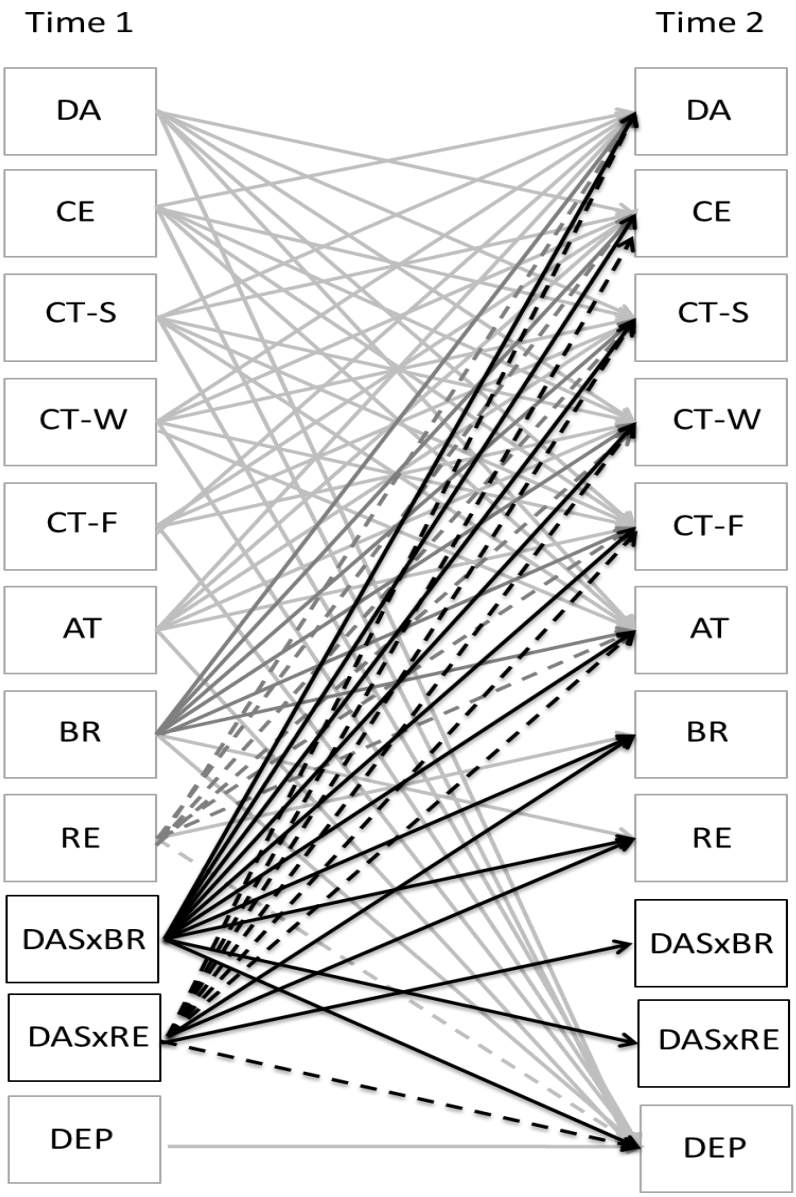

Figure 4. Representing the Full Integrative Model – Brooding & Reflection and Full Integrative Model – Brooding Only models. Autoregressive associations were calculated in the model but are not shown for the sake of clarity. Grey lines represent pathways included in previous models and the current model; black lines represent pathways and constructs unique to the Full Integrative models. The dotted line shows paths that exist in the Full Integrative Model – Brooding & Reflection model and not in the Full Integrative Model – Brooding Only model. DA = dysfunctional attitudes; CE = cognitive errors; CT-S = cognitive triad – self; CT-W = cognitive triad – world; CT-F = cognitive triad – future; AT = automatic thoughts; BR = brooding; RE = reflection; DEP = depressive symptoms.