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Can Beck's Theory of Depression and the Response Style Theory be Integrated?

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Abstract

There are obvious similarities between the cognitive constructs of Beck's cognitive theory (1976) and the response style theory (Nolen-Hoeksema & Morrow, 1991). Different propositions of Ciesla and Roberts (2007) and Lyubomirsky and Nolen-Hoeksema (1993, 1995) concerning associations of two response styles, brooding and reflection, with constructs of Beck's cognitive theory (schemata, cognitive errors, cognitive triad, automatic thoughts) were tested. Model comparisons were based on a 4-week study in which 397 participants completed self-report instruments at two time points. A model allowing schemata to influence brooding and reflection which influence the other cognitive variables of Beck's cognitive theory fits the data better than the other integrated models. However, although schemata were significant predictors of both response styles, neither response style did significantly predict other cognitive variables. A comparison of the integrated model with Beck's original cognitive theory revealed that Beck's original theory fits the data better than the integrated model, while both models explain about the same amount of variance. Thus, an integration of Beck's theory and the response style theory is not supported.

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

In the past decades, two cognitive theories explaining the development and maintenance of depression have been developed, empirically tested, and gained widespread popularity: Beck's cognitive theory (Beck 1976) and the response style theory (Nolen-Hoeksema, Girus, & Seligman, 1992). These models gained importance for several reasons: First, they help to explain epidemiological data (e.g., sex difference in depression rates; Nolen-Hoeksema et al., 1992). Second, they provide a theoretical basis for mechanisms underlying the development and maintenance of depression. Third, both cognitive theories are supported by a variety of empirical studies (see for reviews Abramson, Alloy, Hankin, Haeffel, MacCoon, & Gibb, 2002; Thomson, 2006). Finally, some of the most effective interventions for depression have been developed based on these models (Brunwasser, Gillham, & Kim, 2009; Purdon, 2004; Wells & Papageorgiou, 2004).

Beck's cognitive theory (Beck, 1976) consists of four different cognitive constructs: schemata, cognitive errors, cognitive triad, and automatic thoughts. Schemata are relatively enduring, organizing structures that guide situational information processing. Depressogenic schemata are negative in content and consist of immature, absolute, and rigid attitudes about the self and its relation to the world. When activated by stress, depressogenic schemata lead to cognitive errors, the next step in the causal pathway to depression. Cognitive errors cause our perception and thinking to be unrealistic, extreme, and distorted in a negative way. As a result, the content of cognitions is dominated by a negative view of the self, the world, and the future—the so-called cognitive triad. Following Beck (1976), this depressogenic style of thinking finds its expression in negative automatic thoughts. Automatic thoughts are understood as temporary, non-emotional mental events, which are subjectively plausible in a certain situation (Beck 1976). These automatic thoughts can be interpreted as the most proximal cause for the emotional,

somatic, and motivational symptoms of depression. In Beck's traditional model (1976), each cognitive construct mediates the relationship between its preceding and subsequent construct. For example, schemata as most distal cognitive constructs do not contribute to the cognitive triad, automatic thoughts, and depressive symptoms directly, but contribute instead through cognitive errors.

While Beck's traditional model (1976) proposes unidirectional effects from cognitive constructs on depressive symptoms, whereby each cognitive construct fully mediates the relationship between its preceding and subsequent construct (Alloy, Clements, & Kolden, 1985), an update of Beck's cognitive theory described bidirectional effects between cognitive constructs and depressive symptoms (Beck 1967, 1996; Beck & Weishaar, 2005). Beck (1967) proposed that the activation of cognitive constructs causes the development of depressive symptoms (top-down processes), including negative emotions, which in turn further innervate and consequently reinforce already existing dysfunctional attitudes (bottom-up influences). This update of Beck's cognitive theory (Beck 1967, 1996; Beck & Weishaar, 2005) is empirically supported by cross-sectional and longitudinal studies testing the sequential order of Beck's cognitive theory. These studies not only found that bidirectional relationships between cognitive constructs and depressive symptoms exist, but also that the constructs in Beck's theory only partially mediate the relationship between their preceding and subsequent constructs (Kwon & Oei, 1992; Pössel, 2011; Stewart et al., 2004). In other words, all of the constructs in Beck's cognitive theory is directly associated with one another.

The *response style theory* proposes that the style with which an individual responds to depressed mood is the central factor determining the development, severity, and duration of a depressive episode (Nolen-Hoeksema & Morrow, 1991). Individuals who respond to their

depressed moods by repetitively focusing their attention on their negative emotions and their implications demonstrate a ruminative response style. This response style is thought to lead to a worsening of the depressed mood. However, multiple authors point out that some of the items of mostly used Response Style Questionnaire overlap with items on measures of depressive symptomatology (Conway, Csank, Holm, & Blake, 2000; Cox, Enns, & Taylor, 2001; Segerstrom, Tsao, Alden, & Craske, 2000). In other words, these items do not measure a response style to a depressive mood but depressive symptoms themselves. Based on this critique Treynor, Gonzalez, and Nolen-Hoeksema, (2003) excluded these items. Further, Treynor et al. revealed in their factor analytical study that a ruminative response style can be separated in reflection and brooding. Reflection, the part of rumination that indicates the tendency to contemplate and reflect, as well as brooding, which represents a tendency towards melancholic pondering, on the other hand, seem distinguishable from depressive symptoms. While brooding and reflection correlate significantly positive with each other, they have different patterns of associations with depression. For example, while brooding correlates highly with depressive symptoms and predicts an increase of depressive symptoms one year later in a study with adults from the community, reflection correlates only moderately with depressive symptoms and predicts a reduction of depressive symptoms in the same sample (Treynor et al., 2003). Similarly, in a cross-sectional study with college students, brooding correlates positively with depressive symptoms while reflection showed a lower and negative correlation with depressive symptoms (Lo, Ho, & Hollon, 2008). However, in a sample of 38 outpatients with a diagnosis of major depression, only brooding is correlated with depressive symptoms but not reflection (Lo et al., 2008). Similarities between Beck's cognitive theory (1976) and the response style theory (Nolen-Hoeksema & Morrow, 1991) are obvious and were even pointed out by Nolen-Hoeksema

(1991), one of the authors of the response style theory. One of the most obvious similarities between both cognitive theories is their classification as cognitive vulnerability-stress models, meaning that the interactions between cognitive vulnerabilities and activating negative events are used to explain why some individuals develop depression whereas others do not show this psychopathology. Such similarities raise the question of whether Beck's cognitive theory and the response style theory can be integrated in one cognitive approach.

Nolen-Hoeksema and colleagues (Lyubomirsky & Nolen-Hoeksema, 1993; 1995) provide a proposition how to integrate Beck's cognitive theory (Beck, 1976) and the response style theory. They postulate that rumination (about negative emotions and their implications) causes a negative self-focus which brings cognitive errors and pessimistic expectations for future events, which is part of the cognitive triad in Beck's cognitive theory, to the attention of the ruminating individual. Nolen-Hoeksema (1991, 2004) further specifies the relationship between rumination and negative automatic thoughts. She emphasizes that a ruminative style focuses the attention of an individual, and that negative automatic thoughts may develop as result of this style of thinking. Then, negative automatic thoughts might increase depressive symptoms. This attempt to integrate Beck's cognitive theory (Beck, 1976) and the response style theory (Nolen-Hoeksema & Morrow, 1991) is partially supported by empirical studies. Spasojević and Alloy (2001) demonstrated that rumination completely mediates the relationship between schemata and depressive symptoms in a 3-wave longitudinal study with college students who initially were not clinically depressed (64 % female) of the Temple-Wisconsin Cognitive Vulnerability Depression Project (CVD). Further, in two laboratory studies with depressed and nondepressed college students (56% & 51% female), Lyubomirsky and Nolen-Hoeksema (1995) found that induced rumination increases cognitive errors (second study reported) and hopelessness (negative view of

the future; [first study reported]). Further, a 2-wave study with bereaved adults (71% female) expands on these results, revealing that the association between rumination and depressive symptoms measured 6 months later is partially mediated by optimism (defined as a positive view of the future; Nolen-Hoeksema, Parker, & Larson, 1994). Thus, theoretical considerations and empirical data support an integrated cognitive model wherein rumination schemata influence rumination, which influences cognitive errors, the cognitive triad, and automatic thoughts.

A moderation model is proposed by Ciesla and Roberts (2007). These authors interpret Morrow and Nolen-Hoeksema's (1990) statement that rumination might affect existing dysfunctional schemata by bringing them more often to mind as rumination amplifying the effects of schemata. In other words, Ciesla and Roberts (2007) propose an interaction effect between rumination and schemata. In a laboratory study with college students (55% female), designed very similarly to Lyubomirsky and Nolen-Hoeksema's studies (1995), Ciesla and Roberts (2007 [second study reported]) were able to demonstrate that the interaction between schemata and induced rumination predicts depressive symptoms. In a second laboratory study with college students (50% female), the authors were able to demonstrate that the interaction between schemata and brooding but not reflection predicts depressive symptoms after a dysphoric mood induction. These results point out the possibility of an interaction model.

Finally, a model including both suggested integrated models makes sense conceptually. While Ciesla and Roberts' (2007) moderation model suggests a direct main effect of schemata on depressive symptoms, this is contrary to Beck's cognitive theory (Beck, 1976) and empirical data which demonstrates that schemata influence depressive symptoms, not necessarily directly, but by impacting other cognitive variables (Pössel, 2011). Thus, it seems likely that schemata influence rumination while also interacting with it in influencing other cognitive variables and

depressive symptoms. This model is not only consistent with theoretical considerations of Lyubomirsky and Nolen-Hoeksema (1993, 1995) and Ciesla and Roberts (2007) to integrate Beck's cognitive theory with the response style theory (Nolen-Hoeksema & Morrow, 1991) but also with empirical studies supporting both previously suggested integrated models (Ciesla & Roberts, 2007; Lyubomirsky & Nolen-Hoeksema, 1995; Nolen-Hoeksema et al., 1994; Spasojević & Alloy, 2001). So far, however, no previous study tested this integrated model (Figure 1).

While empirical studies provide clear support for an integration of both cognitive theories (Beck, 1976; Nolen-Hoeksema & Morrow, 1991), they should be interpreted cautiously in light of several limitations. First, in Nolen-Hoeksema et al.'s (1994) study, rumination and optimism were measured at the same time, impeding a determination of the direction of the effects between rumination and optimism. Second, the CVD, the only study supporting that rumination is a mediator between schemata and depressive symptoms, combined Beck's depressogenic schemata and negative cognitive style of the hopelessness theory (Abramson et al., 1989) as risk factor. Therefore, Spasojević and Alloy (2001) do not really test for associations between rumination and depressogenic schemata. Finally and maybe most importantly, only Ciesla and Roberts' third study (2007) measured brooding and reflection as separate constructs (not measuring depression-related rumination) while all other studies measured rumination including depression-related rumination. As depression-related rumination is a symptom of depression, it cannot be excluded that only depression-related rumination but not brooding or reflection is associated with the cognitive constructs in Beck's (1976) cognitive theory in the most previous studies. Furthermore, brooding predicts an increase in depressive symptoms, while the association between reflection and depressive symptoms is inconsistent (Lo et al., 2008; Treynor et al.,

2003). In addition, the only longitudinal study testing the influence of brooding and reflection on depressive symptoms found that brooding, but not reflection, influences depressive symptoms one year later (Treyner et al., 2003). Thus, it seems possible that reflection is a symptom of depression but not a response to depressed mood. This hypothesis is supported by the only study testing the associations of brooding and reflection with cognitive constructs in Beck's theory separately (Ciesla & Roberts, 2007 [third study reported]). Ciesla and Roberts found only the schemata by brooding interaction, and not the schemata by reflection interaction, is associated with depressive symptoms. Summarized, one might expect that only brooding, but not reflection, influences cognitive constructs in Beck's (1976) cognitive theory.

In addition to the main focus of the study, empirical literature exploring the associations between cognitive variables and depressive symptoms as they relate to differences in sex or between clinically depressed individuals and subclinically depressed individuals is very limited. Research has indicated that women are about twice as likely to develop depression as men (Angst, Gamma, Gastpar, Lépine, Mendlewicz, & Tylee, 2002). However, while differences in cognitive variables between the sexes have been well studied (see for a review Nolen-Hoeksema, 2006), only one study tested for possible differences in the associations between cognitive variables as proposed by Beck's cognitive theory (1976) and depressive symptoms (Pössel & Thomas, 2011), and only Ciesla and Roberts (2007) tested for sex differences within the frame of the interaction model to integrate Beck's theory (1976) with the response style theory (Nolen-Hoeksema & Morrow, 1991). In their longitudinal study with college students, Pössel and Thomas (2011) found no sex differences in the associations between the elements of the cognitive triad and depressive symptoms and only one significant difference between the view of the future and the view of the self at a later time point. Ciesla and Roberts found no sex effects

on their interaction model. However, possible differences in the associations between schemata, cognitive errors, and automatic thoughts with the brooding and reflection response styles cannot be excluded.

Regarding possible differences in the associations of cognitive variables and depressive symptoms between clinically depressed individuals and subclinically depressed individuals, neither of the two cognitive theories predicts differences between the associations of cognitive variables with depressive symptoms (Beck, 1976; Nolen-Hoeksema & Morrow, 1991). Furthermore, in their theoretical article which addresses the functions of cognitive constructs in Beck's cognitive theory (1976) for the development, maintenance, and recovery phase of a depressive episode, Kwon and Oei (1994) have proposed that the different cognitive variables have different functions. However, the sequential order of the cognitive variables is identical in each phase of depression in Kwon and Oei's proposition. Concerning response styles, however, empirical studies demonstrated different associations between reflection and depressive symptoms, based on whether a clinically depressed or general populations is being studied. While reflection is consistently associated with depressive symptoms in community dwelling adults (Treyner et al., 2003) and college students (Lo et al., 2008), it is not associated with depressive symptoms in depressed outpatients (Lo et al., 2008). Brooding, however, is significantly associated with depressive symptoms in clinically depressed and community samples (Lo et al., 2008; Treyner et al., 2003). Thus, while contrary to the cognitive theories, it cannot be excluded that reflection is associated with schemata, cognitive errors, automatic thoughts, and depressive symptoms in nondepressed adults but not in clinically depressed individuals.

Based on the existing literature about the two rumination styles, brooding and reflection, and their associations to depressive symptoms (Lo et al. 2008; Treynor et al., 2003), and based on studies attempting to integrate Beck's cognitive theory (1976) with the response style theory (Ciesla & Roberts, 2007; Lyubomirsky & Nolen-Hoeksema, 1993, 1995; Morrow & Nolen-Hoeksema, 1990; Nolen-Hoeksema, 1991, 2004; Nolen-Hoeksema & Morrow, 1991; Nolen-Hoeksema et al., 1994; Spasojević & Alloy. 2001), it can be hypothesized that in an integrated model only brooding is influenced by schemata and interacts with schemata while affecting cognitive errors, the cognitive triad, automatic thoughts, and finally depressive symptoms. Consistent with the cognitive theories and previous empirical support, sex differences or differences between clinically and subclinically depressed individuals are not expected with regard to possible differences in the associations between the cognitive constructs and between the cognitive constructs and depressive symptoms.

Methods

Participants

The sample was derived from 397 psychology students of a university in the southwest of Germany (319 women). Their ages ranged from 18 to 52 years with a mean of 23.27 years and a standard deviation of 6.57 years. Of the participating students, 90 (22.6%) reported depressive symptoms above the cut-off score for clinical significant symptoms in a self-report measure (Hautzinger & Bailer, 1993). From the first to the second wave 61 students (47 women) dropped out. There were no differences between the dropouts and remaining students in sex, $\chi^2(1) = 1.13, p = .29$ or depressive symptoms, $t(387) = -0.69, p = .49$. However, dropouts were significantly older, $t(396) = -2.02, p = .044$, than the remaining students.

Measures

Center for Epidemiological Studies – Depression Scale (CES – D). The CES-D (Radloff, 1977; German version: Hautzinger & Bailer, 1993) consists of 20 items (e.g., “During the past week, there were things that upset me that usually do not upset me.”) and is developed as a quickly administered, economic screening instrument to measure depressive symptoms based on self-report. On a four-point scale, frequency of symptoms is rated, with higher numbers indicating higher frequency of occurrence. Following the German norming sample, a score of ≥ 23 represents clinical significant depressive symptoms (Hautzinger & Bailer, 1993). As four CES-D items overlap with the cognitive triad (Item 4, 8, 9, 15) all inference statistical analyses were calculated with a depression score without these four items. Internal consistency in the German standardization sample is $\alpha = .89$ (Hautzinger & Bailer, 1993).

Dysfunctional Attitudes Scale (DAS). The DAS Form A (Weissman & Beck, 1978; German version: Hautzinger, Joormann, & Keller, 2005) consists of 40 7-point Likert items (e.g., “People will probably think less of me if I make a mistake.”) that measure depressogenic schemata, a cognitive construct described by Beck (1976). Higher scores represent greater endorsement of depressogenic schemata. Internal consistency in German samples range from $\alpha = .88$ to $.94$ (Hautzinger et al., 2005).

Cognitive Error Questionnaire (CEQ). The CEQ (Lefebvre, 1981; German version: Pössel, 2009a) consists of 24 5-point Likert items (e.g., “You noticed recently that a lot of your friends are taking up golf and tennis. You would like to learn, but remember the difficulty you had that time you tried to ski. You think to yourself, ‘I couldn’t learn skiing so I doubt if I can learn to play tennis.’”) that measure cognitive errors, a cognitive construct described by Beck (1976). Although the CEQ includes the subscales *catastrophizing*, *overgeneralization*, *personalization*, and *selective abstraction*, all item values are summed to a total score, with

higher scores representing greater endorsement of cognitive errors. Internal consistency in the German standardization sample is $\alpha = .87$ (Pössel, 2009a).

Cognitive Triad Instrument (CTI). The CTI (Beckham, Leber, Watkins, Boyer, & Cook, 1986; German version: Pössel, 2009b) consists of 36 7-point Likert items (e.g., “Nothing is likely to work out for me.”) to measure the cognitive triad [*view of the self* (10 items), *the world* (10 items), and *the future* (10 items)], a cognitive construct described by Beck (1976). The remaining six items are filler items that are not scored. The items are phrased in both positive and negative directions. Therefore, before calculating the scores for the CTI subscales by summing them up, all items have to be pooled in such a way that higher scores represent positive views and lower scores represent negative views. Internal consistency of the CTI total scale in the German standardization sample is $\alpha = .88$ (Pössel, 2009b).

Automatic Thoughts Questionnaire-Revised (ATQ-R). The ATQ-R (Kendall, Howard, & Hays, 1989; German version: Pössel, Seemann, & Hautzinger, 2005) measures automatic thoughts as described by Beck (1976). The German ATQ-R includes the subscales *negative self-statements* (12 items, e.g., “I’ve let people down.”), *well-being* (5 items), and *self-confidence* (4 items) and consists of 21 5-point items. A higher summary score in the subscale *negative self-statements* indicates more negative automatic thoughts, whereas higher scores in the subscales *well-being* and *self-confidence* indicate more positive automatic thoughts. In this sample, only the negative self-statements scale was administered. Internal consistency of the negative self-statement scale in the German standardization sample is $\alpha = .94$ (Pössel et al., 2005).

Response styles Questionnaire (RSQ). The German version of the Rumination Response Subscale (RRS) of the RSQ (Nolen-Hoeksema & Morrow, 1991; German version:

Bürger & Kühner, 2007) consists of 18 4-point Likert items that measure how often a participant engages in various behaviors in response to depressed mood. Based on the factor analyses conducted by Treynor et al. (2003), the RRS was divided into the subscales *brooding* and *reflection* and items that measure *depression-related* cognitions. In this study, only the subscales brooding (e.g., “When I feel down, sad, or depressed, I think ,Why do I always react this way?”) and reflection (e.g., “When I feel down, sad, or depressed, I analyze recent events to try to understand why I am depressed.”) were included. Higher scores in each subscale represent more engagement in specific behaviors. In a community sample, internal consistency of brooding and reflection scales are $\alpha = .77$ and $.72$, respectively (Treynor et al., 2003).

Data Analysis

In order to test what model fits the data best, Cole and Maxwell’s (2003) approach for multi-wave studies using structure equation models was used. The analyses were conducted with the maximum likelihood method using IBM AMOS 19.0 to calculate structural equation models (Arbuckle, 1999). Goodness of fit of the models was tested with χ^2 . However, as χ^2 is known to increase with sample size and degrees of freedom, the χ^2 was complemented by root mean squared of the residuals (RMSEA; Steiger & Lind, 1980), Tucker-Lewis Index (TLI; Tucker & Lewis, 1973), and Comparative Fit Index (CFI; Bentler, 1990). While a full explanation of these indices and their limitations is beyond the scope of this article, a short description seems necessary. Statistically nonsignificant values of χ^2 indicate a good fit of the model to the data. A RMSEA value of .00 indicates a perfect model fit; a value of $\leq .05$ is conventionally regarded as an indicator of a good model fit; and a value of $\leq .08$ is seen as acceptable (Hu & Bentler, 1999). TLI and CFI values of $\geq .95$ indicate a good model fit and values of $\geq .90$ are regarded as acceptable (Hu & Bentler, 1999). To compare models three different tests were used. First,

Δ CFI was calculated by subtracting the CFI value of one model from the CFI value of another model. When Δ CFI of two models is $> .002$ the model with higher CFI fits the data significantly better. However, when Δ CFI is $\leq .002$ both models fit equally well from a statistical point of view and the more parsimonious model should be accepted (Meade, Johnson, & Braddy, 2008). Second, AIC, a measure of parsimony that adjusts model chi-square to penalize for model complexity, was used. AIC reflects the discrepancy between model-implied and observed covariance matrices. Comparing two models, the lower AIC reflects the model with the better fit to the data (Akaike, 1974) with 0-2 as substantial support, 4-7 as weak support, and > 10 essential none support for equivalency of both models (Burnham & Anderson, 2002). Third, nested models with the same number of observed variables are compared by subtracting the χ^2 values as well as the *dfs* of the models from each other (χ^2 difference tests). When $\Delta\chi^2$ is significant for Δdf , the models are seen as significantly different from each other. To be able to estimate if and how much an integration of Beck's cognitive theory (1976) and the response style theory (Nolen-Hoeksema & Morrow, 1991) increases the predictive value of the cognitive constructs of both theories, percentage of explained variance in depressive symptoms was calculated for each model.

Although this study was not designed for subsample analyses, we felt it would be informative for future research to test the stability of the final model across different groups (women vs. men, subclinical vs. clinical significant depressive symptoms). To do this, multigroup analyses conducting the maximum likelihood method using IBM AMOS 19.0 were calculated. First, the final model was run with no between-group constraints. This model was used to test for equivalence across groups when additional cross-group constraints are imposed. Then, a series of chi-square tests were conducted to compare the unconstrained model to

subsequent models with increasing numbers of constraints. The constraints were applied in the following order: measurement weights, measurement intercepts, structural weights, structural covariances, structural residuals, and measurement residuals. If the chi-square change between the unconstrained model and the final model with all cross-group constraints imposed is not statistically significant, then equivalence between groups is supported. According to Byrne (2001), invariance between groups means that the groups should be analyzed together. For each model, we first report results from the multigroup analyses. Second, we report parameter estimates for the both groups from the unconstrained model as well as the paths which are significantly different between both groups in the unconstrained model.

Results

Descriptive data, internal consistency, and correlations for all instruments at all three waves are presented in Table 1. The majority of the measures are correlated with each other. As expected, the only consistent exception was reflection which did not significantly correlate with most other measures.

Identification of the best Model (Using the Total Sample). To identify the model that fit the data best, eleven different models were tested and compared with each other (Table 2). These models can be understood as three sets of models. The first set of models includes three models. Model 1 represents Beck's original cognitive model (1976) without brooding and reflection or their interactions with schemata. Model 2 describes the response style theory (Nolen-Hoeksema & Morrow, 1991) with associations of brooding and reflection with depressive symptoms, and Model 3 represents the response style theory with associations of only brooding but not reflection with depressive symptoms. The other two sets of models describe different versions of an integrated model. The second set of models allows brooding and

reflection to be part of the integrated model while the last set otherwise identical models allow only brooding to be part of the integrated model. Within each of the two latter set of models, one model allows for direct associations of the response style with depressive symptoms but not for associations between response style and constructs of Beck's theory (1976) at a later time point (Model 4 & 5). The two models follow Lyubomirsky and Nolen-Hoeksema's (1993, 1995) proposal that schemata influence rumination (Model 6 & 7), while the next two of models were based on Ciesla and Roberts' (2007) moderation model (Model 8 & 9). The final two models (Model 10 & 11) represent the combination of Lyubomirsky and Nolen-Hoeksema's and Ciesla and Roberts' recommendations to integrate Beck's theory with the response style theory (Nolen-Hoeksema & Morrow, 1991).

An inspection of the indices of goodness-of-fit and parsimony of the Models 1 to 3 reveals not only a nonsignificant χ^2 value but also that all indices are good for Model 1 (Table 2). In addition, Model 1 explains 34.6% variance of depressive symptoms. The χ^2 values of Model 2 and Model 3 representing the response style theory are significant and they explain 24.4% and 24.5% variance, respectively. In addition, for Model 2 only the CFI is good while neither RMSEA nor TLI are even in the acceptable range. For Model 3 all three indices are acceptable. Further, comparing Model 2 and Model 3 demonstrated no significant differences between both models, $\Delta AIC = 1.83$; $\Delta CFI = 0.002$; $\Delta \chi^2 (1, N = 397) = 0.17, p = .68$. Thus, the more parsimonious Model 3, allowing only brooding to predict depressive symptoms, was retained.

Inspecting the Models 4 to 11 reveals that the CFIs of all models are good. However, the TLIs of Models 6 to 11 are good while the TLIs of Models 4 and 5 are in the acceptable range. In addition, the RMSEAs of Models 6, 8, 9, 10, and 11 are good and these values of Models 4, 5,

and 7 are in the acceptable range. Finally, the χ^2 values for Model 10 are nonsignificant (Table 2).

Comparing the models not allowing response style and cognitive constructs of Beck's theory to be associated, the model with (Model 4) and without reflection (Model 5) do not fit the data significantly different ($\Delta\text{AIC} = 0.26$; $\Delta\text{CFI} = 0.000$; $\Delta\chi^2 (1, N = 397) = 1.74, p = .28$). Thus, the more parsimonious Model 5 was retained. Comparisons of the equivalent integrated models that base on Lyubomirsky and Nolen-Hoeksema's (1993, 1995) model (Models 6 & 7) demonstrate the model allowing brooding and reflection to be part of the integrated model fit the data significantly better than the other otherwise identical model allowing only brooding to be part of the integrated model, $\Delta\text{AIC} = 8.51$; $\Delta\text{CFI} = 0.003$; $\Delta\chi^2 (7, N = 397) = 22.51, p = .002$. Comparisons of the models that represent Ciesla and Roberts's interaction model (2007) reveal that Model 8 (with reflection) and Model 9 (without reflection) do not fit the data significantly differently using CFI values, $\Delta\text{CFI} = 0.001$, and the χ^2 difference test, $\Delta\chi^2 (7, N = 397) = 9.60, p = .21$, favoring the more parsimonious Model 9. In addition, comparisons of the AICs of both models demonstrates clearly that there is only weak support for equivalency of both models favoring Model 9 as well, $\Delta\text{AIC} = 4.40$. Finally, comparisons of the models that are/were based on both Lyubomirsky and Nolen-Hoeksema's (1993, 1995) model and Ciesla and Roberts's interaction model (2007) using CFI values, $\Delta\text{CFI} = 0.004$, and the χ^2 difference test, $\Delta\chi^2 (13, N = 397) = 29.74, p = .005$, favored Model 10. Comparing the AICs of both models demonstrates that the support for equivalency of both models is between substantial and weak, $\Delta\text{AIC} = 3.74$. Thus, Model 10, allowing both response styles and their interactions with schemata to be associated with cognitive variables of Beck's cognitive model (1976) and depressive symptoms, was retained.

Next, Models 5, 6, 9, and 11 were compared using CFIs and AICs, as the models are not nested with one another. Based on the CFIs, Model 6 fits the data significantly better than the Models 5 ($\Delta\text{CFI} = 0.008$) and 9 ($\Delta\text{CFI} = 0.006$), while Models 6 and 11 are not significantly different ($\Delta\text{CFI} = 0.002$). However, as Model 6 is more parsimonious than Model 11, the first model was retained (Figure 1). This result was replicated using AICs as the difference between Model 6 with Model 5 ($\Delta\text{AIC} = 23.90$), model 9 ($\Delta\text{AIC} = 172.72$), and Model 11 ($\Delta\text{AIC} = 153.79$) found essentially no support for equivalency of the models. However, the associations in Model 6 reveal that dysfunctional attitudes are associated with brooding and reflection 4 weeks later, while neither response style is associated with other cognitive variables or depressive symptoms (Table 3).

While Model 6 fits the data significantly better than Model 3 ($\Delta\text{CFI} = 0.006$), it is not significantly different from the model representing Beck's cognitive model (1976; $\Delta\text{CFI} = 0.002$). In addition, the AICs of the models representing the original models are smaller than the AIC of Model 6 (Model 1 vs. Model 6: $\Delta\text{AIC} = -136.11$; Model 3 vs. Model 6: $\Delta\text{AIC} = -313.96$), revealing that there is essentially no support for equivalency of the models. This finding is supported by the fact that Model 6 explain almost the same amount of variance in depressive symptoms than Model 1 (likewise for the other integrated models; Table 2).

Multigroup Analyses.

Multigroup analyses comparing women ($n = 319$) and men ($n = 77$) indicate that the integrated model with schemata influencing both response styles is not stable across both sexes ($\chi^2_{\text{unconstrained}}(40) = 48.43, p = .17, \text{CFI} (0.998), \text{TLI} (0.984), \text{RMSEA} (0.023), \text{AIC} (724.43)$; $\chi^2_{\text{fully constrained}}(209) = 319.24, p < .001, \text{CFI} (0.976), \text{TLI} (0.961), \text{RMSEA} (0.037), \text{AIC} (756.00)$; $\Delta\text{CFI} = 0.022, \Delta\text{AIC} = 31.57$). However, of the 18 paths relevant for the hypotheses,

only two are significantly different between the female and the male subsample. Brooding has a significantly weaker association with cognitive errors and automatic thoughts in the female subsample, compared to the male subsample. Further inspecting the associations in the model for the female subsample revealed that schemata are significantly associated with brooding and reflection at a later time point while neither of the response styles is significantly associated with any other construct in Beck's theory (1976) or depressive symptoms. In the male subsample, however, schema are significantly associated with brooding but not with reflection. In addition, brooding is significantly negatively associated with cognitive errors, and reflection is positively associated with view of the self from Beck's theory to a later time point.

Multigroup analyses comparing the subclinically ($n = 307$) and the clinically depressed subsample ($n = 90$) indicate that the integrated model with schemata influencing both response styles and interacting with both response styles is not stable across both subsamples ($\chi^2_{\text{unconstrained}}(40) = 54.27, p = .07, \text{CFI} (0.996), \text{TLI} (0.967), \text{RMSEA} (0.030), \text{AIC} (730.27)$; $\chi^2_{\text{fully constrained}}(209) = 772.56, p < .001, \text{CFI} (0.846), \text{TLI} (0.749), \text{RMSEA} (0.083), \text{AIC} (756.00)$; $\Delta\text{CFI} = 0.150, \Delta\text{AIC} = 25.73$). However, of the 18 paths relevant for the hypotheses, only one is significantly different between the subclinically and the clinically depressed subsample. Reflection has a significantly weaker association with negative views of the future in the subclinically compared to the clinically depressed subsample. Further examination of the associations reveals that in both subsamples schemata are significantly associated with brooding and reflection at a later time point. However, while neither of the two response styles is significantly associated with cognitive constructs from Beck's (1976) theory in the subclinically depressed subsample, reflection is negatively associated with view of the future in the clinically depressed subsample.

Discussion

The primary goal of the longitudinal study was to integrate Beck's cognitive theory (1976) and the response style theory (Nolen-Hoeksema & Morrow, 1991). Merging two suggestions (Ciesla & Roberts, 2007; Lyubomirsky & Nolen-Hoeksema, 1993, 1995) for how to integrate both theories, it was proposed that ruminative response style is influenced by schemata and interacts with schemata while affecting cognitive errors, the cognitive triad, automatic thoughts, and finally depressive symptoms. Based on the previous literature (Ciesla & Roberts, 2007; Lo et al. 2008; Lyubomirsky & Nolen-Hoeksema, 1993, 1995; Morrow & Nolen-Hoeksema, 1990; Nolen-Hoeksema, 1991, 2004; Nolen-Hoeksema & Morrow, 1991; Nolen-Hoeksema et al., 1994; Spasojević & Alloy. 2001; Treynor et al., 2003) it was further proposed that brooding, but not reflection, would be part of the integrated model. Finally, consistent with theoretical considerations (Beck, 1976; Kwon & Oei, 1994; Nolen-Hoeksema & Morrow, 1991) and empirical data (Pössel & Thomas, 2011), neither sex differences nor differences between clinically and subclinically depressed individuals in the associations between the cognitive constructs and between the cognitive constructs and depressive symptoms were expected.

The study reveals several important findings with regard to these hypotheses:

Contrary to the hypotheses, the model proposed by Lyubomirsky and Nolen-Hoeksema (1993, 1995) wherein schemata influence the ruminative response style which influences the other cognitive variables of Beck's cognitive theory (1976) fits the data better than the other tested integrated models. However, an inspection of the associations in this model reveals that schemata are associated with brooding and reflection 4 weeks later, but neither of the response styles is associated with any other cognitive variable of Beck's model or with depressive symptoms. In addition, compared to the more parsimonious cognitive model of Beck (1976),

this model does not fit better and it does not explain more variance of depressive symptoms. Compared to the original response style theory (Nolen-Hoeksema & Morrow, 1991), however, the integrated model fits the data better and it explains 9.7% more variance of depressive symptoms. Nevertheless, neither Lyubomirsky and Nolen-Hoeksema's mediation model (brooding and/or reflection mediate the association between schemata and other variables in Beck's cognitive model) nor Ciesla and Roberts' moderation model (2007), nor the proposed integration of both models could be supported. This is not only contrary to the hypotheses and previous theoretical considerations (Ciesla & Roberts, 2007; Lyubomirsky & Nolen-Hoeksema, 1993, 1995) but also previous empirical findings (Ciesla & Roberts, 2007; Lyubomirsky & Nolen-Hoeksema, 1995; Nolen-Hoeksema et al., 1994; Spasojević & Alloy, 2001). The unexpected findings might be explainable with two differences in the study designs.

First, the most of the previous studies trying to integrate Beck's cognitive theory (1976) with the response style theory (Nolen-Hoeksema & Morrow, 1991) did not differentiate between brooding and reflection (Ciesla & Roberts, 2007 [second study reported]; Lyubomirsky & Nolen-Hoeksema, 1995; Nolen-Hoeksema et al., 1994; Spasojević & Alloy, 2001). In addition, when measuring habitual rumination, like in the present study, these studies used the Response Style Questionnaire, including depression-related rumination (Nolen-Hoeksema et al., 1994; Spasojević & Alloy, 2001). As depression-related rumination is a symptom of depression this leads to an overestimation of the association between rumination and depressive symptoms. Therefore, the found missing association of brooding and reflection (and their interactions with schemata) with depressive symptoms might be a more valid than in some of the previous studies. However, some of the previous studies differentiated between brooding and reflection (Ciesla & Roberts, 2007 [third study presented]) or measured rumination in other ways (Ciesla & Roberts,

2007 [second study reported]; Lyubomirsky & Nolen-Hoeksema, 1995). Thus, the discrepancies in the findings between the present study and the studies mentioned above cannot be easily explained with an overestimation of the associations between response styles and depressive symptoms.

Second, both Beck's cognitive theory (1976) and the response style theory are (Nolen-Hoeksema & Morrow, 1991) vulnerability-stress models. Thus, the cognitive vulnerabilities need to be activated by stressors (e.g., life events and/or daily hassles) to impact depressive symptoms. While most previous studies trying to integrate Beck's cognitive theory and the response style theory either induced stress (Ciesla & Roberts, 2007 [second & third study reported]; Lyubomirsky & Nolen-Hoeksema, 1995) in form of dysphoric mood or selected already highly stressed individuals (bereaving adults; Nolen-Hoeksema et al., 1994), the present study did neither of these. Thus, it is possible that the associations of cognitive variables with depressive symptoms are underestimated in the present study. This is consistent with the finding that the associations between cognitive variables are consistent with the hypotheses (schemata are associated with brooding and reflection) while no support for associations of brooding and reflection (or their interactions with schemata) with depressive symptoms could be found. However, the good model fit of all tested models seems contrary to this explanation. Nevertheless, future research integrating different cognitive theories should focus on highly stressed individuals (e.g., bereaving adults, individuals with a history of childhood abuse and neglect, adolescents transitioning from middle to high-school) and include measures of various stressors.

Another important finding is that - contrary to the hypotheses – sex differences and differences between clinically and subclinically depressed individuals in the associations

between the cognitive constructs and between the cognitive constructs and depressive symptoms were found. However, of the 18 paths relevant for the hypotheses, only two are significantly different between the male and the female subsamples, and only one is different between the subclinical and the clinical subsample.

Before further exploring the findings in the subsamples, it should be considered that the present study was not designed for these subanalyses. Thus, the male and the clinical subsample each comprise only about 20 to 23% of the total sample. Therefore, the results especially in these subsamples might be an artifact of having low power. In regard to the clinical sample, an additional problem is that the variance of the depressive symptoms (and likely the cognitive variables as well) is limited.

When inspecting the associations in the subsamples relevant to the hypotheses, it becomes clear that the pattern of significant associations in the female and the subclinical subsamples are identical with the ones in the total sample which do not support Lyubomirsky and Nolen-Hoeksema model (1993, 1995) or Ciesla and Roberts moderation model (2007). In the male subsample, however, schemata are significantly associated with brooding which is negatively associated with cognitive errors. In addition, reflection is positively associated with view of the self. Thus, Lyubomirsky and Nolen-Hoeksema model is supported for brooding in the male subsample. In the clinical subsample schemata are significantly associated with reflection, and reflection is negatively associated with view of the future. Thus, Lyubomirsky and Nolen-Hoeksema model is supported for reflection in the clinically depressed subsample.

The differences in findings between both sexes are not consistent with the original cognitive theories (Beck, 1976; Nolen-Hoeksema & Morrow, 1991) and three previous studies (Ciesla & Roberts, 2007[second and third study reported]; Pössel & Thomas, 2011). In addition,

that the association between brooding and cognitive errors was negative and the association between reflection and negative view of the self was positive in the male subsample was similarly unexpected. However, considering the limitations of this study with regard to sex specific analyses and the very limited number of studies researching for possible sex differences in the associations between cognitive variables and depressive symptoms, these results should be interpreted cautiously until replicated by future research.

The difference in the findings between subclinically and clinically depressed participants might be explainable by changes in the function of reflection for the development and maintenance of depressive symptoms. For example, regarding Beck's cognitive theory, Kwon and Oei (1994) have proposed that different variables have different functions. In addition, two experimental studies with subclinically (development) and clinically depressed (maintenance) individuals demonstrated that schemata influenced automatic thoughts but not the other way around in subclinically depressed individuals. In clinically depressed individuals, however, schemata and automatic thoughts influenced each other (Pössel & Knopf, 2008). Thus, the differences in the associations in the clinically and subclinically depressive samples might be caused by real differences in cognitive processing. Nevertheless, until the findings are replicated with bigger sample sizes the difference in the effects of the schemata by reflection interaction between the subsamples with clinically depressed and subclinically depressed participants should be interpreted cautiously.

The presented findings need to be interpreted with certain limitations in mind. Besides the already discussed limitation of not including of stress, a mono-method bias of same informant and method for assessing all constructs in this study is likely. Further, the utilization of self-report instruments to measure depressogenic schemata and cognitive errors has been

criticized. It is questionable how much insight individuals have in their own style of thinking or if such information is outside of our awareness (see Scher, Ingram, & Segal, 2005 for review). Therefore, information processing paradigms would be better suited than self-report questionnaires to measure style constructs. Nevertheless, for cognitive errors, for example, such information processing paradigms have not been developed yet (Gotlib & Neubauer, 2000). As self-report instruments already exist for all of the measured constructs, the restriction to their utilization was deemed adequate at this time.

Furthermore, the restriction to a predominantly female university sample leads to homogeneity of the sample concerning sex, educational level, age range, and social environment, which may limit the generalizability of the results to male and clinical populations. In addition, all differences between the subsamples might be artifacts of having low power to study the details of the final model in the subsamples. Nevertheless, it should be considered that in an underpowered model, individual paths are less likely to be significant. In the presented study, however, associations relevant for the hypotheses that were not significant in the total sample or the bigger female and subclinical subsamples became significant in the smaller subsamples (i.e., men & clinically depressed individuals). In addition, using a student sample, our results should be less prone to Berkson's bias and more generalizable than a clinic-referred sample (Cohen & Cohen, 1984). Nevertheless, replication studies with different adult populations, including bigger male and clinical samples, are desirable. With regard to the developmental hypothesis (Cole & Turner, 1993), it seems particularly beneficial to consider children and adolescents as well.

Despite the limitations, the results of the presented study are not only significant from an academic point of view, but also for clinical applications. The current findings highlight that

while an integrated cognitive theory fits the data better than the original response style theory (Nolen-Hoeksema & Morrow, 1991) and it explains 9.7% more variance of depressive symptoms, it does not fit the data better and it does not explain more variance of depressive symptoms compared to Beck's original cognitive theory (1976). Based on these findings, while literature reveals that interventions based on both original theories are effective (Brunwasser, Gillham, & Kim, 2009; Purdon, 2004; Wells & Papageorgiou, 2004), one could propose that interventions focusing on changing cognitive variables proposed by Beck are more effective than interventions based on changing rumination alone. However, with the discussed limitations in mind, the present study should not be seen as the end but more as a trigger of future research testing for the possibility to integrate Beck's cognitive theory (1976) and the response style theory (Nolen-Hoeksema & Morrow, 1991). In addition, the integration of further variables to better explain the development and maintenance of depression into one model should be considered. Variables to be considered could be self-esteem (Metalsky, Joiner, Hardin, & Abramson, 1993), or cognitive style (Hankin, Lakdawalla, Latchis Carter, Abela, & Adams, 2007; Pössel & Knopf, 2011; Pössel & Thomas, 2011) as proposed by the hopelessness theory (Abramson et al., 1989).

In summary, the 4-week longitudinal study revealed that a model integrating Beck's cognitive theory (1976) and the response style theory (Nolen-Hoeksema & Morrow, 1991) by allowing brooding and reflection to be influenced by schemata fits the data better than the other tested integrated models. However, an inspection of the associations in this model reveals that while schemata are associated with brooding and reflection 4 weeks later, neither of the response styles is associated with any other cognitive variable or with depressive symptoms. In addition, compared to the more parsimonious cognitive model of Beck, this integrated model does not fit

better and it does not explain more variance of depressive symptoms. Compared to the original response style theory, however, the integrated model fits the data better and it explains 9.7% more variance of depressive symptoms. Nevertheless, a model integrating Beck's cognitive theory and the response style theory is not supported by the present study.

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Table 1
Descriptive Data and Correlations Between All Instruments at both waves

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 CES-Dt1	.90																	
2 CES-Dt2	.50	.90																
3 DAsT1	.42	.39	.90															
4 DAsT2	.45	.40	.81	.90														
5 CEQt1	-.36	-.24	-.61	-.50	.85													
6 CEQt2	-.29	-.29	-.56	.57	.77	.88												
7 CTIset1	-.55	-.46	-.61	-.55	.54	.44	.87											
8 CTIwot1	-.53	-.41	-.42	-.40	.35	.27	.62	.69										
9 CTIfut1	-.53	-.37	-.41	-.39	.34	.29	.59	.47	.69									
10 CTIset2	-.49	-.55	-.51	-.59	.41	.47	.83	.52	.49	.87								
11 CTIwot2	-.44	-.52	-.41	-.49	.36	.42	.53	.78	.43	.59	.71							
12 CTIfut2	-.45	-.54	-.44	-.50	.30	.41	.53	.42	.75	.61	.55	.72						
13 ATQt1	.26	.12	.18	.18	-.22	-.20	-.17	-.20	.01	-.16	-.17	.03	.89					
14 ATQt2	.19	.25	.21	.20	-.18	-.23	-.18	-.15	.01	-.25	-.20	-.09	.63	.90				
15 RSQbt1	.25	.15	.38	.36	-.37	-.36	-.36	-.26	-.12	-.32	-.22	-.15	.19	.16	.60			
16 RSQrt1	-.01	.01	.05	.03	-.07	-.08	-.05	-.03	.12	-.06	-.04	.03	.08	.15	.35	.68		
17 RSQbt2	.25	.29	.44	.42	-.40	-.42	-.39	-.25	-.14	-.39	-.28	-.22	.17	.19	.64	.35	.67	
18 RSQrt2	.06	.08	.19	.08	-.15	-.12	-.11	-.11	-.01	-.07	-.07	-.01	.04	.11	.19	.71	.36	.73
Mean	15.60	15.08	102.19	99.97	73.42	74.91	55.29	52.36	53.46	56.07	52.93	53.61	47.72	47.42	2.47	2.58	2.33	2.45

SD	10.02	9.61	25.77	24.55	11.88	12.14	8.88	7.16	6.49	8.58	7.09	6.43	7.91	8.47	0.75	0.62	0.75	0.63
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Note. $N = 302$ for all variables. Values in the diagonal represent Cronbach's Alpha. CES-D = Center for Epidemiological Studies – Depression Scale without items that overlap with cognitive triad; DAS = Dysfunctional Attitude Scale; CEQ = Cognitive Error Questionnaire; CTIse = Cognitive Triad Inventory, view of the self; CTIwo = Cognitive Triad Inventory, view of the world; CTIfu = Cognitive Triad Inventory, view of the future; ATQ = Automatic Thoughts Questionnaire, negative self-statements; RSQb = Response Style Questionnaire, brooding; RSQr = Response Style Questionnaire, reflection; t1 = assessment at beginning of the semester; t2 = assessment at middle of the semester. $r_s > .12$, $p < .05$, $r_s > .14$, $p_s < .01$, $r_s > .18$, $p_s < .001$.

Table 2

Indices of Goodness-of-Fit and Parsimony of the Tested Models (N = 397)

Model	df	χ^2	p	CFI	TLI	RMSEA	AIC	explained variance
1 Beck	6	8.595	0.198	0.999	0.988	0.033	234.60	34.6%
2 RSQ	2	8.571	0.014	0.989	0.889	0.091	58.57	24.4%
3 RSQb	3	8.745	0.033	0.991	0.935	0.070	56.75	24.5%
4 Beck & RSQ unrelated – RSQ->CES-D	32	80.861	> 0.001	0.989	0.943	0.062	394.86	32.3%
5 Beck & RSQ unrelated – RSQb->CES-D	33	82.602	> 0.001	0.989	0.944	0.062	394.60	32.0%
6 DAS to RSQ – RSQ->CES-D	20	32.702	0.036	0.997	0.976	0.040	370.70	34.2%
7 DAS to RSQb – RSQb->CES-D	27	55.207	0.001	0.994	0.961	0.051	379.21	33.7%
8 DAS by RSQ – RSQ->CES-D	44	85.824	> 0.001	0.992	0.952	0.049	547.82	32.7%
9 DAS by RSQb – RSQb->CES-D	51	95.424	> 0.001	0.991	0.956	0.047	543.42	32.2%
10 DAS->RSQ - DAS by RSQ – RSQ->CES-D	32	38.491	0.199	0.999	0.99	0.023	524.49	34.4%
11 DAS->RSQb - DAS by RSQb – RSQb->CES-D	45	68.231	0.014	0.995	0.974	0.036	528.23	33.8%

Note. Beck = Beck's cognitive theory; CES-D = Center for Epidemiological Studies – Depression Scale without items that overlap with cognitive triad; DAS = Dysfunctional Attitude Scale; RSQ = Response Style Questionnaire – Brooding and Reflection subscales; RSQb = Response Style Questionnaire, brooding; CFI = Comparative Fit Index, TLI = Tucker-Lewis Index; RMSEA = root mean squared of the residuals; explained variance = percentage of explained variance in depressive symptoms.

Table 3

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

		both studies	women	men	z-score	subclinical	clinical	z-score
DAS1	DAS2	.73***	.71***	.84***	-2.59**	.72***	.78***	-1.13
DAS1	CEQ2	-.16***	-.19***	-.13	-0.48	-.16**	-.17	0.08
DAS1	CTIset2	-.06	-.08	.01	-0.70	-.13**	.08	-1.73*
DAS1	CTIwot2	-.11*	-.11	-.08	-0.23	-.12*	-.05	-0.58
DAS1	CTIfut2	-.17***	-.18**	-.10	-0.63	-.21***	-.06	-1.26
DAS1	ATQ2	.14***	.16*	.06	0.78	.23***	-.05	2.34**
DAS1	RSQbt2	.26***	.25***	.28**	-0.25	.25***	.20*	0.43
DAS1	RSQt2	.18***	.00	.03	-0.23	.17***	.20*	-0.26
DAS1	CES-Dt2	.19**	.20**	.21	-0.08	.18*	.19	-0.09
CEQ1	DAS2	-.02	-.04	.14	-1.40	-.05	.07	-0.99
CEQ1	CEQ2	.65***	.66***	.57***	1.13	.62***	.65***	-0.41
CEQ1	CTIset2	-.02	-.03	.07	-0.78	-.03	.01	-0.33
CEQ1	CTIwot2	.07	.05	.17*	-0.94	.03	.16	-1.08
CEQ1	CTIfut2	-.02	-.04	.07	-0.85	-.01	-.02	0.08
CEQ1	ATQ2	.01	.00	.03	-0.23	.06	-.09	1.24
CEQ1	CES-Dt2	.08	.08	.11	-0.23	.10	.04	0.50
CTIset1	DAS2	-.04	-.08	.13	-1.63	-.06	.02	-0.66
CTIset1	CEQ2	-.01	-.01	-.11	0.78	-.05	.09	-1.15
CTIset1	CTIset2	.77***	.79***	.63***	2.56**	.67***	.88***	-4.65***
CTIset1	CTIwot2	-.05	.02	-.36***	3.07**	-.07	-.03	-0.33
CTIset1	CTIfut2	.06	.07	-.01	0.62	.07	.02	0.41
CTIset1	ATQ2	-.21***	-.21**	-.05	-1.26	-.07	-.45***	3.41***
CTIset1	CES-Dt2	-.13	-.10	-.25	1.20	-.08	-.29*	1.80*
CTIwot1	DAS2	-.04	-.04	.03	-0.54	-.04	.00	-0.33
CTIwot1	CEQ2	-.04	-.02	-.08	0.47	-.06	.02	-0.66
CTIwot1	CTIset2	.01	-.01	.10	-0.85	.00	.00	0.00
CTIwot1	CTIwot2	.70***	.65***	.78***	-2.09*	.65***	.71***	-0.92
CTIwot1	CTIfut2	.05	.08	-.01	0.70	.03	.08	-0.41
CTIwot1	ATQ2	-.05	-.04	-.14	0.78	-.02	-.15	1.08
CTIwot1	CES-Dt2	-.10	-.05	-.30*	2.01*	-.09	-.15	0.50
CTIfut1	DAS2	-.02	-.02	-.02	0.00	-.02	-.13	0.91
CTIfut1	CEQ2	.00	-.01	-.02	0.08	.05	-.03	0.66
CTIfut1	CTIset2	.00	-.02	.08	-0.78	.01	.01	0.00
CTIfut1	CTIwot2	.06	.02	.25***	-1.82*	.07	.08	-0.08
CTIfut1	CTIfut2	.66***	.63***	.76***	-1.97*	.58***	.78***	-3.15***
CTIfut1	ATQ2	.03	.03	.09	-0.47	-.01	.15	-1.33
CTIfut1	CES-Dt2	-.03	-.06	.10	-1.24	-.02	-.06	0.33
ATQ1	DAS2	.08	.05	.23	-1.43	.05	.00	0.41
ATQ1	CEQ2	-.07	-.05	-.10	0.39	-.11	-.03	-0.66
ATQ1	CTIset2	-.04	-.03	-.15	0.94	-.06	-.01	-0.41
ATQ1	CTIwot2	-.05	-.05	-.13	0.62	-.13**	.02	-1.24

ATQt1	CTIfut2	.04	.04	.03	0.08	.04	.07	-0.25
ATQt1	ATQt2	.44***	.44***	.49***	-0.49	.46***	.31**	1.45
ATQt1	CES-Dt2	-.01	-.02	-.11	0.70	.09	-.02	0.91
RSQbt1	CEQt2	-.04	.00	-.29**	2.31*	-.06	.03	-0.74
RSQbt1	CTIset2	-.02	-.01	-.11	0.78	-.05	.07	-0.99
RSQbt1	CTIwot2	.04	.04	.02	0.16	.03	.08	-0.41
RSQbt1	CTIfut2	.01	.04	-.12	1.24	.01	.06	-0.41
RSQbt1	ATQt2	.00	-.02	.22	-1.89*	.01	-.06	0.58
RSQbt1	RSQbt2	.49***	.50***	.34**	1.51	.48***	.51***	-0.33
RSQbt1	RSQrt2	-.13**	-.11*	-.27**	1.29	-.11*	-.13	0.17
RSQbt1	CES-Dt2	-.04	-.03	.00	-0.23	-.01	-.19	1.50
RSQrt1	CEQt2	.00	.01	.00	0.08	-.01	.04	-0.41
RSQrt1	CTIset2	.01	-.01	.16**	-1.33	.07	-.12	1.57
RSQrt1	CTIwot2	.00	.03	-.11	1.09	.02	-.08	0.82
RSQrt1	CTIfut2	-.03	-.04	.05	-0.70	.02	-.20**	1.83*
RSQrt1	ATQt2	.05	.06	-.07	1.01	.01	.16	-1.25
RSQrt1	RSQbt2	.17***	.18***	.19	-0.08	.17***	.18	-0.08
RSQrt1	RSQrt2	.74***	.73***	.86***	-2.82**	.74***	.75***	-0.18
RSQrt1	CES-Dt2	-.01	-.02	.01	-0.23	-.02	.08	-0.82
CES-Dt1	CES-Dt2	.34***	.41***	.17	2.04*	.27***	.21*	0.52

Note. CES-D = Center for Epidemiological Studies – Depression Scale without items that overlap with cognitive triad; DAS = Dysfunctional Attitude Scale; CEQ = Cognitive Error Questionnaire; CTIse = Cognitive Triad Inventory, view of the self; CTIwo = Cognitive Triad Inventory, view of the world; CTIfu = Cognitive Triad Inventory, view of the future; ATQ = Automatic Thoughts Questionnaire, negative self-statements; RSQb = Response Style Questionnaire, brooding; RSQr = Response Style Questionnaire, reflection; t1 = assessment at beginning of the semester; t2 = assessment at middle of the semester.; error = error term. * $p < .05$; ** $p < .01$; *** $p < .001$.

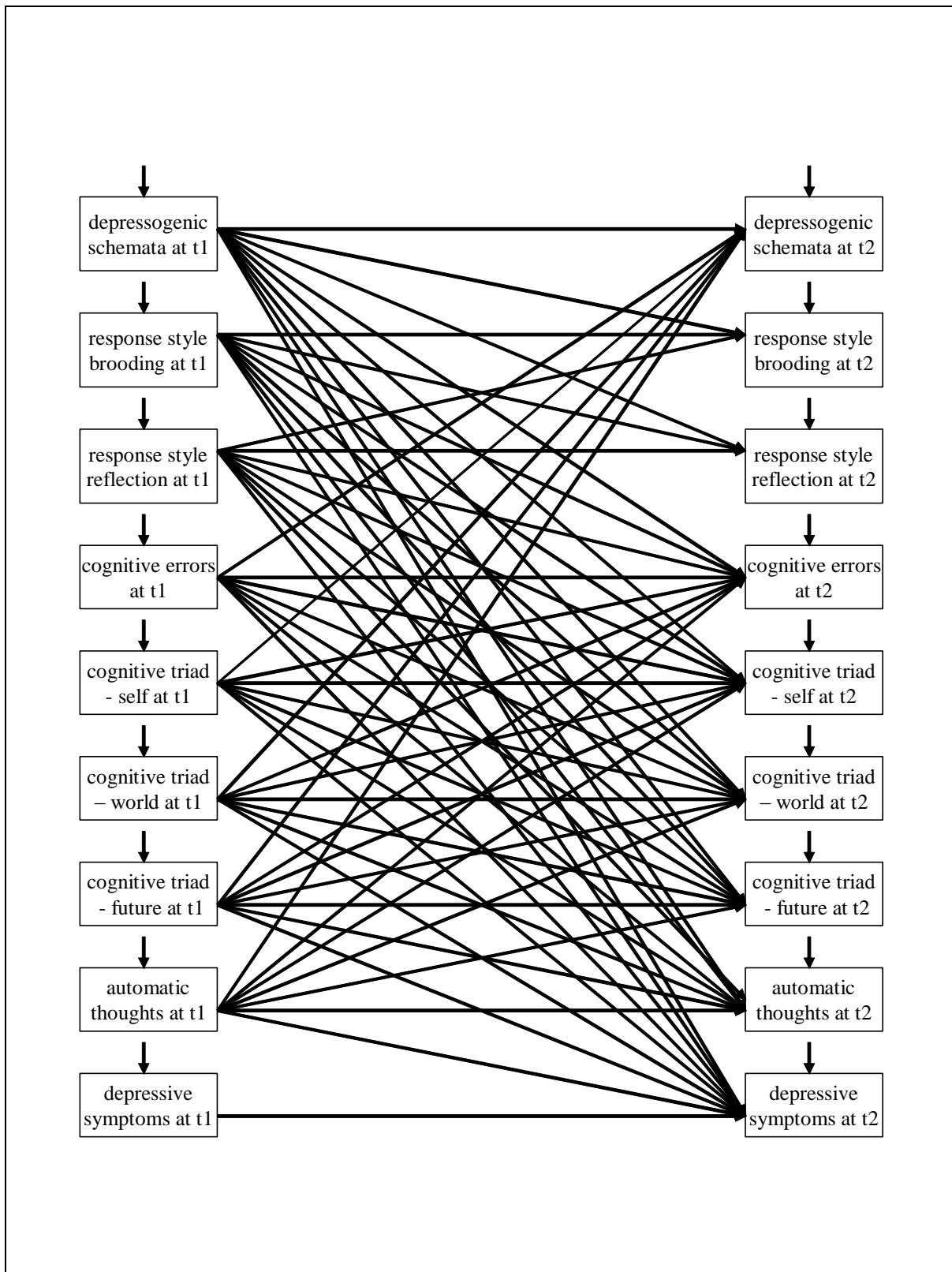


Figure 1: Path diagram of the integrated cognitive model in that brooding and reflection are influenced by schemata while influencing the other cognitive variables of Beck’s cognitive model (1976) and depressive symptoms (Model 6).