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Comparing chronic interpersonal and noninterpersonal stress domains as predictors of depression recurrence in emerging adults☆

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ABSTRACT

Understanding how persistent interpersonal difficulties distinctly affect the course of major depressive disorder (MDD) during emerging adulthood is critical, given that early experiences impact future coping resources and functioning. Research on stress and MDD has mostly concentrated on stressful life events, while chronic stress largely has not been explored. The present study examined interpersonal (intimate relationship, close friendships, social life, family relationships) and noninterpersonal (academic, work, financial, personal health, and family members' health) domains of chronic stress as time-varying predictors of depressive recurrence in emerging adults. Baseline assessments identified previously depressed emerging adults ($N = 119$), who subsequently completed 6-month, 12-month and 18-month follow-up interviews to determine chronic stress experiences and onset of new major depressive episodes. Survival analyses indicated that time-varying total chronic stress and chronic interpersonal stress predicted higher risk for depression recurrence; however, chronic noninterpersonal stress was not associated with recurrence. Intimate relationship stress, close friendship stress, family relationship stress, personal health, and family members' health independently predicted MDD recurrence, over and above well-established depression risk factors of dysfunctional cognitions and personality disorder symptoms. Evidence that interpersonal stress could have substantial impact on course of depression is consistent with theories of emerging adulthood, a time when young people are individuating from the family and experiencing significant social transition.

By emerging adulthood (ages 18–29), major depressive disorder (MDD) is a leading cause of disability (Ferrari et al., 2013). Given the high rates of MDD onset and recurrence during this developmental period, Rohde and colleagues (Rohde, Lewinsohn, Klein, Seeley, & Gau, 2013) recommended that emerging adulthood should be a primary focus of MDD research. Interpersonal stress experiences may be particularly acute during the transition from adolescence to adulthood as young people individuate from the family and strive to create new social support networks (Arnett, 2004). Understanding how persistent interpersonal difficulties uniquely affect the course of MDD during emerging adulthood is essential for prevention and intervention efforts adapted for this critical period of psychiatric vulnerability.

To date, the majority of research on stress and MDD has concentrated on stressful life events, or episodic stress, as predictors of new major depressive episodes (MDEs) while the role of chronic stress has seldom been explored (Hammen, 2005; Kessler, 1997). Stressful life events are conceptualized as discrete, psychologically threatening experiences that occur within a limited time period. Conversely, chronic stress refers to enduring pressures or difficulties in one or more domains of functioning (e.g., Vrshek-Schallhorn et al., 2014). In preliminary investigations, chronic stress has been associated with greater risk for depression (Hammen, Davila, Brown, Ellicott, & Gitlin, 1992; Hammen, Kim, Eberhart, & Brennan, 2009; Shih, Eberhart, Hammen, & Brennan, 2006). This research commonly has combined individuals with and without a history of depression, despite evidence that other forms of stress (life events) have differential impact on first onset versus recurrent episodes of MDD (Kendler, Thornton, & Gardner, 2000; Monroe & Harkness, 2005). Severe life events are more likely to precede a first MDE and less likely to precede later

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episodes as the number of MDEs increases (Monroe, Slavich, Torres, & Gotlib, 2007; Stroud, Davila, Hammen, & Vrshek-Schallhorn, 2011). However, the risk for MDD recurrence continues to increase with each successive episode, suggesting that other forms of chronic or lesser stress supplant severe events as key predictors of MDD recurrence (Burcusa & Iacono, 2007). Monroe et al. (Monroe et al., 2007) reported that severe chronic stress was more common for individuals with a greater number of prior MDEs. Also, earlier age of onset of MDD was associated with greater chronic stress (Hammen et al., 1992). Building on this preliminary evidence that chronic stress may be critical to those at risk for depression recurrence, the present study examined chronic stress among emerging adults with a history of MDD during adolescence.

Of the limited research on chronic stress and depression, most studies have focused on a single domain of stress, such as poverty/financial stress or prolonged marital conflict (e.g., Davila, Bradbury, Cohan, & Tochluk, 1997; Dohrenwend et al., 1992; Poyner-Del Vento & Cobb, 2011; Vrshek-Schallhorn et al., 2014). This methodology does not allow for examination of the cumulative impact of multiple stressors and may underestimate the true overall effect of chronic stress on MDD (Mazure, 1998). Additionally, little is known about which particular domains of stress exert the strongest influence on MDD symptom recurrence and should, therefore, be primary targets for intervention. Improving upon this limitation, the present study compared multiple domains of chronic stress simultaneously as time-varying predictors of depressive recurrence.

The stress generation model suggests that previously depressed individuals are more likely than others to experience dependent stress, stress that is partially or wholly due to their own behavior (Hammen, 1991, 2006). Dependent stressors are particularly likely to occur within interpersonal contexts. Within this literature, interpersonal stress refers to problems with romantic partners, peers, or family, while noninterpersonal stress traditionally refers to occupational, academic, or health difficulties. In a sample of emerging adult women, interpersonal events were twice as likely to trigger MDEs as noninterpersonal events (Stroud et al., 2011). Major interpersonal events were found to interact with genetic risk (5-HTTLPR) to predict depression onset while noninterpersonal events did not in a late adolescent sample (Vrshek-Schallhorn et al., 2014). It is unknown if this pattern extends to chronic stress; further research is needed to distinguish the relative impact of interpersonal versus noninterpersonal chronic stress on MDD recurrence (Liu & Alloy, 2010).

Finally, chronic stress has rarely been examined relative to other well-established depressive risk factors, such as cognitive vulnerabilities and personality pathology. Dysfunctional cognitions are well-known predictors of MDD recurrence (Ilardi, Craighead, & Evans, 1997; Otto et al., 2007; Segal, Gemar, & Williams, 1999). Similarly, greater personality disorder symptoms are consistently associated with greater rates of MDD recurrence and decreased time between MDEs (Hart, Craighead, & Craighead, 2001; Ilardi et al., 1997; Skodol et al., 2011). A previous report from the study's larger parent project indicated that residual subsyndromal levels of depressive symptoms and total personality pathology predicted greater recurrence of MDD (Craighead, Sheets, Craighead, & Madsen, 2011). The present study aimed to identify how chronic stress uniquely impacts depression beyond these predictors, so baseline subclinical depressive symptoms, dysfunctional cognitions, and personality pathology were covariates in all models.

A series of survival analyses were conducted to examine chronic stress broadly, and then increasingly more specifically, as a key contributor to MDD recurrence in emerging adulthood. Total chronic stress was hypothesized to predict MDD recurrence, over and above known depressive risk factors. Additionally, chronic interpersonal stress was expected to predict recurrence, while chronic noninterpersonal stress was not. Emerging adulthood is a developmental phase in which young adults are increasingly exploring and relying on new social networks yet remaining connected with family (Arnett, 2004). Therefore, chronic stress in romantic relationships, close friendships, social life, and family relationships were expected to contribute uniquely to the prediction of MDD recurrence. If supported, the predicted results would highlight the importance of evidence-based interventions that target social problem-solving and stress management during the transition to adulthood.

Method

Participants

Participants were students at a large, public university in the Western United States. All participants were recruited by mail and email during the summer and early fall of their first semester of college. The screening survey asked participants if they had experienced a depressive episode during high school and if they were currently in treatment for depression. Respondents were asked to return the survey only if they believed they had experienced a previous depressive episode (for a detailed description of sampling and recruitment, see Craighead et al., 2011). All enrolled participants met DSM-IV diagnosis of at least one past episode of major depressive disorder (MDD), but they had 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 DSM-IV diagnostic criteria for MDD and experienced no more than two depressive symptoms. Additional inclusion criteria were: 18–21 years of age, and a full-time, first-year university student. Exclusion criteria included current mood disorder (i.e., major depressive disorder or dysthymic disorder), bipolar disorder, history of any psychotic disorders, current substance dependence, imminently suicidal, currently in psychotherapy, or currently taking an antidepressant medication.

The present study combined data from two research projects with identical recruitment and assessment procedures; both studies were approved by the university's institutional review board. The first 50 participants of the present study were randomly assigned to the assessment only condition of a larger study examining a group intervention for depression prevention. In order to examine predictors of depression recurrence, 85 additional participants were recruited directly for assessment only, forming an initial sample of 135 participants; the latter group followed assessment procedures that were identical to the randomly assigned participants. Five participants were excluded due to missing IPDE or BDI data; at the first follow-up interview, two others retrospectively reported that a new MDE had begun at the time of study entry and were excluded. Nine participants did not complete any follow-up assessments and therefore could not be included in final analyses. The final sample for survival analysis comprised 119 participants (79% female, 71% Caucasian).

Assessment measures

Structured clinical interview for DSM-IV, research version

The SCID (First, Spitzer, Gibbon, & Williams, 2001) is a commonly used semi-structured interview, which provides information for current and lifetime diagnoses of Axis I disorders. A random 20% of interviews from the larger project were evaluated for interrater reliability; MDD diagnosis reliability was moderately satisfactory ($\kappa = 0.66$).

International personality disorder examination

The IPDE (World Health Organization, 1996) is a 99-item semi-structured clinical interview that produces both dimensional and categorical scores for the DSM-IV personality disorders. Due to inconsistent empirical support for the DSM-IV Axis II structure (Sheets & Craighead, 2007), the present study focused on the total dimensional score of personality pathology, rather than cluster or disorder specific scores. Twenty percent of the interviews from the larger project were assessed for inter-rater reliability across six interviewers. The intraclass correlation Case 1; (Shrout & Fleiss, 1979) for the IPDE total dimensional score in Study I was 0.95.

Beck depression inventory-II

The BDI-II (Beck, Steer, & Brown, 1996) is a 21-item self-report measure designed to assess the severity of depression symptoms. Higher scores indicate greater depression symptomatology. The scale had good internal consistency in this study (Cronbach's alpha = 0.84).

Dysfunctional attitudes scale

The DAS (Weissman & 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). The total score was used with higher scores indicating greater endorsement of dysfunctional beliefs. The measure had high internal consistency in the current study (Cronbach's alpha = 0.91).

Longitudinal interval follow-up evaluation – modified

The LIFE (Keller et al., 1987) is a semi-structured interview created to assess the longitudinal course of DSM-IV Axis I symptoms and disorders. Specific dates of symptom onset are recorded to determine relapse and recurrence. The LIFE is designed to be administered every 6 months but is adaptable; if a participant misses a follow-up interview, information for the missing period can be collected at the next interview. A random 20% of interviews from the first two cohorts of this study were evaluated for reliability; interrater reliability of MDD diagnosis was excellent ($\kappa = 0.94$).

UCLA life stress interview

The UCLA LSI (Hammen et al., 1987) is a semi-structured interview that assesses ten domains of chronic stress: committed romantic relationships, dating, close friendships, social life, family relationships, academics, work, financial state, participants' physical health, and family members' physical health. Using standard probe questions and follow-up queries, interviewers obtain information to rate each domain on a scale of 1–5, with behaviorally specific anchors for each value. For example, a score of "2" on close friendship stress represents the presence of a close, stable, confiding relationship, while "4" represents presence of only an unstable or poor quality friendship. Higher ratings indicate poorer functioning and greater chronic stress. Level of chronic stress is determined by identifying typical experiences over the previous 6 months. Similar to the LIFE, if a participant missed a follow-up interview, information for the missing period was collected at the next interview. The interview has been shown to be reliable and valid with strong convergent and construct validity (Hammen et al., 1987). Because many participants were either in a committed relationship *or* were casually dating while enrolled in the study, they could not provide data on both domains. Therefore, a general Romantic Relationship stress score was created that was either the committed relationship or dating score, or the average of both when available.

The Total Chronic Stress score was calculated as the total of all nine chronic stress domains for each specific 6-month follow-up period. In the sample, Total Chronic Stress scores ranged from 12 to 28. The Interpersonal Chronic Stress score for a follow-up period was the total of Romantic Relationship, Close Friendships, Social Life, and Family Relationships. Interpersonal Chronic Stress scores ranged from 4 to 14.5. The Noninterpersonal Chronic Stress score was the total of Academic, Work, Financial State, Participant Health, and Family Members' Health chronic stress scores. Noninterpersonal Chronic Stress scores ranged from 5 to 16.

Assessment procedures

Baseline assessments were conducted in two, 2-h sessions. At session one, participants completed the consent form, the BDI-II, the DAS, and the SCID.[3] The IPDE was conducted at session two. By assessing personality pathology at baseline when all participants were out of episode for depression, potential mood-state effects of personality symptom report could be avoided (Zimmerman, 1994).

Six, twelve, and eighteen months after the baseline assessment, participants were contacted to continue their participation. At each 90-min follow-up assessment, participants completed a follow-up consent form, the LIFE to assess course of Axis I disorders over the previous 6 months, and the UCLA LSI to assess chronic stress over the previous 6 months. If a participant missed one follow-up interview but later returned to the study, they provided LIFE and UCLA LSI data on the previous 12 months. Participants received cash compensation at the end of the baseline assessments and at each follow-up session.[4] Treatment referrals were given when clinical judgment indicated a participant needed or might benefit from psychological or psychiatric intervention.

Advanced graduate students in clinical psychology conducted all interviews. During assessment phases, the clinical raters and a Ph.D. level clinical psychologist with extensive assessment experience met weekly to reach consensus on all diagnoses and discuss each stress interview. In order to estimate missing data items with minimal distortion, an individual's mean item score was substituted for single missing items on the BDI, the DAS, and the UCLA LSI scales (Downey & King, 1998).

Results

Attrition and recurrence during follow-up

The average length of follow-up was 515.52 days (16.94 months). Study completers were followed for an average of 553.73 days (18.19 months), which corresponded with the first 2 academic years of college. Twenty-seven of 119 participants (23%) were lost to follow-up. Using baseline variables, completers were compared with the 27 participants lost to follow-up. The two groups did not differ significantly on demographics (gender and race), dysfunctional cognitive style, or level of personality pathology. Only baseline BDI score predicted drop-out versus study completion, $\chi^2(1, N = 128) = 4.52$, $p = 0.034$. Participants who dropped out of the study reported a higher level of depressive symptomatology at baseline. Of the 119 participants included in survival analyses, 34

[3] 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.

[4] The first 46 participants were paid $36 for the baseline assessment and each of the follow-up assessments. The later 73 participants were paid $40 for the baseline assessment and $30 for follow-up assessments.

(28.57%) experienced a new MDE during their first 2 years of college. The average length of survival before recurrence was 438.88 days (14.42 months).

Analytic strategy

All statistical analyses were conducted in SAS, version 9.3. Predictors of MDD recurrence were tested in semiparametric proportional hazards (Cox regression) models using the SAS PHREG procedure. An alpha level of 0.05 was used in all analyses.

The primary aim of the study was to examine chronic stress, varying across follow-up, as a predictor of MDD recurrence over and above the well-established depression risk factors of dysfunctional cognitions and personality pathology (Table 1). Due to the known relationship of subsyndromal depressive symptoms and MDD recurrence (Craighead et al., 2011; Judd, Akiskal, & Paulus, 1997), baseline BDI was entered as a static, or time-fixed, covariate in all survival analyses, to control for the relationships of baseline depressive symptoms and MDD recurrence and baseline depressive symptoms and chronic stress generation (Hammen, 2005). Additionally, it was important to include this covariate because it predicted censoring due to drop-out.

Both dysfunctional cognitive style and personality disorder symptoms are theorized to be stable characteristics. Moderate to high stability in DAS scores has been demonstrated in depressed and non-depressed adults (Farmer et al., 2001). Moreover, cognitive vulnerability has shown considerable stability during the transition into emerging adulthood (Romens, Abramson, & Alloy, 2009). Personality disorders are defined as enduring patterns of experience and behavior that are stable over time (American Psychiatric Association, 2013). Therefore, these variables also were examined as static covariates.

It was hypothesized that variations in chronic stress over time, particularly chronic interpersonal stress, were predictive of MDD recurrence. Therefore, chronic stress scales were treated as time-dependent variables in the Cox proportional hazards models. This analytic approach assumed that, because chronic stress levels changed during the 2-year follow-up phase, using the value most recent to each date of recurrence provided more accurate estimates. Time-dependent variables were created for each chronic stress domain, chronic interpersonal stress, chronic non-interpersonal stress, and total chronic stress.

Before survival analyses were conducted, assumptions of Cox proportional hazards models were tested. The static covariates (baseline BDI score, DAS total score, and IPDE dimensional total score) were examined for normality. Only the IPDE dimensional total was significantly non-normal with a positive skew of 1.09; a square-root transformation was performed before the variable was included in analyses. Next, the squared multiple correlations for variables were examined. The highest SMC was only 0.21 indicating that multicollinearity between the variables was very unlikely. Finally, to test the assumption of proportionality of hazards, the interaction of time and each static covariate was tested; none of the variables violated this assumption.

Table 1
Means, standard deviations, range, and correlations of static covariates.

Variable	*M (SD)*	Range	1	2
1. Baseline BDI-II	11.95 (7.15)	1–32		
2. DAS Total	133.63 (28.10)	72–204	0.42**	
3. IPDE Dimensional Total	9.30 (7.83)	0–35	0.18*	0.08

Note. BDI-II = Beck Depression Inventory (2nd ed.); DAS = Dysfunctional Attitudes Scale; IPDE = International Personality Disorder Examination. *$p < 0.05$, **$p < 0.001$.

Time-varying chronic stress as predictor of MDD recurrence

Table 2 presents the results of the survival analyses. It was hypothesized that total chronic stress would predict risk of MDD recurrence in this sample, over and above baseline depressive symptoms, dysfunctional cognitions, and personality pathology (Model 1).[5] The variables formed a significant omnibus model of MDD recurrence, χ^2 (4, $N = 119$) = 18.94, $p = 0.001$. Total chronic stress demonstrated a stronger relationship with depression than the previously-established risk factors, χ^2 (1, $N = 119$) = 4.80, $p = 0.029$. The hazard ratio indicates that each 1 point increase in total chronic stress was associated with a 16% increase in MDD risk.

The second model compared chronic interpersonal stress and chronic noninterpersonal stress as distinct predictors of MDD recurrence. As hypothesized, interpersonal stress was a strong predictor of depression, χ^2 (1, $N = 119$) = 8.02, $p = 0.005$, while noninterpersonal stress did not predict recurrence, *n.s.*

To further explore the relationship of chronic stress and depression, an exploratory analysis of the individual domains as predictors of subsequent depression was conducted. Chronic romantic relationship stress was a unique predictor of survival time, $p = 0.015$, as were chronic close friendship stress, $p = 0.023$, and chronic family relationship stress, $p = 0.045$. All relationships were in the expected direction with greater interpersonal stress increasing the risk for depression. Although aggregate scores of chronic noninterpersonal stress did not predict recurrence in Model 2, two individual stress domains were significant predictors of survival time. Greater chronic personal health concerns predicted shorter time to depressive recurrence, $p < 0.001$. Having a family member with chronic health concerns, however, was protective against depressive recurrence, $p = 0.052$. Model 3 had the best overall fit to the data; based on the R^2 statistic originally proposed by Cox and Snell (Cox & Snell, 1989) and later described for survival analysis by Allison (Allison, 1995), overall time to MDD recurrence was reasonably well-predicted by this model, $R^2 = 0.273$.

Discussion

Despite continuing recommendations to expand research on chronic stress as a potent predictor of MDD (Hammen, 2005; Mazure, 1998), the topic has remained largely unexplored. Several investigators have advocated finer-level analyses that compare the relative impact of domain-specific stresses (Hammen et al., 2009; Liu & Alloy, 2010; Mazure, 1998). The present study compared multiple domains of chronic stress simultaneously as time-varying predictors of depressive recurrence among emerging adults. As hypothesized, total chronic stress predicted risk for depressive recurrence, over and above well-established risk factors of subclinical depressive symptoms, dysfunctional cognitions, and total personality pathology. Individuals who experienced greater chronic stress were at greater risk for depressive recurrence during the first two years of emerging adulthood. This finding reinforces previous cautions that the field of depression research has missed an important source of variability by neglecting to identify and understand the role of chronic stress in the broad stress–depression relationship (Hammen, 2005; Hammen et al., 2009; Mazure, 1998). These results are consistent with evidence that chronic stress increases risk for depression, particularly among

[5] We conducted all analyses with gender included as a covariate. Gender was not a unique predictor of MDD recurrence and all results were the same with and without the gender variable. For parsimony, the analyses are presented without the gender variable.

Table 2
Cox proportional hazards models with static and time-dependent covariates ($N = 119$).

	Wald χ^2	p	Hazard ratio	95% CI
Model 1: Total Chronic Stress	18.94	0.001		
Baseline BDI-II	5.03	0.025	1.06	[1.01, 1.11]
DAS Total	0.06	0.802	1.00	[0.99, 1.01]
IPDE Dimensional Total[a]	0.93	0.336	1.14	[0.88, 1.47]
Total Chronic Stress	4.80	0.029	1.16	[1.02, 1.32]
Model 2: Interpersonal and Noninterpersonal	22.24	0.001		
Baseline BDI	4.97	0.026	1.06	[1.01, 1.11]
DAS Total	0.00	0.972	1.00	[0.99, 1.01]
IPDE Dimensional Total[a]	0.59	0.444	1.11	[0.86, 1.43]
Interpersonal Chronic Stress	8.02	0.005	1.36	[1.10, 1.69]
Noninterpersonal Chronic Stress	0.02	0.898	0.99	[0.79, 1.23]
Model 3: Chronic Stress Domains	36.10	<0.001		
Baseline BDI	8.58	0.003	1.08	[1.03, 1.14]
DAS Total	0.08	0.780	1.00	[0.99, 1.01]
IPDE Dimensional Total[a]	0.26	0.609	1.08	[0.81, 1.45]
Romantic Relationship Stress	5.95	0.015	2.14	[1.16, 3.95]
Close Friendship Stress	5.17	0.023	2.22	[1.12, 4.40]
Social Life Stress	1.41	0.236	0.66	[0.33, 1.32]
Family Relationship Stress	4.01	0.045	1.81	[1.01, 3.23]
Academic Stress	0.01	0.927	0.97	[0.56, 1.71]
Work Stress	0.61	0.434	0.70	[0.28, 1.72]
Financial Stress	0.00	0.957	0.98	[0.51, 1.88]
Personal Health Stress	14.05	<0.001	4.95	[2.14, 11.41]
Family Member Health Stress	3.79	0.052	0.46	[0.21, 1.01]

Note. BDI = Beck Depression Inventory (2nd ed.); DAS = Dysfunctional Attitudes Scale; IPDE = International Personality Disorder Examination.
[a] Square-root transformation performed before survival analysis to correct for positive skew.

previously depressed individuals (Hammen et al., 2009; Monroe et al., 2007).

When total chronic stress was broken down into interpersonal and noninterpersonal domains, chronic interpersonal stress predicted depressive recurrence, replicating the emphasis in stress generation research on the importance of dependent, and particularly interpersonal, stress (Hammen, 2006; Liu & Alloy, 2010; Stroud et al., 2011). As Liu and Alloy have suggested (Liu & Alloy, 2010), with multiple major depressive episodes, individuals may become increasingly sensitive to interpersonal conflict, while noninterpersonal stressors remain less associated with mood symptoms. Within the interpersonal stress domains, chronic romantic relationship issues, chronic friendship stress, and chronic family conflict all uniquely predicted an increased risk for depressive recurrence. The key and distinct relationships of each of these stressors with MDD recurrence appear developmentally appropriate to the phase of emerging adulthood (Arnett, 2004). Emerging adulthood is characterized by several developmental features including the exploration of serious romantic relationships, an increased emphasis on close friendships as primary social support, and individuation from one's family of origin. Although each of these developmental tasks creates transitory stress for most individuals, chronic stress in the domain would inhibit a key area of focus and functioning during emerging adulthood, thus creating a vulnerability to depression onset.

One unexpected finding regarding chronic noninterpersonal stress emerged: chronic stress related to family members' health concerns was protective against MDD recurrence. This finding is not yet well-explained by other research and warrants further investigation. If this chronic stress is experienced across the family unit rather than solely by the individual, parents and/or treatment providers may encourage emotional disclosure and facilitate the development of coping resources. As a young adult becomes "acclimatized" to dealing with the stress of a family member's chronic health problems (Cairney, Boyle, Offord, & Racine, 2003), they may gain stress management skills that protect them against other stressors and future depressive episodes.

There are limitations of examining a self-selected, emerging adult sample. It is likely that these specific patterns of interpersonal stress domains and depression risk do not generalize to adults in other phases of adulthood. It is also possible that different stress domains predict depressive recurrence in emerging adults who do not matriculate in a higher education institution, although the rates of initial and recurrent MDD are the same in college student and nonstudent emerging adults (Hankin et al., 1998). Males were under-represented in this sample, though males and females appear to be equally vulnerable to relapse or recurrence of MDD (Fergusson & Woodward, 2002; Kessler, McGonagle, Swartz, Blazer, & Nelson, 1993). Finally, future investigations involving cognitive vulnerabilities should include assessments that are not dependent on self-report.

Despite these limitations, the study had a number of strengths. This research is innovative as the first study to examine a broad range of chronic stress domains as predictors of MDD recurrence, including the simultaneous comparison of interpersonal and noninterpersonal chronic stress domains. Methodological advantages of the design include the use of gold-standard semi-structured interviews to assess history of MDD, course of MDD, personality pathology, and chronic stress. The study enrolled participants at high risk for depressive recurrence due to early onset of depression. Also, chronic stress was examined as a time-varying predictor, improving estimation of the stress–depression relationship.

The project points to several paths for future research. Further investigation of the association of chronic interpersonal stress with more distal predictors of MDD risk, such as genetic markers (e.g., 5-HTTLPR, FKBP5 and others) and childhood adversity, is needed. Initial research in this area indicated that chronic family stress predicted depression in emerging adulthood, particularly for those with the short allele variants of 5-HTTLPR (Hammen, Brennan, Keenan-Miller, Hazel, & Najman, 2010; Vrshek-Schallhorn et al., 2014). It is unknown whether 5-HTTLPR (or another specific genetic marker) similarly moderates the association of other chronic stress domains and MDD recurrence. It is also possible that specific chronic interpersonal stress domains mediate the ongoing effects of childhood adversity on adult depression. Further research is

needed to determine how early adversity contributes to the generation and perception of chronic stress into adulthood.

The current findings have implications for evidence-based interventions (e.g., interpersonal psychotherapy, behavioral activation, and cognitive-behavioral therapy) used as acute treatment to reduce depressive symptoms, and particularly as maintenance treatment to sustain positive outcomes and prevent MDD recurrence. Following the interpersonal psychotherapy (IPT) model, emerging adults are experiencing a significant life transition from high school into college or work life (Weissman, Markowitz, & Klerman, 2000). The role transition from dependent adolescent to increasingly independent adult creates significant vulnerability to interpersonal issues and resultant depression. It is consistent with the IPT model that chronic stress in the most meaningful relationships (romantic partners, friends, and family) would be most predictive of depressive recurrence. These data suggest that intervention focused around the IPT problem areas of role transition and interpersonal deficits would be effective at both treating and preventing future depression in emerging adults. In addition to acute intervention, research supports IPT as maintenance treatment for recurrence prevention (Frank et al., 2007, 1990) and within university-based prevention programs (Sheets et al., 2013).

These findings also relate to core elements of the behavioral activation (BA) approach to depression treatment. The likely response of many individuals experiencing chronic interpersonal stress would be to disengage from the fraught relationships. However, these avoidance behaviors reduce the opportunities for positively reinforcing interactions and increase negative affect over time (Jacobson, Martell, & Dimidjian, 2001; Martell, Addis, & Jacobson, 2001). The impact of chronic interpersonal stress potentially could be mitigated through BA strategies such as graded task assignment for avoidance modification. Patients would be encouraged to move toward effective social problem-solving within the troubled relationship(s), or alternatively to broaden their social network to include more positively reinforcing relationships. BA has shown enduring effects in the prevention of MDD recurrence (Dobson et al., 2008).

Finally, there are specific suggestions and implications provided by the current chronic interpersonal stress data for cognitive-behavioral therapy (CBT). Compared to acute treatment, it may be even more important during maintenance treatment to focus on enduring cognitive patterns related to social relationships. Similarly, longer-term intervention with CBT for difficult patients (Beck, 2011) may need to focus on schemas contributing to prolonged interpersonal stress. In their review of acute and maintenance effects of individual and combined therapies, Craighead and Dunlop (2014) reported that chronically depressed individuals, who are less likely to remit with acute CBT, IPT, or antidepressant medications, respond better to Cognitive Behavioral Analysis System of Psychotherapy (CBASP; McCullough, 2003) which includes a large social problem-solving component (Nezu, Nezu, & D'Zurilla, 2012). These effects may very well be because the sustained effective treatments ameliorate the chronic interpersonal stress that contributed significantly to recurrence of depression during emerging adulthood.

In conclusion, chronic interpersonal stress has clear effects on the course of recurrent depression into early adulthood. Among previously depressed individuals, prevention and swift intervention when depressive symptoms re-emerge are critical because experiences in emerging adulthood impact relationship selection, occupational trajectories, and the development of effective coping strategies. Findings from this study point toward the importance of therapies that target social problem solving during the transition to adulthood.

Conflict of interest statement

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