# Inflexible Cognition Predicts First Onset of Major Depressive Episodes in Adolescence

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## Abstract

**Background**—Major depressive disorder often is characterized by a lack of cognitive and emotional flexibility, resulting in an impaired ability to adapt to situational demands. Adolescence is an important period of risk for the first onset of depression, yet relatively little is known about whether aspects of inflexibility, such as rumination and deficits in attentional shifting, could confer risk for the development of the disorder during this time.

**Method**—In the present study, a sample of 285 never-depressed adolescents completed self-report and behavioral measures of rumination and attentional shifting at a baseline visit, followed by up to four years of annual prospective follow-up diagnostic assessments.

**Results**—Survival analyses indicated that adolescents with greater levels of rumination or poorer attentional shifting experienced a shorter time until the first onset of major depressive episodes, even after accounting for baseline symptoms and demographic characteristics. Although girls were twice as likely as boys to experience the first onset of depression, rumination predicted a shorter time until depression onset only for boys. Rumination and attentional shifting were not correlated and predicted time until onset of major depression independently of one another.

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**Conclusions**—These results provide evidence that components of cognition that are characterized by rigidity and perseveration confer risk for the first onset of major depression during adolescence. Evaluating rumination and attentional shifting in adolescence may be useful in identifying individuals who are at risk for depression and who may benefit from interventions that target or alter the development of these characteristics.

## Keywords

Major depressive disorder; rumination; attentional shifting; cognitive flexibility

Major depressive disorder is highly prevalent and its onset increases dramatically during adolescence[1]. Depressed individuals often demonstrate a lack of cognitive and emotional flexibility, resulting in an impaired ability to adapt to situational demands. For example, depression appears to be characterized by patterns of perseverative thought such as rumination and difficulties appropriately shifting attention between tasks[2]. These characteristics are relevant to dimensional approaches to understanding potential cognitive mechanisms involved in the etiology of mental disorders, including depression[3]. Few studies to date, however, have evaluated whether these inflexible cognitive factors precede the first onset of depression in adolescence, and whether they work synergistically to contribute risk for depression.

Rumination, the tendency to passively and repetitively focus on one's dysphoric mood, has been strongly implicated in depression[4]. Prospective studies have demonstrated that rumination predicts a greater likelihood of onset of new depressive episodes in adults, as well as the first onset of depression in children and adolescents[5]. The tendency for depressed individuals to ruminate is thought to be in part a consequence of dysregulation of the default mode network (DMN)[6], which is activated during periods of rest and self-focus such as rumination. Neural conceptualizations of rumination are consistent with other models that suggest that depression involves a failure to recruit top-down cognitive control of limbic activity[7-9].

Attentional shifting, the ability to flexibly redirect the focus of attention between tasks, is an important component of attentional control that is relevant to depression[7,10,43]. Deficits in attentional shifting ability may represent a failure to engage prefrontal cortical resources to attenuate DMN activity during periods in which task engagement may be necessary, such as in transitioning between mental sets[11]. Attentional shifting deficits appear to be present among individuals with current or remitted depression relative to controls[12,13], although evidence among children and adolescents with depressive disorders is mixed[14], particularly during periods of remission[15]. Furthermore, there is evidence that attentional shifting deficits may be an endophenotype of mood disorders that represent underlying vulnerability[12]. However, it is not clear whether deficits in attentional shifting in depression are simply state-dependent correlates, scars of previous episodes, or vulnerability factors that may confer risk for the onset of depressive episodes[16,43].

Although distinct constructs, attentional shifting and rumination may influence one another. An inability to disengage attention from mood-congruent stimuli in depression may facilitate the prolonged processing of such material via rumination, thereby impairing the ability to

use adaptive regulatory strategies such as cognitive reappraisal[10,17-19,35-37]. Aberrant attentional shifting may result in excessive internally-oriented attention that results in failure to use external stimuli to disengage from rumination, rendering them inflexible to changes in environmental context[10,37]. Studies have demonstrated an inverse association between attentional shifting and rumination[20], particularly in the context of negative emotional information[17,21], although this association is less consistent among adolescents, with some studies finding no associations between attentional shifting for neutral stimuli and rumination[19,22]. Although it is plausible that deficits in attentional shifting and rumination are correlated, attentional shifting and rumination also could work synergistically such that rumination may be particularly likely to lead to depression among individuals who have difficulty switching attention away from ruminative processes. Thus, rumination might be a particular risk factor for depression among adolescents who also have difficulty shifting attention.

In a prior study of adolescents, attentional shifting and rumination were independently associated cross-sectionally with current depression status[19]. However, cross-sectional and case-controlled designs are unable to determine whether characteristics are true risk factors for the onset of the disorder, or whether they simply are correlates of existing psychopathology[23]. Although previous studies have indicated that rumination predicts the onset of depressive episodes in children and adolescents, no studies to date have evaluated both attentional shifting and rumination as simultaneous and potentially synergistic predictors of the first onset of major depression. Importantly, no prior studies to our knowledge have evaluated attentional shifting deficits as a predictor of the first onset of depression in adolescence.

In the present study, we sought to extend the existing literature by evaluating attentional shifting and rumination as prospective predictors of depression onset among never-depressed adolescents. We also evaluated sex differences in the relationship between attentional shifting and rumination and depression onset. This was important given that research has found that girls develop a more ruminative response style and higher rates of depression than boys by mid-adolescence[1,24]. However, the literature has provided mixed evidence about the presence of sex differences in the relationship between rumination and depression during adolescence[25], and no studies to our knowledge have evaluated sex differences in the relationship between attentional shifting and first onset of major depression.

## Method

### Participants

**Sample recruitment**—Study participants were adolescents who participated in the Adolescent Cognition and Emotion (ACE) Project, a longitudinal study designed to examine the development of depression among Caucasian and African American adolescents. Adolescents were recruited from both public and private middle schools in the Philadelphia area utilizing two methods. Approximately 68% of the sample was recruited from mailings sent out to the Philadelphia School District as well as follow-up phone calls to families, whereas approximately 32% of the sample was recruited from advertisements in Philadelphia area newspapers.

Inclusion criteria included being 12 to 13 years of age at study entry and identifying as Caucasian/White, African American/Black, or Biracial. Further, inclusion criteria specified that adolescents had to have a mother or primary female caregiver accompany them to sessions. Approximately 93.7% of the caregivers were the adolescents' biological mothers, and therefore will henceforth be referred to as mothers. Exclusion criteria in the study included either the adolescent or mother exhibiting an English reading or speaking level inadequate to sufficiently complete study diagnostic interviews and self-report questionnaires, as well as the adolescent or mother exhibiting any psychotic disorder, developmental disorder, or severe learning disability.

**Study sample**—The study sample included 341 adolescents and mothers who completed the baseline assessment and at least one annual follow-up assessment. Adolescents (Mean age = 12.41 years; $SD = 0.63$) were diverse in terms of race (50% Caucasian, 50% African American; 2.1% were also Hispanic), sex (53.2% female), and socioeconomic status (44.9% were eligible for subsidized school lunch, a measure of financial need that accounts for the number of dependents being supported by a given family income). Participants in the current study were followed for up to 4.75 years (Mean = 34.13 months, $SD = 11.09$) and completed an average of 2.19 ($SD = 0.91$) annual follow-up assessments. Compared to 208 additional adolescents who completed the baseline assessment but did not complete a follow-up assessment, adolescents in the present sample had better attentional shifting scores ($t = 2.13$, $p = .03$) and were less likely to receive a free lunch ($\chi^2 = 3.91$, $p = .05$), but did not differ on any other measures or characteristics.

## Procedures

All study assessments were held in the Psychology Department building on Temple University's campus. At baseline, adolescents were assessed for depressive diagnoses by a trained diagnostic interviewer. They also completed questionnaires assessing depressive symptoms and rumination, and completed a behavioral task to measure attentional shifting. Adolescents were subsequently assessed every twelve months to determine whether they had experienced the onset of a major depressive episode.

## Measures

**Depressive Symptoms**—The Children's Depression Inventory[26] (CDI) is a self-report questionnaire employed to assess depressive symptoms at baseline among adolescent participants. The 27 items are scored on a 0 to 2 scale and are summed to create a total score with higher scores indicating greater depressive symptom severity. In the current sample, total scores ranged from 0 to 32 (Mean = 6.87, $SD = 5.59$). The CDI has good reliability and validity in youth samples. Cronbach's α in this sample was .86.

**Rumination**—The Children's Response Styles Questionnaire[27] (CRSQ) is a self-report questionnaire administered to adolescents to assess response styles to sad moods. The rumination subscale, which measures self-focused responses to negative affect (e.g., "Think about how alone you feel"), was used in the present study. Each item is measured on a 4-point scale (never, sometimes, often, almost always) reflecting the degree to which adolescents experience each thought or technique in response to depressed mood. Items are

summed, with higher scores reflecting a greater tendency to ruminate ($M$ = 24.76, $SD$ = 7.98, Min = 0, Max = 48). The CRSQ has demonstrated good validity and internal consistency in youth samples. In the current sample, the rumination subscale exhibited good internal consistency ($\alpha$ = .85).

**Attentional Shifting**—The Test of Everyday Attention for Children[28] (TEA-Ch) is a neurocognitive test developed for use among children and adolescents ages 6 to 16. The current study utilized one subtest of the TEA-Ch designed to measure attentional shifting, the ability to switch attention from one task or mental set to another. Attentional shifting is associated with some degree of time lapse, or latency, among all individuals. The Creature Counting subtest of the TEA-Ch measures individual differences in this latency. Specifically, the Creature Counting stimulus booklet depicts a varying number of creatures in their burrows on a winding path leading from the top of the page to the bottom of the page. Interspersed between the creatures are up and down arrows. Adolescents are instructed to count the creatures following the path from the top of the page to the bottom of the page, and to switch counting directions when coming upon an up or down arrow. A score is calculated to reflect latency for switching during correct trials only (total time/total switches), which is then scaled so that higher scores represent better attentional shifting ($M$ = 8.56, $SD$ = 2.55, Min = 1, Max = 18). Per scoring instructions and as has been used in prior reports[19,28], the attentional shifting variable was created only for adolescents who completed at least 3 of the 7 total trials correctly, which resulted in 21 participants being removed from the sample. Compared to the other participants, these 21 participants displayed lower levels of rumination ($t$ = -2.05, $p$ = .04) and were more likely to be African American ($\chi^2$ = 7.29, $p$ = .01), but did not differ from the rest of the sample in any other characteristics. To account for individual differences in psychomotor and processing speed, the TEA-Ch also contains a task (Sky Search) that involves searching for 20 pairs of matching spaceships. The TEA-Ch has good reliability and validity[28].

**Depression diagnoses**—The Kiddie – Schedule for Affective Disorders and Schizophrenia – Epidemiological Version[29] (K-SADS-E) is a semistructured diagnostic interview that was administered to adolescents and their mothers at baseline and at 12 month follow-up sessions. The K-SADS-E assesses current and past *Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition* (*DSM-IV-TR*; American Psychiatric Association, 2000) Axis I psychopathology in youth. Trained interviewers administered the interview first to mothers and then to adolescents. Based on the K-SADS-E protocol, after administering both interviews, the interviewer would then create a summary rating based on his/her "best-estimate" clinical judgment. Interviewers in the current study were limited to clinical psychology postdoctoral fellows, Clinical Psychology Ph.D. students, individuals with Clinical or Counseling Masters degrees, and post-baccalaureate research assistants. Past research examining the K-SADS-E has demonstrated good inter-rater and retest reliability ($\kappa$ = .73 for Major Depression[29]). Inter-rater reliability for the current study was $\kappa$ = .85 based on 120 pairs of ratings.

The K-SADS-E was administered to adolescents and their mothers to assess the youth's current and lifetime history of depressive diagnoses at baseline. If adolescents had a current

or past episode of major depression at baseline ($n = 36$), they were omitted from the present analyses, which were focused on predicting the prospective first onset of major depressive episodes. This yielded a final sample size of 285. Adolescents who had a history of depression at baseline had higher baseline levels of depressive symptoms ($t = 2.11$, $p = .04$) and rumination ($t = 2.03$, $p < .05$), and were more likely to be boys (26 boys, 13 girls; $\chi^2 = 4.28$, $p = .04$), but did not differ from the sample included in prospective analyses on attentional shifting ($t = 0.13$, $p = .90$) or on any other demographic or study characteristics. The K-SADS-E was subsequently administered at twelve-month follow-up sessions to measure onset of depressive episodes.

## Statistical Analyses

Preliminary analyses (t-tests and Chi-square tests) evaluated sex and race differences in study variables. Cox regression (survival) analysis evaluated the primary hypotheses that rumination and deficits in attentional shifting would predict a shorter time until the first onset of major depressive episodes, controlling for individual differences in processing speed, baseline symptoms of depression, sex, and age. We also evaluated whether sex would moderate the relationships between rumination or attentional shifting and time until the first onset of depressive episodes. The proportionality of hazards assumption (which assumes that the predictor variables confer similar risk for first onset of depression over time[41]) was upheld for all variables in the survival analyses. Rumination and attentional shifting were Z-standardized prior to entering as predictors.

# Results

## Preliminary Analyses

First, we tested for sex and race differences in baseline study variables. Girls did not differ from boys in levels of rumination ($t = 1.01$, $p = .30$) or attentional shifting ($t = 0.47$, $p = .64$), but they had marginally higher levels of depressive symptoms ($t = 1.70$, $p = .09$). White adolescents did not differ significantly from black adolescents in rumination ($t = -1.13$, $p = .26$), attentional shifting ($t = -1.20$, $p = .23$), or depressive symptoms ($t = -0.35$, $p = .73$). Other baseline correlates are presented elsewhere[38].

Contrary to hypotheses, rumination and attentional shifting were not significantly correlated ($r = -.02$, $p = .73$).

## Prospective Analyses: Predicting First Onset of Major Depressive Episodes

In total, thirty-one adolescents (10.9%) experienced the prospective first onset of a major depressive episode over the follow-up period. The average time from baseline until first onset of depression was 23.67 months ($SD = 14.03$). As expected, girls were significantly more likely than boys to experience the prospective onset of a major depressive episode (Wald = 4.20, $p = .04$, $HR = 2.17$, $CI = 1.03$-$4.55$). Race did not predict time until the onset of depression (Wald = 0.22, $p = .64$, $HR = 0.85$, $CI = 0.43$-$1.68$).

Consistent with hypotheses, multivariate Cox regression analyses indicated that rumination predicted a shorter time until the first onset of a major depressive episode (Wald = 4.73, $p = .$

03, $HR = 1.05$, $CI = 1.01\text{-}1.10$). However, sex moderated this relationship (Table 1), such that rumination predicted a shorter time until the first onset of a major depressive episode for boys (Wald = 10.10, $p = .001$, $HR = 2.75$, $CI = 1.47\text{-}5.13$; Figure 1a[1]), but not for girls (Wald = 0.02, $p = .90$, $HR = 0.97$, $CI = 0.63\text{-}1.50$; Figure 1b).

Also consistent with hypotheses, impairments in attentional shifting predicted a shorter time until the first onset of a major depressive episode (Table 1; Figure 2). Sex did not moderate this relationship (interaction term: Wald = 0.02, $p = .89$, $HR = 0.95$, $CI = 0.43\text{-}2.08$).

However, attentional shifting did not moderate the relationship between rumination and time until the first onset of a major depressive episode (interaction term: Wald = 0.52, $p = .47$, $HR = 0.88$, $CI = 0.62\text{-}1.25$), nor did attentional shifting moderate the two-way interaction between rumination and sex predicting time until depressive episode onset (three-way interaction term: Wald = 0.02, $p = .90$, $HR = 1.06$, $CI = 0.46\text{-}2.44$).

## Discussion

Cognitive inflexibility may be an important risk factor for the onset of major depressive disorder during adolescence. Indeed, the current study found that both higher levels of rumination and poorer attentional shifting abilities were predictive of a shorter time to first onset of major depression, controlling for baseline depressive symptoms, among a community sample of adolescents. Consistent with prior literature, sex differences emerged in that girls were twice as likely as boys to experience first onset of depression during the course of the study. However, the effects of rumination in predicting episode onset were specific to boys. Rumination and attentional shifting abilities acted as independent predictors; contrary to hypotheses, these constructs were not correlated, and attentional shifting did not moderate the relationship between rumination and depression onset. These results provide evidence that rumination and shifting may be important independent factors in the development of mood disorders in adolescence.

These findings suggest that components of cognitive flexibility are predictive of first onset of major depression during adolescence. Inflexible cognition may contribute to depression by hindering one's ability to problem-solve and adapt to changing situational pressures[2]. Deficits in attentional shifting have been observed in individuals with current and remitted depression[13,43] and previously had been hypothesized to serve as a vulnerability for the development of the disorder[12,43]. Cognitive inflexibility also may manifest in the form of rumination, a well-established cognitive vulnerability for depression that may impair problem-solving abilities and perpetuate depressed mood[4]. Indeed, both a neutral test of attentional shifting and a self-report measure of ruminative thinking style predicted first onset of major depression.

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[1]The survival curves represent the proportion of the remaining sample that had (a) not yet experienced an episode or (b) not completed their final assessment. The steep drop-off that occurs at the ends of the figures reflects the fact that the length of follow-up differed for each participant, and that few participants remain in the sample at the time that the last participant experienced the first onset of a depressive episode. Sensitivity analyses demonstrated that removing the last participant who experienced a depressive episode attenuated the steep drop-off in the survival figures; however, the results reported here were statistically consistent. Additionally, analyses were repeated using logistic regression to predict the likelihood of first onset of depression, and results paralleled those of the cox regressions, regardless of whether the last participant who experienced a mood episode was included in analyses.

One possible shared mechanism by which attentional shifting and rumination may lead to depression is dysregulation in the DMN[6]. Ruminative thought and impaired attentional shifting abilities could occur in part from difficulties deactivating the DMN in order to attend to the task at hand[7]. It is possible that these constructs may influence or interact with each other in the development of depressogenic thinking over time, such that shifting deficits may underlie the development of perseverative, ruminative thought or exacerbate the effects of rumination as a risk factor for depression[10].

However, the current study found that rumination and impaired attentional shifting were not correlated, served as independent predictors of depression onset, and did not demonstrate an interactive effect in predicting depressive episode occurrence over time within a community sample of adolescents. These results are similar to those reported in a previous cross-sectional study in which clinically depressed adolescents demonstrated higher levels of rumination and poorer attentional shifting abilities compared to controls, but no significant associations were observed between these risk factors[19]. This suggests that whereas rumination and attentional shifting deficits may both represent facets of inflexible cognition, they exert independent effects in predicting depression onset. These results contrast with some contemporary cognitive theories of depression that have suggested that rumination may result in part from deficits in attentional shifting, as well as with the ability to resolve interference from previously relevant information from working memory[7,10,17,18,35-37]. However, it is possible that rumination is more relevant to emotional attentional shifting abilities (e.g., difficulty disengaging from negative stimuli)[17,20], as opposed to the neutral components of attention evaluated in the current study.

It is somewhat surprising that rumination predicted the first onset of depressive episodes among boys, but not among girls. Although girls demonstrate increased rates of depression onset compared to boys during adolescence[1], a result we also observed in this study, findings have been mixed regarding sex differences in the effects of rumination as a risk factor for the disorder[25]. It is possible that rumination did not confer an additional level of risk among girls in the present study because girls already had increased risk for experiencing depression (i.e., there may have been a ceiling effect for girls). However, it also is possible that among a larger sample (with more participants with a first onset of a depressive episode), the apparently-smaller relationship between rumination and depression onset among girls would become statistically significant. Thus, it may not be the case that rumination does not matter among girls (indeed, the extant literature supports that rumination is an important risk factor for symptoms and episodes of depression among adolescent girls[4,5,24,25,30]), but rather that the additive influence of rumination among girls appeared to be less strong than among boys, at least within the current sample. It also is possible that the effect of rumination becomes more potent in girls when exposed to interpersonal stress[30], which was not evaluated in the present manuscript, or that rumination becomes a stronger predictor of depression for girls later in adolescence.

The current findings have important clinical implications, by suggesting that decreasing rumination and improving attentional control may serve to prevent or alleviate depressive symptoms. Indeed, research has shown that cognitive behavioral therapy that is specifically focused on the reduction of ruminative thought decreased depressive symptoms among

individuals with persistent depression[31]. Furthermore, interventions aimed at improving attentional control, whether through cognitive training protocols or the use of transcranial magnetic stimulation among depressed adults, have been linked to subsequent declines in depressive symptoms. Interestingly, training protocols that increased cognitive control also have been linked to subsequent declines in rumination, suggesting that these constructs may indeed be related[32,33]. From a prevention standpoint, evaluating rumination and attentional shifting in adolescence may help to identify individuals who are at risk for depression and who may benefit from interventions that target or alter the development of these characteristics.

The use of an initially never-depressed sample allowed for tests of rumination and attentional shifting deficits as true vulnerabilities for the development of the disorder, as opposed to correlates or byproducts of major depression[23]. The current research examined multiple facets of cognitive inflexibility by assessing both rumination and attentional shifting. Varied methods of data collection were employed including self-report questionnaires, a behavioral test of executive functioning, and a semi-structured diagnostic interview, which reduces the likelihood of shared method variance. As such, the current study's aims are in line with dimensional approaches to understanding psychopathology such as the National Institute of Mental Health's Research Domain Criteria initiative, by examining both aspects of negative valence (rumination) and cognitive systems (attentional shifting) using varied units of analysis[3]. Furthermore, findings highlight the potential importance of the DMN as an underlying source of risk for the onset of depression that may be responsible for the development of ruminative thought processes and deficits in attentional control.

Several limitations should be noted. As the measure of attentional control employed in this research involved neutral and not emotional stimuli, it will be important to assess whether emotional shifting deficits are a superior predictor of depression onset. In addition, the use of a rumination induction and state measures of ruminative thought may have helped to better evaluate the relationship between perseverative thought and deficits in attentional control. Additionally, adolescents in the prospective sample had better attentional shifting scores and were less likely to receive a free lunch, perhaps limiting the generalizability of these results somewhat to adolescents with these characteristics. Although we evaluated time until the first onset of depression, we did not evaluate predictors of the severity or duration of first depressive episodes. Finally, although results are generally consistent with a proposed imbalance in DMN activity, neural activity and connectivity were not assessed in the current design.

Future research should work towards identifying and characterizing the brain networks that may underlie dysregulation in the DMN, which may manifest in rumination and difficulties shifting attention. It also will be important to better understand the contexts in which these DMN imbalances may be most prominent, such as when at rest, while engaged in cognitively-taxing tasks, or following a negative mood or stress induction[7]. Given research suggesting that depression onset during early to mid-adolescence leads to impaired development of cognitive control[34], as well as findings that rumination is linked to subsequent deficits in attentional abilities in adolescents[22], it would be of interest to examine

subsequent changes in attentional control over time. It is possible that adolescents at risk for depression possess stunted attentional shifting abilities that both predispose them for the disorder and subsequently remain lower than their nondepressed counterparts as their cognitive development continues; the experience of major depression may further contribute to impairments in cognitive maturation over time. Future work also could benefit from examining the predictive utility of methods of evaluating attentional shifting that are more easily implemented than a behavioral task. For example, the self-reported Attentional Control Scale[39] contains a "shifting" subscale that is easy to administer, has been validated with behavioral tasks of attentional shifting, and is concurrently associated with symptoms of depression[40]. In addition, it would be useful to determine the extent to which the relationship between attentional shifting and first onset of depression is attributable to (or is independent from) general cognitive ability or other cognitive impairments[42]. Future longitudinal studies could benefit from implementing measures like these to evaluate whether they would have similar utility in evaluating risk for the first onset of depression.

In sum, the current research provides important preliminary evidence of the role of rumination and attentional shifting deficits in the prediction of the first onset of major depression among a community sample of adolescents. Although ruminative thought and impaired attentional control both may be manifestations of cognitive inflexibility resulting from underlying DMN dysregulation, these risk factors were unrelated in the current sample and instead exerted independent effects as predictors of depression onset. Future research should aim to better understand the nature of the relationship between these cognitive vulnerabilities, particularly by elucidating the neural circuitry that may underlie their development and role in predicting the initial development of depression during the pivotal period of adolescence.

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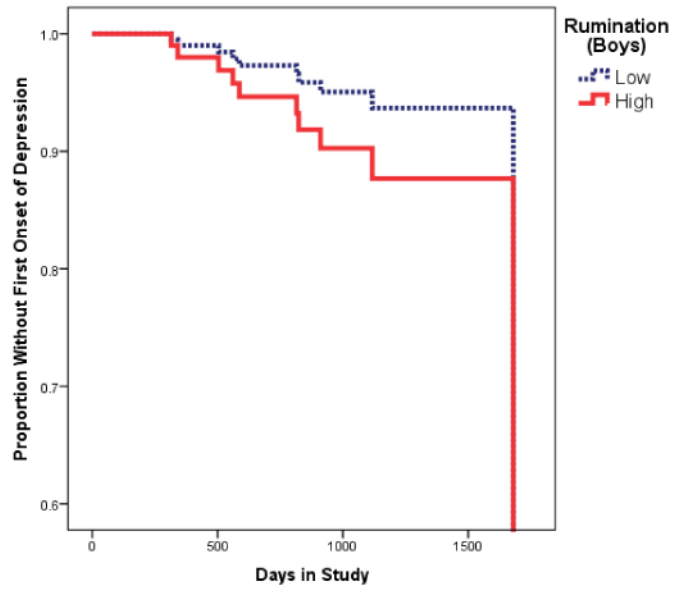
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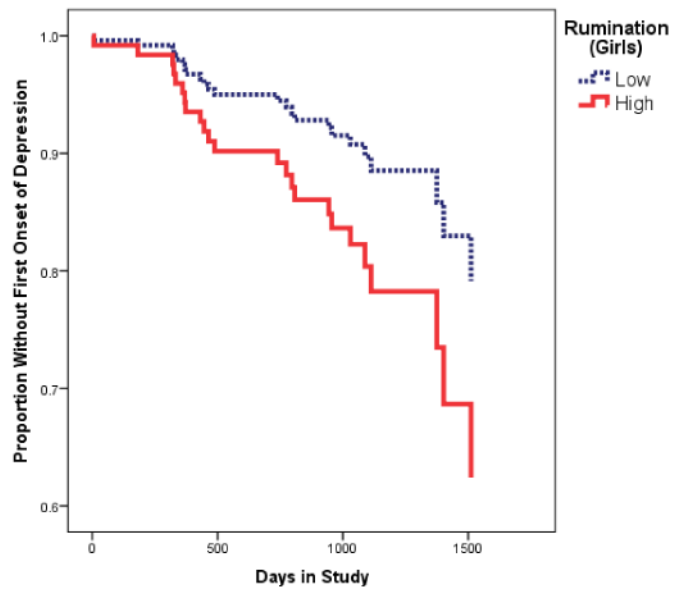


b)

**Figure 1. Survival curves for relationship between rumination (plotted via a median split) and time until first onset of major depressive episode for (a) boys, and (b) girls**
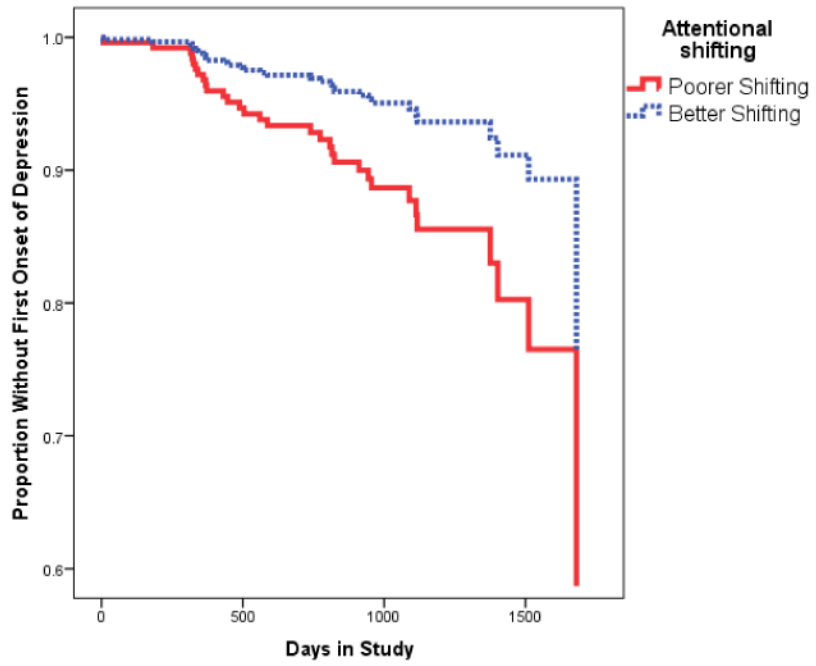
**Figure 2. Survival curves for relationship between attentional shifting (plotted via a median split) and time until first onset of major depressive episode**

**Table 1**

**Cox Regression Analyses Evaluating Rumination and Attentional Shifting as Predictors of the First Onset of Major Depressive Episodes in Adolescence**

| Step | Predictor | Wald | *p* | HR | 95% CI | $R^2$ |
|---|---|---|---|---|---|---|
| 1 | Female | 3.94 | .05 | 2.57 | 1.01–6.53 | .02 |
| | Age | 0.36 | .55 | 0.84 | 0.49–1.47 | |
| | Depressive Symptoms | 2.07 | .15 | 1.05 | 0.98–1.12 | |
| | Processing Speed | <0.01 | .96 | 1.00 | 0.94–1.06 | |
| 2 | Attentional Shifting | 5.71 | .02 | 0.61 | 0.40–0.91 | .03 |
| | Rumination | 10.09 | .001 | 2.75 | 1.47–5.14 | |
| 3 | Rumination X Female | 7.95 | .005 | 0.35 | 0.17–0.73 | .03 |

Note. Change in $R^2$ for Cox regressions represents Cox-Snell $R^2$ change since previous step, an estimate of the relative association between survival and the predictors tested since the previous step.