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Recurrence of MDD: A Prospective Study of Personality Pathology and Cognitive Distortions

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Major depressive disorder (MDD) is characterized by a high risk of recurrence, especially among individuals whose initial episode occurs during adolescence. Identifying predictors of recurrence of MDD among young samples is therefore of paramount clinical importance. Survival analytic models were used to evaluate the effects of dysfunctional cognitions and Axis II personality pathology on MDD recurrence in a sample of 130 previously, but not currently, depressed young adults. Participants were initially assessed for depression, dysfunctional attitudes, and personality pathology during their first semester in college and then reevaluated via the Longitudinal Interval Follow-up Evaluation interview every 6 months for 18 months. Baseline level of depressive symptoms significantly (HR-1.07, $p = .002$) predicted recurrence of MDD. In the survival analyses with baseline level of depression serving as a current mood state covariate, overall personality pathology (HR-1.04, $p < .05$), but not cognitive distortions, uniquely predicted MDD recurrence. In similar analyses, none of the specific *DSM–IV* personality disorder cluster scores uniquely predicted recurrence. We discussed the theoretical, empirical, and clinical implications of these findings, and we noted the limitations of the study.

Keywords: recurrence of depression, cognitive distortions, personality disorders, personality pathology

Approximately 17–18% of the U.S. population experiences a Major Depressive Disorder (MDD; Kessler et al., 2005), which is a substantial individual and societal burden (Murray & Lopez, 1997). One particularly problematic aspect of MDD is the increasing likelihood for recurrence following each successive episode (Burcusa & Iacono, 2007; Solomon et al., 2000). Lewinsohn, Rohde, Klein, and Seeley (1999) found that ~45% of adolescents with MDD have a recurrent depressive episode between 19 and 24. Similarly, Fergusson and Woodward (2002) reported that nearly two thirds of adolescents who experience depression between the ages of 14–16 experience another depressive episode by age 21. Mueller and colleagues (1999) reported that ~85% of adults who recovered from a depressive episode experienced a second occurrence of MDD within 15 years of the index episode. The high probability of second and subsequent episodes, especially among individuals with adolescent onset (Lewinsohn, Rohde, Seeley, & Fischer, 1993; Zisook et al., 2004), compels investigators to identify predictors of recurrence of MDD among young people. Relevant research during the past decade has identified two enduring problems that may predict recurrence risk: Axis II personality pathology and distorted cognitive processes. This paper examines the relationship

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of these two variables to depression recurrence among young adults who have experienced their first episode of MDD during high school.

Axis II Pathology and Recurrence

Since the *DSM–III* (American Psychiatric Association, 1980) introduction of a separate axis for the diagnosis of personality disorders, investigators and clinicians have been encouraged to make simultaneous Axis I and Axis II (personality disorders) diagnoses. These separate diagnoses better inform research, case conceptualization, and treatment. Although the extent of major depression and personality disorder comorbidity varies across studies, rates of co-occurrence of one or more personality disorders in samples diagnosed with MDD generally fall between 35% (Shea, Glass, Pilkonis, Watkins, & Docherty, 1987) and 65% (Zimmerman, Pfhol, Coryell, Stangl, & Corenthal, 1988) but rates as low as 20% and as high as 85% have been reported (Yen, McDevitt-Murphy, & Shea, 2006).

Personality disorder comorbidity is associated with an especially pernicious course of MDD; this course is marked by high levels of functional impairment, high levels of emotional dysregulation, poor social functioning, and low levels of general well being (Skodol et al., 2005). Studies have indicated that depressed patients with personality disturbance report an earlier age of onset of depression, longer duration of depressive episodes, a greater number of previous episodes, and more frequent suicide ideation and attempts (Black, Bell, Hulbert, & Nasrallah, 1988; Fava et al., 1996; Grilo et al., 2005; Melartin et al., 2004; Ramklint & Ekselius, 2003; Rothschild & Zimmerman, 2002; Shea et al., 1987). There is some evidence that the deleterious effects of personality pathology on the course of MDD are most prominent in individuals who meet criteria for two or more personality disorders (O'Leary & Costello, 2001) and those who score higher on more global measures of Neuroticism (Burcusa & Iacono, 2007). Comorbid personality pathology also predicts a more erratic and unpredictable course of depression and poorer prognosis in pharmacological and psychosocial treatments for MDD (see Craighead, Sheets, Brosse, & Ilardi, 2007; Farabaugh et al., 2007; Mulder, 2002; Newton-Howes, Tirer, & Johnson, 2006). Thus, comorbid Axis II personality pathology and the stress and distress associated with it has emerged as one of the characteristics most consistently associated with recurrence of MDD.

Only a small number of *prospective* studies, however, have explored Axis II pathology as a predictor of depressive recurrence. Ilardi, Craighead, and Evans (1997) evaluated a sample of 50 depressed inpatients 33 to 84 months postdischarge. Using both dimensional and categorical measures of Axis II pathology, the investigators found that a significantly higher proportion of patients with elevated baseline Axis II pathology met criteria for a MDE during the follow-up period than patients without personality disorder pathology. The expected survival time before relapse for Axis II patients was only 13% the survival time of patients without personality disorders. Analyses also indicated that Cluster B and Cluster C dimensional scores were related to decreased survival time, while higher Cluster A scores, surprisingly, were associated with increased survival time. The greatest risk disparity between patients with and without personality disorders occurred in the first 6 months after recovery, when 77% of Axis II patients but only 14% of patients without personality pathology relapsed.

Additional prospective studies (Alnaes & Torgersen, 1997; Gunderson et al., 2008; Lewinsohn, Rohde, Seeley, Klein, and Gotlib, 2000) have demonstrated that depressed individuals with comorbid personality disorders (particularly Clusters B and C disorders) compared to depressed individuals without personality disorders have experienced greater rates and more frequent recurrences of MDD. In preliminary work for the currently reported project, Hart, Craighead, and Craighead (2001) identified Axis II pathology as a predictor of recurrence of MDD. Sixty-five young adults with remitted MDD were followed through their first 18 months of college, during that Time 41.5% of the sample experienced a recurrence of MDD. Analyses indicated that a total dimensional score of personality pathology (i.e., total pathology across disorders) was related to recurrence in this sample. Furthermore, the dimensional score for Cluster B, but not Cluster C, was related to increased risk of recurrence.

In summary, a few prospective studies with adults and late adolescents/young adults have found that Axis II personality pathology is a significant predictor of depression recurrence. How-

ever, there is another related vulnerability factor, distorted and dysfunctional beliefs, which also frequently predicts MDD recurrence.

Dysfunctional Cognitive Beliefs

Dysfunctional beliefs, derived from Beck's cognitive model (Beck, 1976) of MDD, comprise another frequently studied predictor of recurrence of MDD. Beck hypothesized that cognitive distortions such as excessive need for approval from others and high levels of perfectionism render individuals vulnerable to both initial episodes and recurrences of MDD. The data regarding Beck's hypotheses are less compelling for initial episodes of MDD, but findings generally support the relationship of recurrence of MDD to Beck's hypothesized dysfunctional beliefs (e.g., Ilardi & Craighead, 1999; Zuroff, Blatt, Sanislow, Bondi, & Pilkonis, 1999), especially when dysfunctional cognitions by themselves are studied as predictors of recurrence. These cognitive processes have been labeled in numerous ways (e.g., sociotropy [need for approval] and autonomy [perfectionism]) and various measures of these constructs have been developed. The most frequently studied of these measures is the Dysfunctional Attitudes Scale (DAS; de Graff, Roelofs, & Huibers, 2009; Weissman & Beck, 1978), which yields a total cognitive dysfunction score as well as factor scores for "need for approval" and "perfectionism."

Previous research has shown that the baseline DAS total score, like personality pathology, is associated with longer duration of depression (Luty et al., 1999), and a higher rate of recurrence of MDD (Ilardi et al., 1997; Otto, Teachman, Cohen, Soares, Vitonis, & Harlow, 2007; Segal, Gemar, & Williams, 1999). In addition, higher DAS scores at posttest have predicted greater rate of recurrence following CBT treatment (e.g., Simons, Murphy, Levine, & Wetzel, 1986; Thase et al., 1992). Maladaptive beliefs, however, are at least moderately and positively correlated with personality disorders (Farabaugh, Mischoulon, Schwartz, Pender, Fava, & Alpert, 2007; Ilardi & Craighead, 1999; Luty, Joyce, Mulder, Sullivan, & McKenzie, 1999); the same people who have higher levels of personality pathology also report higher levels of dysfunctional cognitive styles on the DAS.

The preceding investigations provided evidence that both comorbid personality pathology and dysfunctional cognitions, *when considered separately*, are reliable predictors of higher probability of and shorter time to recurrence among previously depressed adult patients. Most prior investigations have not examined these constructs simultaneously in previously depressed individuals. Because of their interrelationships, it is possible that personality disorders and distorted beliefs may be confounded variables that predict recurrence of MDD. Thus, either of these variables might uniquely predict recurrence of MDD only when considered independent of the other. For example, in our earlier work with adult and smaller samples, we found that when DAS and personality disorders were entered as simultaneous predictors of MDD, personality disorder scores accounted for a large percentage of the variance in recurrence with no unique predictive power being associated with elevated cognitive distortion scores (Hart et al., 2001; Ilardi et al., 1997). We attempted to replicate these findings among young adults in the current study; thus, the primary goal of the present study was to identify the unique contributions of personality pathology and dysfunctional attitudes as predictors of MDD recurrence among previously depressed young adults.

Participants' scores from personality disorder interviews and dysfunctional cognition measures were tested as predictors of MDD recurrence using semiparametric proportional hazards models. It was predicted that when considered simultaneously, high scores on personality pathology but not dysfunctional belief scores would predict a greater frequency of and shorter time to MDD recurrence. Ultimately, the project aimed to identify vulnerabilities to depressive recurrence in early adulthood. Theoretically, this is an important step toward identifying what factors may underlie personality disorders and/or cognitive distortions and mediate their relationship to recurrence of MDD. Clinically, identification of these predictors and their mediators of depression recurrence will better inform treatment planning and allow investigators to expand and tailor relapse prevention and intervention programs for MDD.

Method

Sample Description

The current study combines data from two related studies with identical recruitment and assessment procedures conducted by the same research team: Study 1, a treatment development study on the prevention of MDD recurrence; and Study 2, a study on predictors of depression recurrence. The complete sample of participants totaled 185 college freshmen; the 50 Study 1 participants who were randomly assigned to the depression prevention condition were excluded from the analyses in the current paper, so this is a naturalistic investigation of predictors of recurrence of depression. An additional 5 participants with missing data on one or more predictor variables were excluded, forming a final sample of 130 participants for the present study. Participants were followed for the first 18 months of college and completed the interviews and symptom measures described below.

All participants met *DSM–IV* diagnostic criteria for at least one past MDE during high school, but they were recovered from depression when they enrolled in the project. Recovery was defined as a period of 2 months or longer during which the individual no longer met criteria for MDD; furthermore, participants could report no more than two depressive symptoms at the time of the baseline assessment. Additional inclusion criteria were 18–21 years of age and full-time, first-year freshman status. Exclusion criteria for all participants included: current depressive mood disorder (i.e., major depressive disorder or dysthymic disorder); history of bipolar mood disorder; current substance dependence disorder; history of a psychotic disorder; imminently suicidal and therefore in need of immediate treatment; currently in psychotherapy treatment; or currently taking antidepressant medication. A semistructured interview (SCID-IV; First, Spitzer, Gibbon & Williams, 2001) was used to assess current and past history of Axis I psychopathology to determine if participants met the inclusion/exclusion criteria. Final decisions about study eligibility occurred in a consensus conference that included the clinical interviewers and an independent experienced PhD level clinical psychologist.

Procedure

Sampling and recruitment. A screening survey was mailed to all incoming freshmen across four summers (~5,500 students each year) before they matriculated at the University of Colorado, Boulder. An introductory paragraph explained the purpose of the study and provided a brief description and definition of depression. The survey asked participants if they had experienced a depressive episode during high school, if they were currently in treatment for depression, and if they were interested in being contacted about a study. As an incentive for returning the survey, one of every 25 respondents was randomly selected to receive a $50 prize for returning the survey. The same questionnaire was sent again via email in mid-September to all new freshmen but did not offer entry into the lottery. Students were asked to return the survey only if they believed they had experienced a previous MDE. Respondents were then contacted if they indicated that they had previously experienced at least one 2-week period of depression and were not currently depressed.

Of the ~28,000 surveys sent to incoming freshmen, 2,228 surveys were returned. Based on survey responses, phone screens were conducted with 894 individuals who appeared appropriate for the study. A total of 352 participants completed the SCIDs interview to determine study eligibility.

We collected the respondents' gender and identified ethnicity by using information provided by the Office of the Registrar with approval from the Vice Chancellor of Student Affairs. Students who did not want to report their ethnic identity to the Office of the Registrar and allow it to be accessible to university personnel had the option of keeping their ethnic identity "unknown."

Assessment. Assessments were conducted at baseline, 6, 12, and 18-months after baseline. Because of the length of the interviews, baseline assessments were conducted in two sessions. At Session 1, participants read the consent form and completed the BDI-II, DAS, and the Structured Clinical Interview for *DSM–IV* (SCID).[1] The International Personality Disorder Examination (IPDE) interview was administered at a second baseline assessment session, at the end

[1] Participants also completed other self-report and brief interview assessments, at baseline and follow-up, which were not closely related to the study hypotheses and thus were not included in analyses.

of which the participant received monetary compensation for completing the baseline phase of assessments.[2] The use of a semistructured Axis I diagnostic interview ensured that all participants met inclusion criteria at study entry. In addition, Axis II pathology was assessed through a structured diagnostic interview when all participants were "out of episode" for MDD.

Six, 12, and 18 months after the baseline assessment, participants were contacted and asked to continue their participation in the study in person, or by mail and phone if the participant had moved away. For precise measurement of time to recurrence of MDD, the Longitudinal Interview Follow-up Evaluation (LIFE) was conducted at each follow-up assessment. After providing informed consent, the individual completed the BDI-II and the LIFE interview. Participants received monetary compensation for completing each follow-up assessment.[2] Using various follow-up strategies (e.g., obtaining permission to contact a designated family member for updated contact information if necessary), 103 of 130 (79%) participants in the study completed the full 18-month assessment process. However, survival analysis allowed the use of data from all 130 participants.

Assessment staff. Advanced graduate students in the clinical psychology PhD program at the University of Colorado conducted all clinical interviews. The interviewers participated in formal training for the SCID (Axis I diagnosis) as part of the assessment course curriculum. All clinical interviewers participated in a half-day training seminar to begin formal training for the IPDE. Clinical raters then viewed and scored 3 videotaped interviews previously rated by an experienced interviewer. Intraclass correlation coefficients for the IPDE dimensional score were required to equal 0.80 or higher on the 3 reviewed interviews before beginning study assessments.[3] During the assessment phases of the project, the clinical raters and a PhD level clinical psychologist with extensive SCID and IPDE experience met for diagnostic consensus conferences.

Assessment Measures

Clinical interviews.

Structured clinical interview for DSM–IV, research version (SCID). The SCID (First et al., 2001) is a commonly used semistructured interview, which assesses current and lifetime diagnoses of Axis I disorders. First et al. report that typical interrater kappa scores range from 0.70 to 1.00. The SCID takes between 45 and 90 min to complete. The SCID was administered at baseline with the primary aim of determining participant eligibility. Information regarding past suicidality, number of MDEs during high school, and prior treatment for psychological difficulties was also gathered. A random 20% of Study 1 interviews were evaluated for interrater reliability; MDD diagnosis reliability was moderately satisfactory ($\kappa = 0.66$).

Longitudinal interval follow-up evaluation–modified (LIFE). The LIFE (Keller et al., 1987) is a semistructured interview created to assess the longitudinal course of *DSM–IV* Axis I symptoms and disorders. Specific dates of onset, remission, relapse, and recurrence are recorded, which makes the LIFE an appropriate measure for conducting survival analyses. The LIFE is designed to be administered every 6 months. However, if a participant misses a follow-up interview, information for the missing period can be collected at the next interview. High interrater reliability has been demonstrated for the interview (Keller et al., 1987). The interview takes between 30 and 60 min to administer. The LIFE was administered at 6, 12, and 18-month follow-up to identify the specific date of onset of Axis I disorders, including MDD recurrence. Information regarding treatment received for psychological difficulties during the follow-up period was also collected. A random 20% of interviews from the first two cohorts of this study were evaluated for reliability; interrater reliability of MDD diagnosis was excellent ($\kappa = 0.94$).

IPDE. The IPDE (Loranger, 1999) is a 99-item semistructured clinical interview that produces a total dimensional score, dimensional scores for the 3 DSM personality disorder clusters, and distinct dimensional and

[2] The 88 participants from Study I were paid $36 for the baseline assessment and each of the follow-up assessments. The 42 participants of Study II were paid $40 for the baseline assessment and $30 for follow-up sessions.

[3] Ten of the 218 interviews were conducted by four interviewers who did not complete the IPDE interrater reliability ratings before conducting interviews. These four interviewers were included in the interrater reliability checks conducted at study completion.

categorical scores for the 10 *DSM–IV* personality disorders. On each of these scales, higher scores represent greater pathology. As suggested in the interview manual, a duration criterion of 3 years, rather than 5 years, was adopted for this sample of young adults (i.e., a symptom had to be present for at least 3 years to be rated at a clinical level). Temporal stability coefficients range from .65 to .92 (M = .77) for the dimensional score (Boyle, 2003). Typical interrater reliability estimates range from .79 to .94 (M = .86) for the dimensional score on each *DSM–IV* disorder. Twenty percent of the interviews for Study 1 were assessed for interrater reliability across six interviewers. The intraclass correlation (Case 1; Shrout & Fleiss, 1979) for the IPDE total dimensional score in Study 1 was 0.95. For the Cluster A, Cluster B, and Cluster C dimensional scores, the intraclass correlations were 0.95, 0.95, and 0.91, respectively.

Self-report symptom measures.

Beck Depression Inventory II (BDI-II). The BDI-II (Beck, Steer, & Brown, 1996) is a 21-item self-report measure designed to assess the severity of depression symptoms. The possible range of scores is 0 to 63, with higher scores indicative of greater depressive symptoms. The measure has high internal consistency (mean coefficient α = .93 in college students) and test–retest reliability (r = .93 for a 1 week interval). Concurrent validity appears to be sound with the BDI-II demonstrating a moderately high correlation (r = .71) with the Hamilton Rating Scale of Depression (HRSD; Hamilton, 1960) in psychiatric outpatients (Arbisi, 2001). In the current data, an individual's mean item score was substituted for individual missing items, consistent with recommendations on estimating missing data items with minimal distortions (Downey & King, 1998). The measure had good internal consistency in the current sample (Cronbach's α = .84).

DAS. The DAS (Weismann & Beck, 1978) is a 40-item self-report questionnaire that assesses dysfunctional cognitions and maladaptive beliefs, based on Beck and colleagues cognitive theory of depression (Beck, Rush, Shaw, & Emory, 1979). A total score and two scale scores of Perfectionism and Need for Approval are produced, with higher scores indicating greater endorsement of dysfunctional beliefs. Satisfactory internal consistency (Cronbach's α = .89) and 8-week test–retest reliability (r = .84) have been demonstrated (Weismann & Beck, 1978). To estimate missing data items with minimal distortion, an individual's mean item score was substituted for missing items (Downey & King, 1998). The measure had high internal consistency in the current sample (Cronbach's α = .91).

Sample characteristics. Table 1 presents demographic and clinical data for the present sample (N = 130). Eighty percent of the sample was female. Approximately 71% of the sample identified themselves as White; 9% chose not to indicate their ethnicity.

Attrition during follow-up. Of the 130 total participants, 121 (93.1%) completed the 6-month follow-up assessment, 111 (85.4% completed 12 months, and 103 (79.2%) completed the final 18-month follow-up assessment. The average length of follow-up was 479.9 days (15.8 months). Completers were compared with the 27 participants who were lost to follow-up on demographic and predictor variables. Using logistical regression analysis, two of these variables were found to predict dropout versus study completion: baseline BDI score and baseline DAS total score. Participants who dropped out of the study during the follow-up phase were more likely to have a greater baseline depressive symptoms, χ^2 (1, N = 130) = 8.43, p = .004, and a higher level of dysfunctional beliefs, χ^2(1, N = 130) = 7.91, p = .005.

Results

Predictors of Major Depressive Disorder Recurrence

Of the 130 participants included in survival analyses, 36 (27.7%) experienced a new MDE during their first 2 years of college. The average length of survival before recurrence was 401.8 days (13.2 months). Similar to many longitudinal studies, the event of interest in the current investigation (MDD recurrence) did not occur for all participants before the end of the follow-up period. These cases are termed right-censored data, because the occurrence and/or time of the event of interest are unknown (Tabachnick & Fidell, 2007). Survival analyses are well suited for data with right-censoring,

Table 1
Sample Characteristics: Demographic and Clinical Variables

Variable	*n* (%)		
Gender			
Female	104 (80)		
Male	26 (20)		
Race			
White	92 (70.77)		
African American	1 (0.77)		
Latino	14 (10.77)		
Asian	10 (7.69)		
Native American	1 (0.77)		
Did not identify	12 (9.23)		
Number of MDEs in high school			
1	107 (82.31)		
2	19 (14.62)		
3	4 (3.08)		
Current Axis I disorder			
Yes	23 (17.69)		
No	107 (82.31)		
Lifetime Axis I			
Yes	72 (55.38)		
No	58 (44.62)		
Past treatment for MDD			
Yes	56 (43.41)[a]		
No	73 (56.59)		
Suicidality during previous MDE			
Yes	86 (66.15)		
No	44 (33.85)		
Number of symptoms during first MDE in high school	6.26 (1.09)[a]		
	M (*SD*)	Skewness	Kurtosis
BDI-II	12.30 (7.13)	0.56	−0.20
DAS total score	134.68 (29.09)	0.37	−0.41
DAS perfectionism	48.23 (14.58)		
DAS need for approval	44.11 (10.20)		
IPDE total dimensional	9.34 (7.76)	1.04	0.90
Cluster A	1.12 (1.86)		
Cluster B	5.15 (4.97)		
Cluster C	2.83 (3.01)		

Note. $N = 130$. MDE = Major Depressive Episode; MDD = Major Depressive Disorder; BDI-II = Beck Depression Inventory (2nd edition); DAS = Dysfunctional Attitudes Scale; IPDE = International Personality Disorder Examination.
[a] $n = 129$ because of missing data.

such as the assessment of time to MDD recurrence. Additionally, data from study dropouts can be included in the analyses. Participants who dropped out before experiencing a new MDE had a survival time (in days) up to the date of the last completed study interview, and then were categorized as right-censored data.

The study hypotheses were tested using a series of semiparametric proportional hazards (Cox regression) models using the SAS PHREG procedure (SAS Institute, Inc., 2002). An alpha level of .05 was used in all analyses. Before survival analyses were conducted, sets of squared multiple correlations (SMC) for variables within each survival model were examined to check for multicollinearity. The highest SMC was only 0.45 indicating that multicollinearity between the variables was unlikely. To test the assumption of proportionality of hazards before proceeding with analysis, the interaction of time and each predictor variable was

tested.[4] None of the predictor variables violated this assumption.

Table 2 presents the results of the survival analyses. Based on the established relationship of subclinical depressive symptoms and MDD recurrence (Fergusson, Horwood, Ridder, & Beautrais, 2005; Judd, Akiskal, & Paulus, 1997), the first survival model examined baseline depressive symptoms (baseline BDI-II) as a predictor of recurrence. As shown in Model 1, baseline BDI score was a significant predictor of recurrence, χ^2 (1, N = 130) = 9.77, p = .002. The hazard ratio of 1.07 indicates that with one standard deviation increase in BDI score (7.13), the probability of MDD recurrence increased by ~50%. Consequently, BDI was entered as a covariate in all survival analyses to examine the role of other variables in the prediction of MDD recurrence, over and above the baseline BDI.

We then examined pretest descriptor variables, which were not hypothesized to predict recurrence of depression but had been related to recurrence in some prior studies (Bercusa & Iacono, 2007). Categorical variables of gender, lifetime history of a nonmood disorder, and current comorbid nonmood disorder as defined in prior predictive studies (Hart et al., 2001; Lewinsohn et al., 2000; Melartin et al., 2004) were entered as predictors in Model 2, as were categorical descriptors of previous depressions including number of MDEs in high school (1 vs. 2 or more), suicidality during a past MDE, and treatment history for depression. An additional measure of severity of the first depressive episode in high school was included, operationalized as the number of depressive symptoms reported for the first episode (ranging from 5 to 9 symptoms). As expected, none of these descriptor variables was a unique predictor of risk for depression recurrence, although the variables formed a significant omnibus model, χ^2(8, N = 128) = 18.32, p = .02. These null findings replicate previous results with young adults (Hart et al., 2001) indicating no unique relationship between similar depression-specific clinical variables and recurrence.

Next, the predictive utility of the current DSM classification system was examined by evaluating two models of Axis II organization as predictors of depression recurrence: the total level of personality pathology across disorders and the DSM Axis II cluster structure. Previous research had found that dimensional measures of total Axis II pathology were associated with risk for relapse or recurrence (Hart et al., 2001; Ilardi et al., 1997). We replicated this finding in Model 3. The IPDE total dimensional score, which represents total personality pathology, was found to be a significant predictor of recurrence, controlling for baseline depressive symptoms, χ^2(1, N = 130) = 3.91, $p < .05$. The hazard ratio of 1.04 indicates that with one standard deviation increase in IPDE total dimensional score (7.76), the risk for recurrence during the first 2 years of college increased ~31%, controlling for baseline BDI score. A model including dimensional scores for all three personality disorder clusters was analyzed (Model 4). Although the omnibus test of this model was significant, χ^2(4, N = 130) = 13.58, p = .009, none of the specific PD cluster scores was a significant predictor of recurrence, after adjusting for the other covariates. These results do not replicate previous findings showing a relationship between specific PD cluster scores and the recurrence of depression (Hart et al., 2001; Ilardi et al., 1997).

The DAS total score and DAS subscales of Perfectionism and Need for Approval were then examined as predictors of recurrence in Models 5 and 6. Based on previous findings (Farabaugh et al., 2007; Hart et al., 2001; Ilardi et al., 1997) we expected that higher scores would predict recurrence; this hypothesis was not supported. Again, the BDI score was a significant predictor, but the DAS variables were not related to MDD recurrence.

Finally, we evaluated survival analysis models with total personality disorder score and dysfunctional cognition scores entered simultaneously (Models 7 and 8). Drawing on previous work with adults (Ilardi et al., 1997), we hypothesized that higher scores on personality pathology but not dysfunctional cognitions would

[4] Because logarithmic transformation of survival time was required for these equations, 11 participants with 0 days of survival were not included in this phase of data screening. Nine participants dropped out before the first follow-up assessment and therefore had no survival data. At the first follow-up assessment, 2 patients reported the onset of a MDE in the time immediately before the baseline assessment. Because the new episode had not lasted 2 weeks or more at the time of study entry, these participants were not excluded but follow-up report indicated that they had 0 days of survival from study entry before the onset of a MDE.

Table 2
Cox Proportional Hazards Models

	Wald χ^2	*p*	Hazard ratio
Model 1: Baseline depressive symptoms	9.77	**0.002**	
BDI-II	9.77	**0.002**	1.07
Model 2: Pretest variables	18.32[a]	**0.02**	
BDI-II	5.02	**0.03**	1.06
Gender	1.42	0.23	2.19
Lifetime nonmood disorder	0.90	0.34	1.44
Comorbid nonmood disorder	1.20	0.27	0.52
Number of MDEs in high school	1.41	0.24	1.71
History of suicidality	0.26	0.61	0.81
Treatment history	0.004	0.95	0.98
Number of symptoms during	3.19	0.07	1.36
First MDE in high school			
Model 3: PD dimensional total	13.68	**0.001**	
BDI-II	8.16	**0.004**	1.06
IPDE dimensional total	3.91	**0.048**	1.04
Model 4: DSM personality disorder clusters	13.58	**0.009**	
BDI-II	8.14	**0.004**	1.06
Cluster A	0.09	0.77	1.03
Cluster B	1.54	0.21	1.04
Cluster C	0.52	0.47	1.04
Model 5: DAS total	10.67	**0.005**	
BDI-II	10.49	**0.001**	1.08
DAS total score	0.54	0.46	1.00
Model 6: DAS scales	10.17	**0.02**	
BDI-II	9.11	**0.003**	1.07
Need for approval	0.05	0.83	1.00
Perfectionism	0.03	0.85	1.00
Model 7: DAS total and PD dimensional total	14.63	**0.002**	
BDI-II	8.99	**0.003**	1.07
DAS total	0.62	0.43	1.00
IPDE dimensional total	4.01	**0.045**	1.04
Model 8: DAS scales and PD dimensional total	14.32	**0.006**	
BDI-II	7.57	**0.006**	1.07
Need for approval	0.006	0.94	1.00
Perfectionism	0.22	0.64	0.99
IPDE dimensional total	4.06	**0.04**	1.04

Note. $N = 130$. Values in boldface represent $p < 0.05$. BDI-II = Beck Depression Inventory (2nd edition); PD = Personality Disorder; IPDE = International Personality Disorder Examination; DSM = Diagnostic and Statistical Manual of Mental Disorders; DAS = Dysfunctional Attitudes Scale.
[a] $n = 128$ because of missing data.

predict the recurrence of MDD when entered simultaneously. In the first of these two models, we analyzed total personality score and total dysfunctional cognition as predictors; the final model examined the unique predictive roles of total personality pathology, perfectionism, and need for approval. In both models, IPDE total dimensional score was a unique predictor of the course of depression, controlling for variance because of the total level of dysfunctional cognitions (Model 7) or maladaptive cognitions of perfectionism and strong need for social approval (Model 8); again, the DAS variables were not significant predictors of recurrence.

Discussion

This investigation was designed to identify the unique contributions of personality pathology and dysfunctional attitudes as predictors of MDD recurrence among previously depressed young adults while taking baseline levels of depressive symptoms into account. First, this study replicated several earlier studies (Ilardi &

Craighead, 1999; Judd, Akiskal, & Paulus, 1997; Fergusson et al., 2005) demonstrating that residual subsyndromal levels of depressive symptoms predict subsequent recurrence of major depressive episodes. Thus, initial levels of depressive affect were taken into account when evaluating other predictors of recurrence of depression.

In the current sample, dysfunctional attitudes scores did not predict recurrence of MDD as had been found in some previous studies (e.g., Ilardi & Craighead, 1999; Otto et al., 2007; Segal et al., 1999). Because of the significant correlation of baseline DAS scores and BDI-II scores ($r = .43$), controlling for the baseline BDI-II scores in the survival analysis may have contributed to this result; analyses in prior studies have not consistently taken this covariation into account. The current participants' average and range of DAS scores were similar to those of prior studies, so this finding was unlikely to have been a function of lower scores or a restricted range of DAS scores in the current sample.

The *principal finding* of this study was the relationship of Axis II personality pathology and recurrence of MDD. The IPDE total dimensional score significantly predicted greater recurrence of MDD within the first 2 years of college, even when the baseline level of depressive symptoms was employed as a covariate. Specifically, there was a 31% cumulative increase in recurrence of MDD for those scoring one standard deviation above the mean on the baseline IPDE dimensional total score.

Previous studies have also demonstrated, although somewhat inconsistently, that greater risk for MDD recurrence was associated with Cluster B (Hart et al., 2001; Ilardi et al., 1997) and Cluster C (Ilardi et al., 1997) pathology. In the current sample, no single cluster score was uniquely and significantly related to hazard of recurrence. It is not entirely clear why the previous findings for cluster B and C pathology were not replicated. It is possible that the poor construct validity of the current Axis II organization accounts for variable results when examining these cluster scores as predictors of mental health outcomes (Sheets & Craighead, 2007). It also is possible that the differences in severity of personality pathology among the studies' samples account for the lack of consistent replication. The mean IPDE total dimensional score (the sum of the cluster scores) in this project was 9.34, compared with 18.1 in the Hart et al. (2001) college-student sample and 27.5 in the Ilardi & Craighead (1999) adult sample that had been previously hospitalized for MDD. The lower levels of personality pathology may also explain why the MDD recurrence rate was somewhat lower in the current sample than in the two studies just noted.

In summary, this study found that baseline levels of depression prospectively predicted recurrence of depression and that total personality pathology (when taking baseline levels of depression into account) was also uniquely associated with depression recurrence. Thus, previously depressed students entering college with subclinical depressive symptoms and impaired interpersonal functioning characteristic of personality pathology were at substantial risk for MDD recurrence within the first 2 years of college. These findings underscore the importance of implementing programs designed to prevent recurrence of MDD (Hollon, Thase, & Markowitz, 2002). The highest risk freshmen could be targeted, and the prevention programs could be tailored for the specific psychological difficulties characterizing previously depressed individuals who also are experiencing the enduring and maladaptive patterns of personality disorders. For example, such programs might include interventions that focus on emotional regulation, improving interpersonal social interactions, and decreasing social avoidance.

Prior studies have found a substantial positive correlation between personality disorders pathology and cognitive distortions associated with MDD (e.g., Ilardi & Craighead, 1999; O'Leary et al., 1991; Luty et al., 1999). Consequently, in this study, dysfunctional attitudes and personality pathology were entered as simultaneous predictors while controlling for levels of residual depressive symptoms. Personality pathology exerted a prospective and unique effect on recurrence of MDD whereas cognitive distortions did not. Although the specific causal mechanisms by which personality disorders contribute to the recurrence of MDD remain unclear, it has become increasingly clear that cognitive distortions are unlikely mediators of that effect (see Otto et al., 2007); the data in the current study are consistent with this notion. It is possible that other types of cognitive dysfunctions such as explanatory or hopelessness styles

or self-focused attention (see Alloy et al., 2006; Ingram, Miranda, & Segal, 1998), which were not measured in the current study, might add unique variance to the prediction of recurrence of depression or mediate its recurrence. However, most of the studies of those cognitive variables have not considered their covariation with personality disorders in predicting depression recurrence.

Perhaps the most intriguing issue arising from this and related research is the identification of the mediators of the relationship between personality pathology and recurrence of MDD. Ilardi and Craighead (1999) suggested that the occurrence of *clinically significant distress* (because of dysfunctional interpersonal behaviors and emotional dysregulation), that characterizes most of the personality disorders, might be responsible for the impact of personality pathology on MDD recurrence. Otto and colleagues (Otto et al., 2007) made a cogent argument for a very similar conceptualization of the processes by which personality pathology may result in greater MDD recurrence; namely, the trait-like nature of personality pathology leads to chronic distress that may activate cognitive distortions which are essentially epiphenomena of the associated higher depressive state rather than a causal factor in the recurrence of MDD. This conceptualization would explain the typical increase in DAS scores during MDD and the substantial cross-sectional relationships between personality disorders and DAS among patients with MDD. The persistent, enduring, and stable or trait-like problem in this clinical process, however, is posited to be the personality pathology and not the dysfunctional attitudes. This viewpoint is also consistent with the conclusions of Candrian, Farabaugh, Pizzagalli, Baer, and Fava (2007) who, based on the data in a treatment study of MDD with fluoxetine, argued that the depressogenic cognitions associated with MDD are activated by the presence of personality pathology. They further posited that it was the activation from the chronic distress associated with personality pathology that resulted in poorer treatment outcomes for the group with higher levels of personality pathology. Although advocating different psychological mechanisms for the process, Gunderson et al. (2008), focusing primarily on borderline personality disorder, also concluded that it is the distress associated with the ongoing personality pathology that produces recurrences of MDD. Not surprisingly, as Skodol et al. (2005) have noted, higher levels of personality pathology (just like the recurrent depression with which it is associated) result in greater emotional adjustment difficulties, poorer health perceptions, and poorer social and interpersonal functioning. Logically, there is nothing in the preceding conceptualization that would preclude the use of cognitive restructuring as a clinical mechanism by which the *stress* of the personality disorder may be decreased and the depressive symptoms alleviated. Obviously, further study directly examining chronic stress and distress as mediators of Axis II symptoms and MDD is needed.

Previous research has already identified potential psychological processes and disturbances that may moderate and mediate various forms of personality pathology, and these, thereby, become leading candidates for both empirical research and clinical interventions tailored to the needs of patients with Axis I and Axis II comorbidities. These more fundamental constructs and behavioral patterns may comprise factors that have specific genetic and neurobiological markers. Personality patterns currently subsumed under one cluster could, in fact, be broader traits of general personality dysfunction. For example, many individuals diagnosed with one or more personality disorders typically experiences difficulty with emotional regulation as a part of the clinical distress. The struggles with emotional volatility of individuals diagnosed with borderline and/or histrionic personality disorders are apparent. Similarly, the overcontrolled emotional expression of individuals diagnosed with avoidant and dependent personality are equally evident. Indeed, many individuals diagnosed with personality disorders of all types exhibit behavioral patterns that currently are defined only as Cluster C diagnoses. Another example is provided by Farabaugh et al. (2007) who suggested that individuals with more stable personality disorders (i.e., disorders that persist from the beginning to the end of successful treatment of MDD) are more likely to exhibit stable dysfunctional behavior patterns associated with or meeting Cluster C diagnoses and they experience greater "need for approval" distortions at the beginning but not the end of treatment. A further example of a broad underlying personality pattern comes from Luty et al. (1999) who found that the

general personality characteristic of "self-directedness" is marked by a lack of resourcefulness, self-criticism, and other behaviors typical of individuals diagnosed with Cluster C disorders such as avoidant and dependent personality disorders. In sum, the present findings indicate that the specific Personality Disorders as defined by the current DSM do *not* relate to the recurrence of MDD, although more *general personality pathology does* predict future recurrence. Clearly, further empirical investigation of alternate organizations of personality disorder symptoms and the course of MDD is needed to identify the clinical phenomena underlying and driving the sustained detrimental impact of Axis II pathology on mood disorder recovery.

The current study had certain methodological limitations and strengths that should be noted. Limitations of the sample include: a self-selected, previously depressed, young adult sample; the relatively low level of personality psychopathology; a limited age-range of the sample; and the limited diversity of participants even though it was representative of the college population where the study was conducted and is generally representative of major research university students. Methodological limitations include the use of videotaped interviews rather than independent diagnostic evaluations to determine interrater reliability, failure to record initiation of participation in psychotherapy or pharmacotherapy during the course of the follow-up period though new episodes of MDD were recorded, and retrospective reporting of adolescent depression to determine study eligibility. Strengths of the study included: the clearly defined study sample including the use of clinical diagnostic criteria, the reliability of the measures employed, including a standardized clinical interview to assess personality pathology; the assessment of personality pathology while participants were not experiencing major depression, circumventing possible mood state effects; the use of a dimensional rather than categorical conceptualization of personality; and the recruitment of participants at high risk for depressive recurrence because of early onset of depression.

Despite the limitations, this investigation provides further evidence of subclinical depressive symptoms and general Axis II personality pathology as significant risk factors for recurrence of MDD among young adults. These findings provide strong support for the importance of targeted college-based depression prevention programs, particularly those emphasizing emotional regulation and interpersonal skills training, and they call for further evaluation of the classification system and nosology of Axis II personality pathology.

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