Rumination Mediates the Impact of Personality on the Development of Depression

During the Transition to College

By

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Abstract

The prevalence of depression is heightened in students transitioning to college. The current study examines the roles of two Five Factor Model personality traits of (Neuroticism and Extraversion) and a cognitive bias (Rumination) in the emergence of depressive symptoms in this particular vulnerable cohort. This study examined 70 (24 males and 46 females) 17-21 year old first-term freshmen students from the University of Michigan (M= 18.14, SD= 0.54). Participants attended two laboratory visits at the beginning and end of the semester to complete the Center for Epidemiologic Studies Depression Scale (CES-D) and the Ruminative Response Scale (RRS). The Big Five Inventory (BFI) was completed during the initial visit only. Findings confirm prior studies showing that high neuroticism predicts high levels of depression at the beginning of the semester. Surprisingly, our study is the first to report that high levels of neuroticism predict decreased depressive symptoms throughout the semester. In this sample of elite college students, neuroticism may reflect anxiety surrounding academic performance. While this anxiety may be detrimental prior to exams, high levels of neuroticism may be appropriately motivational later in the semester to keep up with high academic demands. Additionally, low levels of extraversion predicted an increase of depressive symptoms, however, this effect was fully mediated by rumination. These findings can help up better understand the traits and cognitions important to success and well-being in times of high academic pressure.

Key words: depression, rumination, neuroticism, extraversion, freshmen

Depression in college campuses is highly prevalent with 44% of college students reporting suffering from depressive symptoms (Krucik, 2012) and 9% developing major depression in the first semester of college (Reyes-Rodriguez, Rivera-Medina, Camara-Fuentes, Suarez-Torres & Bernal, 2012). Therefore, the identification of factors that contribute to the development of depression in this population is a research priority. For example, dispositional factors, such as personality characteristics, play a particularly important role in determining risk for depression (Charney & Manji, 2004). Similarly, cognitive biases, such as ruminative thoughts, have been consistently linked to the development and maintenance of depression (Teasdale & Dent, 1987). However, whether these factors contribute to the emergence of depression in first-semester college students is unknown. In addition, there is evidence to suggest that the association between personality traits, specifically neuroticism, and depressive symptoms may be mediated by ruminative thought (Watson & Hubbard, 2006). However, studies have yet to examine whether rumination also mediates the impact of other personality traits, e.g. extraversion, on depressive symptoms. Therefore, this study will examine the impact of rumination and specific personality traits, extraversion and neuroticism, on the development of depressive symptoms during a time of significant stress: the first semester transitioning to college. Furthermore, we will examine whether rumination mediates the effect of various personality traits on the emergence of depressive symptoms. The results of this study may help to further our understanding of the independent and combined effects dispositional factors and cognitive biases have in triggering the onset of depressive symptoms in college students.

According to the Five-Factor Model (Bagby, Schuller, Bindseil, Cooke, Dickens, Levitt & Joffe, 1996), personality factors are categorized into five dimensions: neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. Previous research examining the association between personality traits and depressive symptoms has primarily focused on neuroticism. Neuroticism is the tendency to experience negative emotional states (Clark & Watson, 1992; Costa & McCrae, 1980; Eysenck, 1975) and shown to be related to mental health disorders by either predisposition, or influencing how a disorder is expressed (Widiger & Trull, 1992). Neuroticism is associated with a tendency to interpret situations and stressors more negatively, greater self-consciousness and/or anxiety (Widiger & Trull, 1992). Thus, neuroticism has been shown to be associated with depression and anxiety (Widiger & Trull, 1992). Given that the first semester of college is a time of significant stress due to increased social and academic demands (Friedlander, Reid, Shupak & Cribble, 2007; Tao, Dong, Pratt, Hunsberger & Pancer, 2000), it is likely that neuroticism is one mechanism that increases the risk for depression in this population.

While previous research has demonstrated strong evidence for the link between neuroticism and depressive symptoms (Bagby et al., 1996), few studies have focused on the impact extraversion has on depressive symptoms (Bagby et al., 1996; Young, Bagby, Cooke, Parker, Levitt & Joffe, 1995). Preliminary research suggests that there may be contributing factors associated with low levels of extraversion during the development and maintenance of depressive symptoms (Bagby et al., 1996; Blatt, Quinlan, Pilkonis, & Shea, 1995). For example, low extraversion has been significantly and uniquely correlated with depression (Harkness, Bagby, Joffe & Levitt, 2002; Tellegen, 1985;

Watson & Clark, 1984, 1992). In addition, extraversion appears to increase to normal levels upon a patient's remission from major depression episodes (Harkness et al., 2002). Thus, this suggests that extraversion can be considered dependent upon the state of depression (Harkness et al., 2002). At the beginning of the transition to college, many students can feel isolated for the first time and extroversion can aid relationship development and social support more quickly (Swickert, Rosentreter, Hittner & Mushrush, 2002). Therefore, it is possible that extraversion may act as a buffer to the onset of depression during the transition to college.

Rumination has also shown to be associated with increased depressive symptoms (Bagby, Rector, Bacchiochi & McBride, 2004). Ruminative thought can be described as focusing ones attention on his or her negative emotional state and its consequences, which inhibits any actions that might distract the individual from his or her negative mood (Nolen-Hoeksema, 1991). Similar to worrying, however, people who ruminate tend to dwell on things that have happened in the past that they cannot change. The tendency to engage in ruminative thoughts is typically a precursor to the development of depression or depressive symptoms (Nolen-Hoeksema, 1987, 1991; Nolen-Hoeksema, Morrow & Fredrickson, 1993). For example, individual differences in the duration of a depressive episode are influenced by how people respond to their depressed mood (Nolen-Hoeksema, 1987, 1991; Nolen-Hoeksema et al., 1993). Generally, people cope with either distractive or ruminative coping mechanisms; distracting mechanisms have been shown to lead to more positive results and decreased levels of depressed mood. Individuals with high ruminative responses in contrast, have amplified and prolonged episodes of depression (Nolen-Hoeksema, 1987, 1991; Nolen-Hoeksema et al., 1993).

While studies have concurrently linked rumination with depression in adults and adolescence (Lo, Ho & Hollon, 2009), it is unknown whether rumination predicts an increase of depressive symptoms during the transition to college. Therefore, the current study aims determine whether rumination predicts the onset of depressive symptoms during the first semester of college in young adults.

Additionally, previous studies suggest rumination may mediate the link between neuroticism and depression (Nolen-Hoeksema & Lyubomirsky, 1992; Nolen-Hoeksema et al., 1993) such that high levels of neuroticism leads to increases in rumination, which in turn results in increases in depressive symptoms. However, studies have yet to examine whether rumination also plays a role in the association between extraversion and depressive symptoms. Thus, we speculate that low levels of extraversion may be linked to internalizing problems, which increases susceptibility to engage in ruminative thought, and such responses have been shown to intensify and prolong depressed moods (Bagby & Parker, 2001). However, we also hypothesize that higher levels of extraversion will attenuate depressive symptoms because extroverted people are more likely to actively participate in distracting coping mechanisms when presented with problems (Bagby & Parker, 2001), one example being making new friends after the initial transition to college. Thus, this study will examine whether rumination mediates the impact of extraversion and neuroticism on depression onset during the transition to college.

In conclusion, this study aims to examine the direct effects of neuroticism and extraversion on changes in depressive symptoms during the transition to college. It is hypothesized that high levels of neuroticism and low extraversion will be associated with increases in depressive symptoms during the first semester of college. The second aim of

the study is to examine the independent effect of rumination on changes in depressive symptoms during the transition to college. It is hypothesized that students who engage in more ruminative responses, over distracting responses will be more likely to experience greater depressive symptoms during the transition to college. The third and final aim is to examine the mediation effect of rumination on the impact of personality traits (i.e., neuroticism and extraversion) on changes in depressive symptoms during the transition to college. We hypothesize that participants who demonstrate high levels of neuroticism and low levels of extraversion will engage in more ruminative responses and ultimately be the most susceptible to trigger depressive symptoms. This study is important because it will help to provide further insight into the interactive association between dispositional factors (personality traits) and rumination. Furthermore, this study will be the first to attempt to understand whether rumination mediates the link between extraversion and depression. Gaining a better understanding of the interaction between rumination and different personality factors may inform targets for future intervention and prevention efforts.

Method

Participants

This study examined 70 (24 males and 46 females) 17-21 year old first-term freshmen students from the University of Michigan (M= 18.14, SD= 0.54), who participated in this study in return for Introduction to Psychology course credit. Participants racially identified themselves as: White/Hispanic (67.4%), African American (2.2%), Asian (21.7%), biracial (4.3%), other/prefer not to say (4.4%).

Procedure

The protocol was comprised of two online questionnaire assessments via Qualtrics ("Qualtrics," 2014): one during the beginning few weeks of the fall semester, and one right before Thanksgiving break. The first assessment took approximately an hour and a half to complete various questionnaires. The participants were asked to complete a series of questionnaires assessing demographic information, sleep, stress and current and previous moods. Participants were also assessed on how they responded to perceived stressful situations and whether they had previous or were currently experiencing depressive symptoms. The second assessment took approximately 30 minutes to fill out the follow-up questionnaires they had previously completed at the initial visit. A General Information Sheet-Short Version (GIS-S) and the Big Five Inventory (BFI) were both completed at the initial lab visit only to obtain basic demographic information and personality traits from the participant during the last month. Participants completed both the Center for Epidemiologic Studies Depression Scale (CES-D), and the Ruminative Response Scale (RRS) at both lab visits.

Materials

The following questionnaires were completed:

General Information Sheet-Short Version (GIS-S). The GIS-S is a brief demographic questionnaire designed to obtain information about a variety of domains that have been associated with HPA-axis functioning, including age, sex, Body Mass Index, and phase of menstrual cycle. The GIS-S was completed only during the initial visit.

Big Five Inventory (BFI). The BFI is a 44-item inventory that measures five dimensions of personality. Each of the factors is then further divided into personality

facets: Agreeableness, Conscientiousness, Extraversion, Neuroticism, and Openness to Experience. It has been confirmed as valid (John, 1999). The BFI was completed only during the initial visit.

Center for Epidemiologic Studies Depression Scale (CES-D). The CES-D is a widely used measure of depression in the field of psychiatric epidemiology. It has acceptable psychometric properties, is associated with exposures documented to be associated with an increased likelihood of depression, and may be used to screen for suspected major depressive disorder in US community studies (Levine, 2013).

Ruminative Response Scale (RRS). The RRS is a self-reported measure asking participants how often they engage in ruminative thoughts or behaviors when they feel sad or upset. Schoofs, Hermans & Raes (2010) examined the internal consistency of the scale through Cronbach's alpha and found respective scores ranging from good ($0.7 \leq \alpha < 0.9$) to excellent ($\alpha \geq 0.9$).

Statistical Analysis Plan

First, we conduced descriptive statistics measuring means, standard deviation and correlations among variables. Then, we conducted a linear regression predicting depression using the regressor method. That is, we predicted depression time 2 while controlling for depression at time 1 and the covariates of gender and age. For aims 1 and 2, linear regressions were conducted using extraversion, neuroticism and rumination predicting to depression changes with unadjusted and adjusted models. To test the 3rd aim for mediation, we ran another linear regression using both extraversion and rumination as predictors of increases in depression at time 2. Lastly, to confirm significance of the mediation effects, we ran a Sobel test.

Results

Descriptive Statistics

Means and standard deviations for the predictors and outcome variables are listed in Table 1. Bivariate correlations among the key predictors of Extraversion, Neuroticism, Rumination and Depression are presented in Table 2. Time 1 and Time 2 Depression are strongly negatively correlated with Extraversion (r = -.45, p < .001), weakly negatively correlated with Neuroticism (r = -.03, p = .81) and positively correlated with Rumination (r = .53, p < .001). Rumination is strongly negatively correlated with Extraversion (r = -.63, p < .001), and weakly positively correlated with Neuroticism (r = .18, p = .09). Neuroticism and Extraversion are moderately negatively correlated with each other. Additionally, gender, β = -.05, p = .66, and age, β = .10, p = .35, did not significantly predict the development of depressive symptoms in our sample and thus were excluded from the following analyses.

Aims 1 and 2: Does Neuroticism, Extraversion or Rumination Predict the development of Depressive symptoms?

In three separate unadjusted models, we examined whether Extraversion, Neuroticism or Rumination predicted changes in Depressive symptoms by predicting time 2 depression symptoms while controlling for depression symptoms at time 1 (See Table 3). Lower levels of Extraversion significantly predicted increases in depressive symptoms, β = -.23, p = .04. Contrary to expectations, lower levels of Neuroticism predicted increases in depressive symptoms at trend level, β = -.17, p = .11. In an adjusted model including Extraversion and Neuroticism, low levels of Neuroticism significantly predicted increases in depressive symptoms, β = -.21, p = .06, while low

levels of Extraversion did not, $\beta = -.27$, $p = .23$. Finally, higher levels of Rumination also significantly predicted increased depressive symptoms, $\beta = .32$, $p = .01$ (See Table 3).

Aim 3: Does Rumination Mediate the Impact of Extraversion or Neuroticism on the development of depressive symptoms?

The predictor variable Extraversion was significantly related to the proposed mediator Rumination, $\beta = -.63$, $p < .001$, thus we are able to test for mediation. To test for this mediation, we conducted a regression analysis and entered Extraversion and Rumination as predictor variables and Depressive symptoms at time 2 as the outcome variable, controlling for depressive symptoms at time 1. The overall equation was significant, $F(69) = -.63$, $p = .00$, $R^2 = .39$, and Rumination's relationship with Depression at time 2 remained moderately significant even while controlling for Extraversion, $\beta = .27$, $p = .03$. Most importantly, the relationship between Extraversion and Depression became non-significant in this analysis, $\beta = -.10$, $p = .42$, compared to the direct relationship, $\beta = -.23$, $p = .04$. These results suggest full mediation (see Figure 1), which a Sobel test confirmed, $\beta = -2.73$, $p = .01$.

The direct relationship between Neuroticism and Depression was found to be only trend level significant, $\beta = -.17$, $p = .09$. Therefore, the pre-conditions for mediation were not met and we did not test for the mediation of Rumination on the link between Neuroticism and Depression.

Discussion

The aim of the current study was to examine the independent and combined effects that dispositional factors and cognitive biases have in triggering the onset of

depressive symptoms during the transition to college. As hypothesized, low levels of extraversion predicted increases in depressive symptoms from the beginning to end of the semester. However, while we had predicted a strong, positive relationship between neuroticism and depression, our results only suggested trend level significance and they were in the opposite direction than predicted. That is, low levels of neuroticism predicted increases of depression suggesting that the link between neuroticism and depression in college students is more complex than previously though. Finally, consistent with our hypotheses, rumination fully mediated the association between extraversion and depression. Overall, this study provides insight into the mechanisms that predict the onset of depression during the transition to college.

Consistent with our hypothesis, our study found a strong negative association between extraversion and depression. The few studies that have examined this relationship have found low levels of extraversion to play a role in the development and maintenance of depressive symptoms (Bagby et al., 1996; Blatt et al., 1995). For example, lower levels of extraversion were associated with being in a state of depression (Harkness et al., 2002). However, the mechanism connecting low extraversion and depression remains unclear. This link could be explained through lack of social support (George, Blazer, Hughes & Fowler, 1989), or be a result of a particular cognitive bias such as ruminative thought. We speculate that social support will aid students during the transition to college and allow them to engage in distracting coping mechanisms rather than ruminative ones that can increase their vulnerability to the onset of depression symptoms (Bagby & Parker, 2001).

In fact, we examined whether rumination mediated the impact of extraversion on depressive symptoms. Consistent with our hypothesis, we found that extraversion increased rumination and this in turn predicted increases in depressive symptoms. This mediation was significant suggesting that the effect of extraversion on depression was primarily via its impact on rumination. While few studies have associated low levels of extraversion (introversion) with depression (Akiskal, 1983; Bagby et al., 1995; Harkness et al., 2002), this study was the first to examine the mediating effect of rumination on this relationship. Suggesting that, people with low extraversion are more susceptible to developing depressive symptoms because they're more likely to ruminate. It is important to better understand what components of low levels in extraversion trigger this particular cognitive bias. Thus, future studies should test additional possible mechanisms such as social support to better understand all salient underlying factors together.

Neuroticism also predicted changes in depressive symptoms, but differently than anticipated. Previous research has associated neuroticism with depression, such that higher neuroticism results in increased depressive symptoms (Widiger & Trull, 1992). We found a trend level of significance in the unadjusted model, (made significant in the adjusted model) that lower levels of neuroticism predicted higher depressive symptoms. Furthermore, in the fully adjusted model, which controlled for the effects of extraversion, low levels of neuroticism significantly predicted increases in depression symptoms during the semester. We first considered that the reason neuroticism did not predict change in depression might be because people tested already possessed such high levels of neuroticism, reaching a plateau, of depressive symptoms at time 1. Whereas when examined at time 2, neuroticism wouldn't predict depressive changes because there was

no room for change to occur. However, this is unlikely because neuroticism was not significantly correlated with time 1 depression. Alternatively, our findings may be unique to the population we studied. That is, when attending an elite university, neuroticism may be a protective buffer for students, where neurotic tendencies motivate them rather than disabling their academic performance and triggering depressive symptoms. For example, previous research has associated both perfectionist behavior (Klibert et al., 2005; Stairs, Smith, Zapolski, Combs & Settles, 2012), as well as critical self-evaluation (Stairs, et al., 2012), with positive outcomes and characteristics such as academic achievement and motivation. Further research should be conducted at a variety of academic universities to examine the relationship between academic pressures, neuroticism, and depression.

In addition, high levels of rumination predicted increases in depression symptoms during the study. Consistent with previous research, our study found that when engaging in ruminative thoughts, people are more likely to develop depression (Nolen-Hoeksema, 1987, 1991; Nolen-Hoeksema, Morrow & Fredrickson, 1993). However, inconsistent with previous findings, we found a weak relationship between rumination and neuroticism. We speculate that this finding may be a reflection of the participant sample recruited from an elite university, with high academic pressure. As discussed above, specific neurotic tendencies such as being self-critical may be helpful to succeed. However, a strong positive correlation between neuroticism and depression has been found to result when a person focuses their self-esteem too much into a single outlet, such as academic achievement (Barnett & Gotlib, 1988; Nietzel & Harris, 1990; Widiger & Trull, 1992). Thus, there might be a necessary amount of neuroticism needed to achieve, but if that threshold is exceeded, a person will become depressed. Future research is

needed to examine adaptive levels of neuroticism in different situations. Further examination on the complex associations between neuroticism, rumination, and depressive symptoms in a range of student populations will also allow us to better understand the role they play during the development of depression.

There are several limitations within this study. First, our population of first-year freshman experienced relatively low demographic risk factors, restricting generalizability of our findings to all universities. In particular, future studies would benefit from studying incoming freshman from more diverse socio-economic backgrounds. This variance would provide information on whether the mediating impact of rumination on the relationship between neuroticism and depression can be further generalized or if it is unique to high-achieving universities. Our research should be replicated with larger samples to confirm our significant and trend level associations between both dispositional traits and cognitive biases to depression. It would also allow us to analyze gender differences, as well as control for social support, motivation to achieve academically, and potentially life stress, and to better identify exact mechanisms of susceptibility to depression. Finally, the specific time period that is examined, first semester of college, restricted our subject pool and generalizability.

The results of this study have clear implications to mental health on college campuses. The transition to college can be a stressful experience as a young adult, which can have detrimental consequences on students who are susceptible to depression. Specifically, understanding the relationship between personality factors and cognitive biases allow us to identify how students handle perceived stress during stressful transitions and inform targets for future intervention and prevention efforts. Our findings

add to the previous understanding of the relationship between neuroticism and depression such that at academically demanding universities, neuroticism may actually help buffer depression. Additionally, we add to the previous literature demonstrating that rumination fully explains the relationship between extraversion and depression. These findings could be generalized to the stressful period of attending college and help us to understand how to successfully cope and succeed under academically stressful circumstances.

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Table 1. *Descriptive Statistics for the Predictor and Dependent Variables.*

	Whole Sample N = 70 M(SD)
Variables	
Time 1 CESD total score	5.69(4.151)
Range: 1-21	
Time 2 CESD total score	10.76(6.807)
Range: 1-29	
BFI Extraversion scale score	3.12(.474)
Range: 2.13-4.25	
BFI Neuroticism scale score	2.23(.393)
Range: 1.25-3.13	
Time 1 RRS total score	41.19(12.25)
Range: 23-74	

Table 2. *Correlations among Predictor and Outcome Variables (N = 70).*

Predictor and Outcome Variables	1.	2.	3.	4.	5.
1. t1CESD total	---				
2. t2CESD total	.573**	---			
3. BFI Extraversion	.476**	.450**	---		
4. BFI Neuroticism	.222	-.030	-.259*	---	
5. t1RRS total	.507**	.529**	.609**	.110	---

*Note. *p < 0.05, **p < 0 .01*

Table 3. *Unadjusted and Adjusted Models of Personality and Rumination Predicting Increases in Depression Symptoms.*

	Unadj.			Adj.		
	Beta	t-test	p-value	Beta	t-test	p-value
Neuroticism	-.17	1.6	.11	-.21	-2.12	.06
Extraversion	-.23	2.08	.04	-.27	-2.47	.23
Rumination	.32	2.93	.01			

Figure 1. *Mediation Effect of Rumination on the link between Extraversion and*

Depression.

Extraversion		Depression Time 2 score

-.23*

	Rumination	

.63**   .27*

Extraversion		Depression Time 2 score

-.10
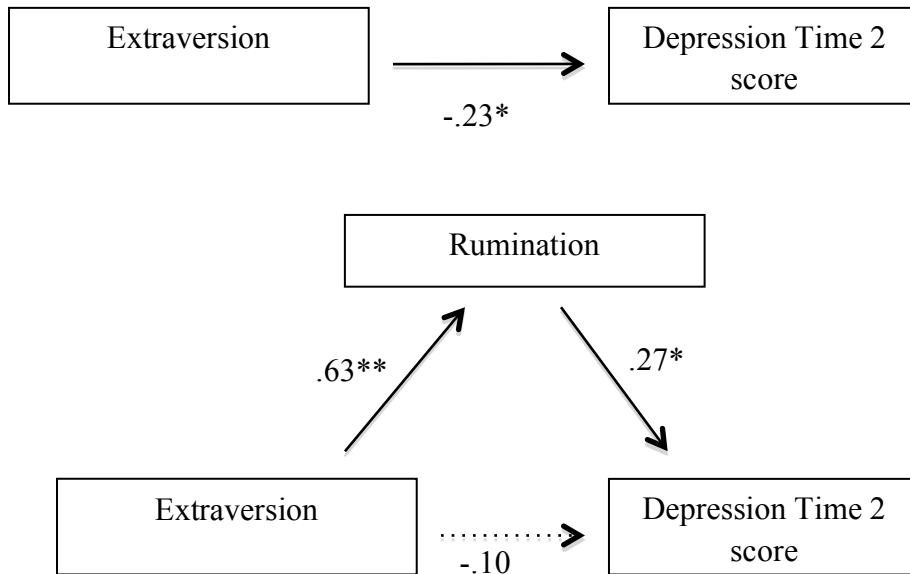
Sobel Test = -2.73, p < .01

*Note. *p < 0.05, **p < 0 .01,* Solid line = significant, dotted line = non-significant