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Developmental Relations between Depressive Symptoms, Minor Hassles, and Major Events from Adolescence Through Age 30

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Abstract

Stress generation and stress exposure models of the relations between depressive symptoms, minor hassles, and major event stress were investigated among 815 community-dwelling participants. Autoregressive latent trajectory models were constructed to examine latent growth patterns from ages 15–30 and to test one-year lagged, reciprocal paths between depressive symptoms and stress constructs. Results indicated significant cross-sectional and longitudinal associations between depressive symptoms and both stress constructs at the latent level. At the manifest level, lagged paths from hassles at one year to depressive symptoms at the next year were significant between ages 17–24. Significant cross-sectional paths between major events and depressive symptoms were found between ages 24–28, and modest support was found for lagged paths from depressive symptoms to major events one year later. Findings generally suggest a high degree of covariation in depressive symptoms and stress concurrently and over time. One-year lagged predictive effects net of the associations between individuals' latent trajectories appear to be weak, constrained to specific time periods, and most consistent with a stress exposure effect of hassles on depressive symptoms.

Keywords

Depression; Stress; Major Events; Hassles; Trajectories

The association between stress and depressive symptoms in youth and young adults has received considerable attention. Extensive literature supports the stress exposure model of depression, in which the experience of stress promotes the development of depressive

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symptoms (Ge, Conger, & Elder, 2001; Hammen, 2005; Lewinsohn, Roberts, Seeley, Rohde, Gotlib, & Hops, 1994). Although the reverse path in which depressive symptoms prospectively promote the development of stress has been investigated less frequently than the stress exposure model, a degree of support has emerged (Hammen, 1991; Lewinsohn, Rohde, Seeley, & Gotlib, 2003; Rudolph, Hammen, Burge, Lindberg, Herzberg, & Daley, 2000; Van Os & Jones, 1999). In conjunction, these two bodies of literature suggest that depression and stress reciprocally influence one another. Until recently, however, investigations of bi-directional relations between depression and stress have been limited to cross-sectional and two-wave designs, which provide limited “snapshots” of complex temporal processes (Curran & Hussong, 2003).

Recent research has used multi-wave designs and advanced statistical procedures to examine patterns of growth in depressive symptoms and stress in youth (Carter, Garber, Ciesla, & Cole, 2006; Cole, Nolen-Hoeksema, Girgus, & Paul, 2006; Garber, Keiley, & Martin, 2002; Ge, Natsuaki, & Conger, 2006; Kim, Conger, Elder, & Lorenz, 2003; Meadows, Brown, & Elder, 2006). In longitudinal studies of major life event stress and depressive symptoms ranging from 3–11 years, evidence of reciprocal effects in adolescence has been mixed. Consistent with a stress exposure model, Ge et al. (2006) reported that initial levels of major events at age 12 predicted growth in depressive symptoms, and that variations in major events over time predicted growth in depressive symptoms through age 23. In contrast, Garber et al. found that initial levels of major events cross-sectionally associated with depressive symptoms, but did not significantly predict growth in depressive symptoms from grades 6–11. Neither of these studies tested the reverse path from depressive symptoms to major events.

Others have obtained support for a reciprocal effects model of depressive symptoms and major events (Cole et al., 2006; Ge, Lorenz, Conger, Elder, & Simons, 1994; Kim et al., 2003). Kim et al. reported reciprocal effects between internalizing symptoms and major events from grades 7–12, in which scores in each domain significantly predicted scores in the opposite domain 1–2 years later. Cole et al. found support for models in which depressive symptoms and major events from grades 3–8 and from grades 7–9, respectively, predicted scores in the opposite domain 6 months later. Ge et al. (1994) reported similar reciprocal associations among girls, but not boys. Although Meadows et al. (2006) did not examine initial levels of major events as a predictor of growth in depressive symptoms, they found that variations in major events over time associated with changes in depressive symptoms over time among girls (not boys) from grades 7–12. To our knowledge, only one study has examined multi-wave reciprocal patterns of growth in depressive symptoms and another form of stress: minor hassles, or aversive experiences from everyday life. Carter et al. (2006) found support for reciprocal effects between internalizing scores and school-related hassles from grades 6–9. However, a stress exposure model in which school-based hassles predicted internalizing symptoms one year later provided the best fit to the data, leading Carter et al. to select it over the reciprocal effects model.

Taken together, results from prior multi-wave studies tend to support stress exposure effects in which major events or hassles predict subsequent increases in depressive symptoms. The stress generation path from depressive symptoms to increases in stress has received less empirical scrutiny; results are mostly suggestive of a positive predictive effect, but it is difficult to draw conclusions at this point. The purpose of the present research was to add to and extend existing literature on longitudinal patterns of growth in stress and depressive symptoms. Whereas past research on reciprocal models has examined either major events, or in one instance, school-based hassles, we examined both major events and minor hassles. Rather than emphasizing school-based hassles, we examined hassles from everyday life across a broad range of domains (e.g., being criticized, being excluded, not having enough

money for recreation, etc.). Inclusion of major events and hassles in the same study enhances understanding of whether they similarly impact – and are similarly impacted by – depressive symptoms.

An additional aspect of prior multi-wave research on depression and stress is an emphasis on middle and high school years. In one exception, Ge et al. (2006) extended their models through early adulthood (age 23). Using data from the Oregon Adolescent Depression Project (OADP), the present study examined trajectories from ages 15–30. This approach adds to existing research on growth patterns in adolescence and extends such research through the third decade of life. This allowed us to address whether depressive symptoms and stressful environments in adolescence set the stage for adjustment difficulties through the 20s. These are important developmental periods in which individuals face rapidly changing opportunities and challenges, such as the transition out of high school, achieving independence from parents, entrance into the work force and/or pursuit of higher education, increasing stability and intimacy in social and romantic relationships, and in many cases, adaptation to the roles of marriage and parenthood (Arnett, 2000). Adolescence and early adulthood also represent the peak onset windows for depressive disorders (Sorenson, Rutter, & Aneshensel, 1991), making those ideal times in which to examine developmental relations between stress and depressive symptoms.

In the present study, we drew upon prior research and Lewinsohn, Hoberman, Teri, and Hautzinger's (1985) integrative model of depression to guide hypotheses and model testing. The integrative model posits that the disruption of behavior patterns via stress initiates a sequence culminating in depression, which in turn feeds back into continued behavior disruption. Stemming from this theoretical model and past research, we hypothesized reciprocal effects between depression and stress, both for major life events and minor hassles. Past research on the trajectory of depressive symptoms suggests that they increase in early adolescence, then decline in late adolescence and early adulthood (Ge et al., 1994, 2006; 1994; Hankin, Abramson, Moffitt, Silva, McGee, & Angell, 1998; Meadows et al., 2006). We therefore anticipated that the trajectory of depressive symptoms in our sample would slightly increase in late adolescence and then decline through age 30. The trajectories of stress are less clear, with some studies reporting increases through adolescence (e.g., Garber et al., 2002) and others reporting decreases (e.g., Schmeelk-Cone & Zimmerman, 2003). Based on the notion of reciprocal growth, we tentatively expected that mean trajectories in hassles and major events would mirror that of depressive symptoms and decrease through age 30. Finally, based on theoretical arguments and empirical evidence that the relations between stress and depression may be stronger for women than men (Ge et al., 1994; Hammen, 2005; Meadows et al.; Nolen-Hoeksema, 2006; Rudolph, 2002), we expected that reciprocal effects would be most likely to emerge among women.

We tested hypotheses using an autoregressive latent trajectory (ALT) modeling approach. As described by Bollen & Curran (2004), ALT incorporates key components of both latent growth trajectory models and autoregressive models. Random intercept, linear, and quadratic factors are drawn from the latent trajectory approach to capture the fixed and random effects of the trajectories over time. Standard, fixed autoregressive parameters are drawn from the autoregressive approach to capture the time-specific influences between repeated measures (Bollen & Curran, 2004, pg. 346). This modeling approach is based on the assumption that behavior at any point in time is likely to operate as a function of both individual trait-like trajectories and recent state-like experiences. The ALT model allows each participant to have a distinct, trait-like trajectory (which is not the case with autoregressive models) and allows for additional state-like effects due to prior values of the repeated measure (which is not the case with traditional latent trajectory models). The ALT approach therefore permits the examination of a more theoretically compelling framework

than either autoregressive or latent trajectory approaches alone by simultaneously modeling individual differences in long-term trajectories and the time-specific impact of past behavior on future behavior (Zyphur, Chaturvedi, & Arvey, 2008). This is in contrast to prior examinations of stress exposure and stress generation models, which examined either trait-like influences or state-like influences, but failed to take into account both influences. By providing a more complete model of the developmental relations between depressive symptoms and stress, the ALT model may clarify discrepant findings from previous studies.

In the present study, univariate ALT models were used to describe latent trajectories in depressive symptoms, hassles, and major events from ages 15–30, with one-year lagged autoregressive effects. Bivariate ALT models were then used to examine co-occurring trajectories of depressive symptoms and each respective stress construct, while simultaneously incorporating one-year lagged autoregressive and cross-lagged effects. In essence, the bivariate ALT model represents a synthesis of the bivariate cross-lagged model and the parallel process latent trajectory model (Bollen & Curran) and allows for a test of the relations between depressive symptoms and stress over time.

Method

Sampling Strategy

OADP participants were randomly selected from high schools in western Oregon. A total of 1709 adolescents (ages 14–18; mean age 16.6, SD = 1.2) completed an initial (T1) assessment between 1987 and 1989. Approximately one year later, 1507 of the adolescents (88%) returned for a second evaluation (T2). Differences between the sample and the larger population from which it was selected, and between participants and those who declined to participate or dropped out of the study before T2, were negligible (Lewinsohn, Hops, Roberts, Seeley, & Andrews, 1993). At age 24, all adolescents with a history of MDD by T2 ($n = 360$) or a history of non-mood disorders ($n = 284$), and a random sample with no history of psychopathology by T2 ($n = 457$) were invited to participate in a third (T3) evaluation. Of the 1101 T2 participants selected, 941 (85%) completed the T3 evaluation. T2 diagnostic groups did not differ on T3 participation rate. At age 30 (mean = 30.1 years, SD = .71), all T3 participants were invited to participate in a T4 evaluation. Of the 941 T3 participants, 815 (87%) completed the T4 diagnostic interview. The 815 T4 participants included 479 (59%) women. Among those invited to T3 and T4 assessments, women were more likely than men to complete evaluations, $\chi^2 > 5.99$, p 's < .05; participation did not differ as a function of other demographic variables or previous diagnoses.

In addition to the four major assessments, participants were asked to complete seven annual questionnaires that included measures of depressive symptoms and stress. The period covered by the annual questionnaires ran on average between the ages of 21–28 (mean age at first mailer = 21.53 years, SD = 1.51 years). The 815 participants who completed the four major assessments represent the reference sample for this report. Ninety-seven percent of participants completed at least four annual questionnaires, meaning that data from at least eight assessment points were available for almost all participants.

Measures

Depressive Symptoms were measured with the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977). The CES-D is a widely-used self-report measure of the frequency of 20 depressive symptoms during the past week. Its reliability and validity in adolescent and young adult samples have received ample support (e.g., Roberts, Lewinsohn, & Seeley, 1991). Internal reliability in the present sample was good, with coefficient alpha ranging from .91-.92 across the assessment waves.

Minor Hassles were measured with the Unpleasant Events Schedule (UES; Lewinsohn, Mermelstein, Alexander, & MacPhillamy, 1985). The short form of the UES contains 20 items that assess the frequency of occurrence of unpleasant events in the past month. Examples include “being insulted,” “not having enough money for hobbies, recreation, entertainment, etc.,” “being excluded or left out,” and “working under a great deal of strain.” Items are scored on a 5-point likert scale ranging from 0 (“not at all”) to 4 (“about every day”). Internal consistency and test-retest reliability of the UES have received support (Andrews, Lewinsohn, Hops, & Roberts, 1993). Internal reliability in the present sample was acceptable, with coefficient alpha ranging from .87–.89 across the assessment waves.

Major Life Events measured the occurrence of 12 negative life events to oneself in the prior year. On the basis of relative frequency and negative valence (Andrews et al., 1993), these events had been selected from 59 events from various measures, including the Schedule of Recent Experiences (Holmes & Rahe, 1967) and the Life Events Schedule (Sandler & Block, 1979). Examples include “had an illness or accident requiring hospitalization,” “important possession stolen,” and “got in serious trouble with the law.” Previous work supported the test-retest reliability of the measure and demonstrated high agreement between these self-report negative events and subsequently obtained interview-based ratings (Lewinsohn, Joiner, & Rohde, 2001; Lewinsohn, Rohde, & Gau, 2003).

Analytic Approach

Primary advantages of the ALT analytic approach used in the present study are that individuals do not have to be measured at all occasions and that the measurement intervals do not have to be constant. In such cases, maximum likelihood estimation was used to incorporate missing data points (Ferrer, Hamagami, & McCardle, 2004; Muthén & Shedden, 1999). All models were estimated using the statistical program Mplus, Version 4.1 (Muthén & Muthén, 1998–2006).

Measures on each domain were collected at 11 assessment waves. Due to the presence of age heterogeneity at each assessment wave, data were available at every age year from 15 to 30 (although no participant had more than 11 data points). We used an age-based approach that allowed us to examine the entire 16-year span represented in the sample. Age was scaled to the youngest value at the first wave of data (15), and the outcome at each year in age was read in as a separate variable (Mehta & West, 2000). Participants were assumed to have missing data at ages for which they did not provide data. This approach takes advantage of the age heterogeneity within assessment points and bridges the data gap in years without assessment (Ge et al., 2006). The number of participants with data at each age year is listed in Table 1.

The following steps were taken in model development. First, we estimated univariate latent growth models (no growth, linear growth, quadratic growth) to determine the shapes of the trajectories in depressive symptoms, hassles, and major events. Autoregressive paths from one age year to the next age year were then added to the best fitting univariate latent growth models to develop the univariate ALT models.¹ At each step of the univariate model building process, a series of constraints was examined to determine the best model fit. Next, the best fitting univariate ALT models of depressive symptoms and each respective stress domain were used to develop a bivariate ALT model to examine the developmental relations between depression and each stress domain. An example of a complete bivariate ALT model used this investigation is presented in Figure 1. A significant path from the latent intercept of one domain to the latent slope of the other domain would indicate that the trait-like component of the first domain is associated with the rate of change in the second domain over the 16-year study period. The inclusion of one-year cross-lagged paths permitted an examination of time-specific stress generation and stress exposure effects. That is, it allowed

us to evaluate the extent to which state-like levels of stress at each age year predicted state-like fluctuations in depressive symptoms at the next age year and vice versa, above and beyond what would be expected based on individuals' latent trajectories.

Given the stratified sampling procedure used at T3, weights reflecting the probability of selection for the T3 follow-up were used in all analyses. Values of 0.90 or greater on the comparative fit index (CFI) and Tucker-Lewis Index (TLI) and 0.05 or lower on the root mean square error of approximation (RMSEA) were deemed to represent an acceptable model fit (Bentler, 1990; Brown & Cudeck, 1993).

Results

Basic Growth Trajectories

In this section, we present the development of univariate models of depressive symptoms, hassles, and major events. Whereas univariate models do not address the primary aims of this investigation, they are necessary precursors to the construction of bivariate models that test hypotheses from the stress exposure and stress generation models. Observed means and standard deviations on the measured variables at each age year are presented in Table 1.

Depressive Symptoms—Prior to model building, a visual inspection of the raw individual plots revealed heterogeneity in initial status and patterns of change, suggesting potential for a non-linear trajectory across time (Curran & Hussong, 2003; Singer & Willet, 2003). To determine the latent trajectory of depressive symptoms, a sequence of intercept, linear, and quadratic growth models were fit. The quadratic model (M1, Table 2) fit significantly better than the other two models, $\Delta \chi^2$'s > 71, p 's < .01, and was selected as the base for the ALT model. We examined the ALT model using endogenous and exogenous first-wave indicators (Curran & Bollen, 2004) for the single group model. Each approach fit the data similarly well. We report the results of the endogenously modeled first-wave indicators due to the clearer interpretability of the intercept. A quadratic ALT model with constraints on the autoregressive terms across age years was developed and compared to an unrestricted quadratic ALT model, and the unrestricted model displayed a superior fit, $\Delta \chi^2$ (14, $N = 815$) = 28.15, $p < .05$ (M2, Table 2).

To examine potential gender differences, a series of multiple group analyses guided by the findings of the single-group model was conducted. The initial multiple group model was unconstrained across gender on all parameters. Models constraining the quadratic factor's mean and variance, as well as the autoregressive terms, were subsequently estimated. The best-fitting model constrained the mean and variance of the quadratic factor to be equal across genders and allowed the autoregressive terms to vary across genders (M3).

As displayed in the top panel of Figure 2, growth in depressive symptoms from age 15–30 was best characterized as nonlinear and decreasing over time. Parameter estimates for univariate models are displayed in Table 3 for women and Table 4 for men. Women endorsed significantly higher levels of and greater variability in depressive symptoms at age

¹The autoregressive (AR) functions of the ALT models were constructed around the manifest (i.e., state) variables, as originally recommended by Bollen & Curran (2004). Because the state factor may become increasingly stable over time in this approach, others have recommended constructing the AR functions around the residuals of the manifest variables when examining short time frames (e.g., Cole, Martin, & Steiger, 2005). However, the original ALT approach does appear to be appropriate for modeling longer periods of development in which psychological constructs may become increasingly stable. The present investigation fits well with that scenario, given the lengthy study period of 16 years and the possibility that stress and depressive symptoms become more stable during the progression from adolescence through age 30. During this time period and transition into young adulthood, there is likely a consolidation and stabilization of behavior patterns, which may portend increasing stability in stress and depressive symptoms (cf. Arnett, 2000; Levinson, 1978). We therefore opted to construct the AR function around the manifest variables rather than their residuals.

15 than men [t 's (813) = 4.86, 4.46, p 's <.001]; no gender differences were found in other parameters. For both genders, higher initial levels of depressive symptoms were strongly and negatively related to the linear factor and were positively related to the quadratic factor (the quadratic factor describes the downturn in depressive symptoms beyond what was predicted by the linear factor). This suggests that at the latent level, higher depressive symptoms at age 15 were related to a slower rate of improvement over time and to a greater acceleration in the rate of change over time. Examination of lagged autoregressive parameters revealed significant effects, mainly in the early- to mid-20s, and a greater number of significant effects for women (Table 3) than men (Table 4). The autoregressive effects must be interpreted in conjunction with the latent trajectory process (Bollen & Curran, 2004). For example, for each unit change in depressive symptom scores at age 22, we expect a difference of .11 for women and .15 for men in age 23 depressive symptom scores net of the latent trajectory of an individual's depressive symptoms (see Table 3 for women, Table 4 for men). In this context, therefore, it is not surprising that some autoregressive effects were not statistically significant.

Hassles—An identical analytic approach was used to model the trajectory of hassles. The quadratic model (M4, Table 2) displayed a significantly better fit than the intercept and linear models, $\Delta \chi^2$'s > 138, p 's < .01, and served as the foundation for the ALT model. Again, a constraint on the autoregressive terms across age years was examined and the unconstrained ALT model (M5, Table 2) displayed the best fit, $\Delta \chi^2$ (14, N = 815) = 79.27, p < .01. A series of multiple group analyses then examined gender constraints on parameters. No significant differences in the χ^2 values were observed between models. We retained a model that constrained the mean and variance of the intercept and the cross-group autoregressive terms across genders (M6, Table 2) based on its incremental parsimony and superior adjusted Bayesian Information Criterion (BIC) value (26746.77 vs. 26778.07), as compared to a model that freed them to vary across genders.

As displayed in the second panel of Figure 2, growth in hassles from age 15–30 was best characterized as nonlinear and decreasing. For both genders (Table 3 for women, Table 4 for men), the latent intercept of hassles was strongly and negatively related to the latent linear factor and strongly and positively related to the latent quadratic factor (here again, the quadratic factor describes the downturn in hassles beyond what was predicted by the linear factor). Moreover, these associations were significantly stronger among women than men [t 's (813) = 4.55, 3.39, p 's <.001]. This pattern of findings suggests that at the latent level, higher levels of minor hassles at age 15 were related to a slower rate of decrease in hassles over time and to a greater acceleration in the rate of change. Examination of the lagged autoregressive parameters revealed that almost all autoregressive effects were statistically significant, with the largest effects seen between ages 19–26 (Table 3). This indicates that over and above what was expected based on an individual's 16-year hassles trajectory, higher levels of hassles at one year incrementally predicted a higher level of hassles at the next year.

Major Life Events—Model building of major life event trajectories followed an identical analytic scheme to that of depressive symptoms and hassles. The quadratic model fit significantly better than the intercept and linear models, $\Delta \chi^2$'s > 474, p 's < .01, but did not provide an acceptable fit (CFI = .74, TLI = .76, RMSEA = .05). To determine the need for latent growth factors, the quadratic model was selected as the base for the ALT model and compared to a simplex model with no latent growth parameters. The quadratic ALT model displayed acceptable fit (CFI = .92, TLI = .92, RMSEA = .03), while the simplex model did not (CFI = .85, TLI = .85). A constraint on the autoregressive terms across age years was examined and the unrestricted ALT model (M7, Table 2) provided a better fit than the constrained model, $\Delta \chi^2$ (14, N = 815) = 151.17, p < .01. To examine possible gender

differences, multiple group models that freed or constrained parameters across genders were estimated, with results showing no significant difference in fit, $\Delta \chi^2 (15, N = 815) = 14.79, p = .47$. Therefore, the model constraining autoregressive parameters across genders (M8, Table 2) was chosen for its parsimony and lower adjusted BIC value (21894.49 vs. 21932.61).

As displayed in the third panel of Figure 2, growth in major events from age 15–30 was best characterized as nonlinear and increasing from ages 15–20 and decreasing from ages 20–30. Women and men did not significantly differ in initial level (intercept), rate of change (linear), or acceleration of rate (quadratic) in major events. For both genders (Table 3), initial levels of major events did not significantly associate with either the linear factor or the quadratic factor (the quadratic factor describes the downturn in major events beyond what was predicted by the linear factor). Examination of autoregressive parameters revealed that most autoregressive effects were statistically significant (Table 3). This indicates that over and above what was expected based on an individual's major events trajectory, higher levels of major events at one year incrementally predicted a higher level of major events at the next year.

Bivariate ALT Models

Based on the findings from the univariate ALT models, we constructed bivariate ALT models that tested the hypotheses derived from the stress exposure and stress generation theories. Results are presented separately for bivariate models of depressive symptoms and hassles, on the one hand, and depressive symptoms and major events, on the other.

CESD-Minor Hassles Bivariate ALT Model—To test competing stress-generation and stress-exposure models for depressive symptoms and hassles, we constructed a series of bivariate-ALT models (Curran & Bollen, 2004). The best fitting multiple group models for depressive symptoms and hassles were simultaneously estimated and allowed to covary on the manifest and latent levels. A series of within- and between-gender constraints was placed on cross-process covariations among manifest variables. The model that freed cross-process covariations to vary across time and gender provided the best fit (M9, Table 5). Lagged cross-process regressions were added to examine reciprocal, one-year prospective paths between hassles and depressive symptoms. A model that constrained the cross-process regressions to be equal across gender and freed them to vary across lags (M10, Table 5) did not differ, $\Delta \chi^2 [30, N = 815] = 39.11, p = .12$, but provided a superior fit based on adjusted BIC (50351.36 versus 50418.08) and was therefore retained.

Both genders displayed similar patterns of associations among latent parameters (Table 6), although a large number of the associations were significantly stronger among women than men (Table 6, final column). The significant path coefficient connecting the intercepts of depressive symptoms and hassles indicated a moderately strong cross-sectional association between the two trait factors at age 15. The significant and negative path coefficient from the intercept of depressive symptoms to the linear and quadratic factors of hassles indicated that adolescents with higher trait levels of depression tended to experience a slower rate of decrease in hassles over time and a greater acceleration in the decrease of hassles over time. The path coefficients from the intercept of hassles to the linear and quadratic factor of depressive symptoms were significant for women but not men, indicating that women with higher trait-level hassles tended to experience a slower rate of decrease in depressive symptoms over time and a greater acceleration in the decrease of depressive symptoms over time. The significant path coefficients between the linear factors indicated that the rate of decrease in depressive symptoms was positively associated with the rate of decrease in

hassles. The significant paths between the quadratic factors reflected a positive association in the acceleration in the rates of decrease.

At the manifest (i.e., state) level, significant covariation was observed between depressive symptoms and hassles at most age years for both genders (Table 7). Examination of lagged cross-process regressions revealed a unilateral effect of hassles predicting depressive symptoms from ages 17–24, but not at earlier and later ages. For each standardized unit change in hassles scores from ages 17–24, we would expect differences ranging from .05 (age 19→20) to .12 (age 17→18) in standardized depressive symptom scores at the subsequent age year, net of the latent trajectory of an individual's depressive symptoms, the covariation between latent trajectories of depressive symptoms and hassles, the manifest covariation between depressive symptoms and hassles, and the autoregressive effects from one age year to the next. Taken together, the autoregressive and cross-process regressions suggest significant, incremental state-level effects of hassles predicting depressive symptoms one year later during the transition from late adolescence to emerging adulthood. In contrast, depressive symptoms did not significantly and incrementally predict hassles or depressive symptoms one year later.

CESD-Major Life Events Bivariate ALT Model—A series of bivariate CESD-major events ALT models were fit to test competing stress-generation and stress-exposure models. The best fitting univariate multiple group models for depressive symptoms and major life events were simultaneously estimated and allowed to covary on the manifest and latent levels. A series of within- and between-gender constraints was placed on cross-process covariations among manifest variables. While all models fell below traditional fit criteria, the model that constrained cross-process covariations across gender but freed them across lags demonstrated the best fit (M11, Table 5). Lagged cross-process regressions were added to examine reciprocal, one-year prospective paths between major life events and depressive symptoms. The model that constrained cross-process regressions across gender and freed their variation across lags provided the best fit among the estimated models, but only a marginal fit to the data (M12, Table 5). Given the marginal fit, the results should be interpreted with caution.

The significant and negative path coefficient from the intercept of major events to the intercept, linear, and quadratic factor (for men only) of depressive symptoms indicated that adolescents with higher trait levels of major events tended to experience higher trait levels of depressive symptoms, a slower rate of decrease in depressive symptoms over time, and greater instability in the acceleration of their depressive symptoms among men (Table 8). The path coefficient from the intercept of depressive symptoms to the linear factor of major events was not significant for either gender. The significant path coefficient between the linear factors indicated that a faster rate of decrease in depressive symptoms was associated with a slower rate of increase in major events for both genders.

At the manifest (i.e., state) level, significant covariation between depressive symptoms and major events was found primarily between ages 24–28, but rarely at other ages (Table 9). Inspection of lagged cross-process regressions revealed few significant effects, with the most noteworthy pattern being four significant one-year lagged paths from depressive symptoms to major life events (ages 19→20, 21→22, 24→25, 27→28). Taken together, these findings suggest that depressive symptoms and major events generally had weak cross-sectional and one year prospective relations net of individuals' latent trajectories in these domains, with the exception of relatively inconsistent paths from depressive symptoms to major life events during young adulthood. Although individuals with higher trait levels of major events did experience a slower rate of decrease in depressive symptoms over the

entire 16-year study period, incremental time-specific effects of major events on depressive symptoms one year later were not found.

Discussion

Consistent with past research among adolescents (Ge et al., 1994, 2006; Hankin et al., 1998; Meadows et al., 2006), the present findings suggest that the latent trajectory of depressive symptoms was nonlinear and decreasing through late adolescence and early adulthood. This indicates that the previously reported decline in depressive symptoms at the end of adolescence continues through the third decade of life. Although little research has charted the latent trajectory of stress across these developmental periods, our findings indicate that the trajectory of hassles was decreasing in a somewhat similar manner to that of depressive symptoms. The best fitting model of major events suggested an increase in major events through age 20, followed by a decrease through age 30. The rising level of major events in adolescence through age 20 may reflect expected developmental occurrences such as changing residence (e.g., moving out of parents' home), but may also indicate a rise in negative events such as major arguments or fights, crime victimization, and illnesses or accidents requiring hospitalization. After peaking at age 20, the frequency of such events gradually tapered over the next decade.

After developing univariate models, stress exposure and stress generation effects were examined with bivariate ALT models. The latent trajectory portions of the ALT models (i.e., the trait portions) suggested significant associations between stress and depressive symptoms. Adolescents who experienced higher trait levels of hassles and major events also tended to experience higher trait levels of depressive symptoms. Higher trait levels of depressive symptoms were associated with slower rates of decrease in hassles for both genders and with faster rates of increase in major events among women. Similarly, higher trait levels of major events (for both genders) and hassles (for women only) were associated with slower rates of decrease in depressive symptoms. Conceptually, the cross-domain correlations between latent intercept factors and latent growth factors indicate that initial levels of the trait-like component in one domain were (in most cases) significantly associated with the rate of change in the other domain over the entire 16-year-period. Whereas these associations were broadly consistent with stress exposure and stress generation theories, they did not address the time-specific, proximal effects that are generally posited in the theories. Such time-specific effects were better captured by the autoregressive portion of the ALT models, which we discuss below.

As expected, a number of the associations between latent parameters of depressive symptoms and hassles were stronger among women than men. This gender difference is consistent with past research and theory (e.g., Ge et al., 1994; Meadows et al., 2006). As others (Ge et al., 1994; Rudolph & Hammen, 1999) have argued with regard to major events, the significant gender differences may suggest that young women are more susceptible than young men to depressive symptoms under conditions of frequent hassles. The general absence of gender differences in the associations between latent parameters of depressive symptoms and major events was unexpected, and should be interpreted with caution given the marginal model fit.

The autoregressive and cross-lagged portions of the ALT models (i.e., the state portions) revealed significant cross-sectional covariation between depressive symptoms and hassles at almost every time point, as well as a significant incremental lagged effect of hassles on depressive symptoms one year later during the transition period of emerging adulthood. This is consistent with a stress exposure effect of hassles during this developmental period. In contrast, results did not support an incremental lagged stress generation effect of depressive

symptoms on hassles. This is partially consistent with Carter et al. (2006), who concluded that the associative growth between depressive symptoms and school-based hassles was best characterized by a stress exposure model. The present findings extend those of Carter et al. to a broader measure of hassles and suggest that their predictive effect on depressive symptoms may be most pronounced during the transition from late adolescence to adulthood. Emerging adulthood is a developmental period between adolescence and adulthood that is characterized by relative independence and rapidly changing social opportunities and challenges, such as achieving autonomy from parents and increasing stability and intimacy in social and romantic relationships (Arnett, 2000). Minor hassles during this period, such as strained interpersonal relationships, difficulties adjusting to changes in academic or occupational settings, or limited economic resources, appear to be particularly salient predictors of one-year increases in depressive symptoms, even after taking into account individuals' expected levels of depressive symptoms based on trait-like trajectories.

Little support was obtained for incremental, lagged predictive paths from major life events to depressive symptoms one year later, and cross-sectional covariation was significant at less than half of the age years. The failure to obtain support for an incremental, time-specific stress exposure effect of major events diverges from several previous studies (Cole et al., 2006; Ge et al., 1994; Ge et al., 2006). This discrepancy may have arisen due to differences in the scales used to measure depression and negative events across studies. Additionally, differences in statistical approaches may account for the discrepant findings, at least in part. The majority of past studies focused on either group, state-level effects or trait-like individual trajectories without taking into account both influences. In contrast, the ALT approach used in the present study simultaneously modeled long-term individual trajectories over 16 years and year-to-year group level effects. Consistent with the notion of significant relations between major events and depressive symptoms, the present study found clear associations between latent trajectories in these domains. After accounting for these individual-level trajectories and their associations, however, the proximal state level effects between major events and depressive symptoms were relatively weak. This conclusion must be considered with caution given the marginal fit of the bivariate ALT model of depressive symptoms and major events.

Modest support was found for an incremental stress generation effect of depressive symptoms on major events one year later, as approximately one-fourth (four out of 15) of the lagged paths were statistically significant. These significant paths are consistent with prior research and theory (Ge et al., 2001; Hammen, 2005), although the effect was observed infrequently and did not correspond to a particular developmental period.

Although results from the latent model components were mostly similar for hassles and major events, different patterns were found for the time-specific, year-to-year relations for hassles and major events. What might explain the support for an incremental stress exposure effect of hassles, but not major events, on depressive symptoms? The persistent nature of hassles, in conjunction with the year-long duration of measurement intervals, may provide an explanation. Because hassles reflect ongoing conditions, their effect on mood is presumably fairly steady and would likely be detected across measurement intervals of varying durations. Major events, in contrast, typically occur infrequently. Although major events likely do lead to short-term increases in depressive symptoms, the ability to detect such effects may be heavily dependent on the precision of measurement intervals (i.e., being able to capture a recent major event and its time-limited impact on mood, which may be measured in days or weeks). It may be that the one-year measurement intervals in this study missed such effects.

Conversely, what might explain the absence of an incremental stress generation effect of depressive symptoms on hassles, but occasional stress generation effects on major events? It is possible that the proximal path from depressive symptoms to major events is mediated by an increase in risk-taking behaviors. Individuals with higher levels of depressive symptoms may engage in risky behaviors (perhaps as an affect regulation strategy; Auerbach, Abela, & Ho, 2007) that tend to result in major life events (e.g., unplanned pregnancy, arrest) more than ongoing hassles. We emphasize that this finding was not hypothesized a priori and that we did not examine risk-taking behaviors in this investigation. As such, replication and additional study are needed before conclusions are drawn.

It is also interesting that findings from the latent and cross-lagged portions of the ALT models suggest somewhat different patterns. Although they may appear contradictory in terms of their implications for the stress exposure and stress generation models, it is important to recall that they provide conceptually distinct information. The latent portions of the models indicate that, in general, the rate of change in domains over the entire 16-year period was significantly associated with initial levels in the opposite domain at age 15. In contrast, the cross-lagged portions of the models indicate whether there were time-specific associations between domains from one year to the next, above and beyond what would be expected based on individuals' trajectories in each domain. As such, the ALT modeling approach likely provided a more stringent test of the stress exposure and stress generation models than has typically been conducted.

In interpreting these findings, several study limitations merit discussion. First, mono-method variance is a concern given our exclusive reliance on self-report data, which may have inflated correlations between measures. In a related manner, current depressive symptoms may have biased participants' memory for self-reported stressful events and hassles (e.g., Monroe & Simons, 1991). Although it would have been difficult to circumvent this potential bias completely, the use of multiple informants and interview-based measures of stress would have eased concerns about it. Second, although the presence of repeated measures represents a strength in some regards, it also introduces the possibility of historical or maturation effects (e.g., scores change simply as a function of participants repeatedly completing the same measures). Third, our measure of major events was restricted to 12 items. It is possible that patterns of growth would have looked different and that acceptable model fit would have been more readily achieved with a more comprehensive measure of events, or the use of an interview-based procedure to assess stress. Fourth, the generalizability of our findings is limited by an ethnically homogeneous sample, a stratified sampling approach at T3, and attrition. Sampling weights were employed to reduce bias, but replication of these findings in diverse samples is needed. Fifth, aside from gender, we did not examine moderators or mediators of the associations between depressive symptoms and stress domains, such as social support, problem-solving skills, or emotion regulation strategies. Finally, the present investigation emphasized general trajectories and their interrelations by modeling individual differences in the context of a single overall growth trajectory. However, the significant variance components for the parameters suggest that initial levels of and growth in the respective domains meaningfully vary across individuals. In subsequent investigations, we plan to examine the possibilities that (a) multiple subgroups, or classes, of trajectories exist within the overall group trajectory, and (b) risk factors and outcomes may differ across classes of trajectories.

In summarizing the present findings, it must be recalled that depressive symptoms and stress at any point in time likely operate as a function of both trait-like factors and recent state-like experiences. The present findings provide strong support for the interrelations between trait-like trajectories of stress and depressive symptoms. After taking into account individual differences in trajectories over time, support was obtained for a prospective predictive effect

of hassles on depressive symptoms one year later during emerging adulthood. It may be that ongoing hassles among emergent adults promote the establishment of routines (cf. reinforcement patterns; Lewinsohn et al., 1985) that exacerbate or maintain depressive symptoms over time. Accordingly, depression prevention strategies may wish to emphasize coping and stress inoculation strategies for hassles during the transition from late adolescence into early adulthood. In contrast, the proximal relations between depressive symptoms and major events appeared to be weak after taking into account individuals' latent trajectories in these domains, although modest support was obtained for a stress generation effect of depressive symptoms on major events one year later. Future work is encouraged to examine proximal predictive relations between major events and depressive symptoms after taking into account individual trajectories, while also using shorter follow-up intervals, alternative measures of major events, and other recently developed approaches to modeling the relations between constructs (e.g., the associative latent transition model; Flaherty, 2008).

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Figure 1. Example Bivariate ALT Model

Note. CES-D = Center for Epidemiological Studies Depression Scale. Int = Intercept. Quad = Quadratic factor. Dep = Depressive symptoms.

Figure 2.
Model Estimated Means of Trajectories.

Table 1

Observed Means and Standard Deviations on Measured Variables at Each Age Year.

	n	Women			Men		
		CES-D	Hassles	Major Evt.	CES-D	Hassles	Major Evt.
Age 15	256	19.6 (13.1)	47.9 (12.5)	.61 (.85)	14.4 (9.7)	48.5 (11.6)	.89 (1.21)
Age 16	395	17.9 (11.7)	47.1 (12.2)	.93 (1.09)	14.1 (10.1)	46.9 (12.7)	1.11 (1.42)
Age 17	402	16.9 (11.5)	47.2 (12.2)	1.04 (1.23)	16.1 (9.5)	49.9 (12.6)	1.05 (1.33)
Age 18	314	18.0 (11.3)	46.2 (11.8)	1.31 (1.30)	13.8 (8.9)	47.1 (11.9)	1.25 (1.29)
Age 19	206	15.5 (9.9)	44.7 (11.1)	1.80 (1.40)	13.1 (9.1)	47.7 (11.8)	1.64 (1.81)
Age 20	210	14.1 (9.6)	47.0 (11.7)	2.09 (1.68)	14.1 (11.0)	50.4 (13.6)	2.34 (2.24)
Age 21	327	15.0 (11.7)	44.9 (12.2)	1.99 (1.52)	12.2 (9.1)	48.6 (12.8)	2.08 (1.95)
Age 22	470	14.8 (10.8)	45.4 (11.6)	1.98 (1.53)	12.9 (9.1)	48.7 (11.9)	2.22 (1.86)
Age 23	575	13.8 (10.5)	44.4 (11.3)	1.93 (1.59)	12.5 (9.3)	47.8 (11.6)	1.98 (1.61)
Age 24	596	13.6 (10.8)	44.1 (11.1)	1.83 (1.47)	11.4 (8.5)	46.6 (11.4)	1.88 (1.59)
Age 25	542	12.2 (9.8)	42.6 (11.0)	1.51 (1.38)	10.5 (8.9)	45.9 (12.4)	1.64 (1.58)
Age 26	512	12.1 (10.6)	42.1 (10.8)	1.46 (1.36)	11.0 (9.1)	45.7 (11.8)	1.50 (1.42)
Age 27	462	12.4 (10.7)	43.5 (11.4)	1.46 (1.27)	10.6 (8.9)	44.5 (11.0)	1.46 (1.45)
Age 28	368	11.8 (10.1)	42.2 (10.8)	1.55 (1.48)	11.3 (10.6)	44.7 (11.3)	1.56 (1.46)
Age 29	433	11.9 (10.2)	42.4 (10.7)	1.28 (1.27)	9.6 (8.5)	44.6 (12.2)	1.28 (1.46)
Age 30	441	11.3 (10.4)	43.0 (11.5)	1.39 (1.25)	9.7 (8.3)	44.0 (11.5)	1.24 (1.37)

Note. Standard deviations in parentheses. CES-D = Center for Epidemiological Studies Depression Scale; Major Evt. = Major Events.

Table 2

Model fit indices with endogenous predictors.

	χ^2	df	CFI	TLI	Adj. BIC	RMSEA	90% CI
<u>CESD</u>							
M1. LG-Quadratic	208.81	127	.97	.97	25006.11	.03	.02-.03
M2. ALT-Quadratic	169.86	112	.98	.97	25020.07	.03	.02-.03
M3. Multi-group	341.17	226	.95	.95	25055.26	.04	.03-.04
<u>Hassles</u>							
M4. LG-Quadratic	241.97	127	.96	.96	26715.34	.03	.03-.04
M5. ALT-Quadratic	156.44	112	.98	.98	26682.73	.02	.01-.03
M6. Multi-group constrain autoregression	367.73	241	.96	.96	26746.77	.04	.03-.04
<u>Major Evt.</u>							
M7. ALT-Quadratic	135.18	112	.98	.97	21859.23	.02	.02-.04
M8. Multi-group constrain autoregression	290.68	248	.96	.96	21894.49	.02	.01-.03

Note. M = Model. CES-D = Center for Epidemiological Studies Depression Scale; Major Evt. = Major Events. CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; BIC = Bayesian Information Criterion; RMSEA = Root-Mean Square Error of Approximation.

Table 3

Univariate Model Parameter Estimates for Women (N = 479).

Factor Means	CES-D ^a			Hassles ^b			Major Evt. ^c		
	Est.	SE	Std Est	Est.	SE	Std Est	Est.	SE	Std Est
INT	3.64**	.17	2.10	9.57**	.13	4.70	.69**	.05	.97
LIN	-2.23**	.45	-.80	-5.30**	1.04	-1.34	1.75**	.21	1.08
QUA	.69**	.34	.51	2.82	.92	1.26	-1.08**	.17	-1.28
Factor Variance ^d									
INT	3.02**	.59	--	4.16**	.47	--	.50**	.18	--
LIN	7.83**	2.21	--	15.62**	2.80	--	2.63**	1.05	--
QUA	1.83**	.62	--	5.01**	1.16	--	.71**	.37	--
Factor Covariance									
INT ↔ LIN	-3.00**	.97	-.62	-5.66**	.85	-.70	-.68	.38	-.59
INT ↔ QUA	.97**	.47	.41	2.59**	.47	.57	.28	.20	.47
LIN ↔ QUA	-.35**	1.11	-.92	-8.30**	1.72	-.94	-1.32*	.60	-.97
Autoregression									
Age 15→16	-.01	.05	-.01	.02	.02	.02	.07	.09	.06
Age 16→17	.00	.05	.00	.07**	.03	.07	-.03	.07	-.03
Age 17→18	.04	.05	.04	.07**	.03	.08	.14	.08	.14
Age 18→19	-.03	.07	-.03	.13**	.04	.14	.43**	.10	.33
Age 19→20	.09	.06	.10	.20**	.04	.19	.47**	.07	.41
Age 20→21	.17**	.06	.15	.18**	.04	.18	.31**	.04	.35
Age 21→22	.11**	.04	.11	.18**	.04	.20	.25**	.04	.26
Age 22→23	.11**	.04	.11	.18**	.04	.19	.28**	.04	.29
Age 23→24	.14**	.05	.14	.18**	.04	.18	.20**	.04	.21
Age 24→25	.12**	.05	.14	.16**	.04	.16	.11**	.04	.12
Age 25→26	.10	.06	.09	.14**	.04	.15	.09**	.04	.10
Age 26→27	.12	.07	.11	.13**	.05	.12	.10	.06	.10

	CES-D ^a		Hassles ^b		Major Evt. ^c	
Age 27→28	.15*	.08	.12*	.05	.18**	.07
Age 28→29	.16	.11	.09	.06	.21**	.08
Age 29→30	.15	.13	.06	.08	.26**	.10
						.26

Note.

** p ≤ .01,

* p ≤ .05,

^aModel 3;

^bModel 6;

^cModel 8;

^dThe standardized variance is equal to one for all factors and was omitted from the table.

INT = Intercept, LIN = Linear, QUA = Quadratic, CES-D = Center for Epidemiological Studies Depression Scale; Major Evt. = Major Events.

Table 4

Univariate Model Parameter Estimates for Men (N = 336).

Factor Means	CES-D ^a			Hassles ^b		
	Est	SE	Std Est	Est	SE	Std Est
INT	2.98**	.19	2.16	9.57**	.13	4.70
LIN	-1.79**	.47	-.69	-4.16**	.12	-1.62
QUA	.69*	.34	.51	2.15*	.97	1.20
Factor Variance ^c						
INT	1.91**	.64	---	4.16**	.47	---
LIN	6.82**	2.50	---	9.95**	2.84	---
QUA	1.83**	.62	---	3.22**	1.10	---
Factor Covariance						
INT ↔ LIN	-2.44*	1.12	-.68	-4.27**	1.00	-.66
INT ↔ QUA	1.16*	.50	.62	1.81**	.61	.49
LIN ↔ QUA	-3.32**	1.18	-.94	-5.18**	1.71	-.92
Autoregression						
Age 15→16	-.04	.06	-.02			
Age 16→17	.11	.08	.11			
Age 17→18	-.02	.08	-.02			
Age 18→19	.06	.07	.06			
Age 19→20	.23**	.08	.22			
Age 20→21	.10	.08	.11			
Age 21→22	.12	.07	.12			
Age 22→23	.15*	.08	.15			
Age 23→24	.08	.06	.09			
Age 24→25	.05	.07	.05			
Age 25→26	.08	.08	.08			
Age 26→27	.09	.09	.09			
Age 27→28	.18	.11	.15			

	CES-D ^a		Hassles ^b
Age 28→29	.02	.11	.03
Age 29→30	-.05	.14	-.05

Note.

** p ≤ .01,

* p ≤ .05,

^aModel 3;

^bModel 6;

^cThe standardized variance is equal to one for all factors and was omitted from the table.

INT = Intercept, LIN = Linear, QUA = Quadratic. CES-D = Center for Epidemiological Studies Depression Scale. Parameter estimates for Major Events and the autoregressive effects for Minor Hassles are not presented because they are identical to those for women (see Table 3).

Table 5

Bivariate ALT Model Fit Indices.

	χ^2	df	CFI	TLI	Adj. BIC	RMSEA	90% CI
<u>CESD-UES</u>							
M9. Free covariation across time and gender	1474.94	929	.93	.92	50286.97	.04	.03–.04
M10. Free cross reg across time, constrain across gender	1433.51	899	.93	.92	50351.36	.04	.03–.04
<u>CESD-Major Evt.</u>							
M11. Constrain covariation across gender, free across time	1392.74	949	.89	.88	46811.16	.03	.03–.04
M12. Constrain cross reg across gender, free across time	1328.27	919	.90	.89	46853.10	.03	.03–.04

Note. CES-D = Center for Epidemiological Studies Depression Scale; UES = Unpleasant Events scale; Major Evt. = Major Events; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; BIC = Bayesian Information Criterion; RMSEA = Root-Mean Square Error of Approximation.

Table 6

Bivariate ALT CESD-Hassles Latent Parameter Estimates.

	Women				Men			
	Est	SE	Std Est	Est	SE	Std Est	t-test	
Factor Means								
D_INT	3.67**	.17	2.22	3.06**	.20	2.21	NS	
D_LIN	-4.62**	.95	-1.76	-4.33**	.94	-1.69	NS	
D_QUA	2.68**	.77	2.09	2.68**	.77	2.09	---	
H_INT	9.62**	.14	4.72	9.62**	.14	4.72	---	
H_LIN	-5.31**	.05	-1.36	-4.28**	1.12	-1.40	3.37**	
H_QUA	2.79**	.93	1.29	2.21**	.98	1.29	NS	
Factor Variances								
D_INT	2.74**	.71	---	1.93**	.69	---	NS	
D_LIN	6.85**	2.26	---	6.56**	2.47	---	5.03**	
D_QUA	1.64**	.60	---	1.64**	.60	---	---	
H_INT	4.16**	.50	---	4.16**	.50	---	---	
H_LIN	15.15**	2.66	---	9.39**	2.99	---	5.57**	
H_QUA	4.68**	1.05	---	2.96**	1.18	---	3.50**	
Factor Covariance within domains	Est.	SE	p	Est.	SE	p	t-test	
D_INT ↔ D_LIN	-2.72**	1.10	-.63	-2.49*	1.20	-.70	3.47**	
D_INT ↔ D_QUA	.94	.51	.44	1.17*	.54	.66	2.04*	
D_LIN ↔ D_QUA	-3.05**	1.10	-.91	-3.12**	1.16	-.95	3.38**	
H_INT ↔ H_LIN	-5.52**	.89	-.70	-4.14**	1.05	-.66	3.36**	
H_INT ↔ H_QUA	2.46**	.49	.56	1.72**	.65	.49	2.73**	
H_LIN ↔ H_QUA	-7.88**	1.58	-.94	-4.82**	1.82	-.91	4.37**	
Factor Covariance between domains								
D_INT ↔ H_INT	2.34**	.46	.69	1.62**	.49	.57	2.21*	
D_INT ↔ H_LIN	-2.89**	.84	-.45	-1.90*	.93	-.45	3.09**	

	Women		Men	
D_INT ↔ H_QUA	1.27**	.46	.35	.48
D_LIN ↔ H_INT	-2.67**	.82	-.50	.96
D_LIN ↔ H_LIN	7.43**	2.09	.73	2.04
D_LIN ↔ H_QUA	-3.74**	1.23	-.66	1.14
D_QUA ↔ H_INT	1.04**	.43	.40	.51
D_QUA ↔ H_LIN	-3.57**	1.16	-.72	1.06
D_QUA ↔ H_QUA	2.12**	.72	.77	.65

Note.

**
p < .01,

*
p < .05.

D_INT = Intercept of CESD, D_LIN = Linear factor of CESD, D_QUA = Quadratic factor of CESD, H_INT = Intercept of UES, H_LIN = Linear factor of UES, H_QUA = Quadratic factor of UES. *df* for all t-tests = 813.

Table 7

Bivariate ALT CESD-Hassles Manifest Cross-Process Regression and Covariance Estimates.

Cross-Process Regression ^a	Women		Men		t-test
	Est.	SE	Est.	SE	
CES-D 15 → UES 16	.01	.10	.01		---
CES-D 16 → UES 17	.00	.10	.00		---
CES-D 17 → UES 18	-.16	.10	-.15		---
CES-D 18 → UES 19	-.20	.10	-.19		---
CES-D 19 → UES 20	.08	.13	.07		---
CES-D 20 → UES 21	-.12	.09	-.09		---
CES-D 21 → UES 22	.10	.08	.09		---
CES-D 22 → UES 23	-.01	.06	.00		---
CES-D 23 → UES 24	-.06	.06	-.06		---
CES-D 24 → UES 25	-.02	.05	-.02		---
CES-D 25 → UES 26	-.07	.06	-.06		---
CES-D 26 → UES 27	-.01	.06	-.01		---
CES-D 27 → UES 28	.06	.09	.06		---
CES-D 28 → UES 29	-.04	.10	-.04		---
CES-D 29 → UES 30	.08	.15	.07		---
UES 15 → CES-D 16	.00	.05	.00		---
UES 16 → CES-D 17	.00	.04	.00		---
UES 17 → CES-D 18	.11**	.04	.12		---
UES 18 → CES-D 19	.09*	.04	.10		---
UES 19 → CES-D 20	.04	.05	.05		---
UES 20 → CES-D 21	.09*	.04	.11		---
UES 21 → CES-D 22	.09*	.04	.10		---
UES 22 → CES-D 23	.07*	.04	.08		---
UES 23 → CES-D 24	.08**	.03	.09		---
UES 24 → CES-D 25	.05	.03	.05		---

Cross-Process Regression ^d	Women		Men		t-test
	Est.	SE	Est.	SE	
UES 25 → CES-D 26	.03	.03	.03	.03	---
UES 26 → CES-D 27	.01	.04	.01	.04	---
UES 27 → CES-D 28	-.03	.05	-.03	.05	---
UES 28 → CES-D 29	-.07	.05	-.08	.05	---
UES 29 → CES-D 30	-.13	.07	-.14	.07	---
Covariance					
	Est.	SE	Est.	SE	t-test ^b
UES 15 ↔ CES-D 15	.22	.49	.90*	.43	.18 NS
UES 16 ↔ CES-D 16	1.20**	.25	.82*	.35	.18 NS
UES 17 ↔ CES-D 17	1.05**	.41	.19	.42	.35 .09 NS
UES 18 ↔ CES-D 18	.96**	.24	.19	.58	.38 .13 NS
UES 19 ↔ CES-D 19	1.13**	.38	.24	.61	.47 .13 NS
UES 20 ↔ CES-D 20	.87**	.30	.19	1.60**	.49 .28 NS
UES 21 ↔ CES-D 21	1.59**	.37	.30	.91**	.24 .24 NS
UES 22 ↔ CES-D 22	.68**	.22	.14	.90**	.29 .22 NS
UES 23 ↔ CES-D 23	.78**	.21	.17	.61**	.24 .15 NS
UES 24 ↔ CES-D 24	1.03**	.19	.22	.54**	.12 .15 2.09*
UES 25 ↔ CES-D 25	.46**	.14	.11	.67**	.20 .17 NS
UES 26 ↔ CES-D 26	.89**	.17	.21	.90**	.19 .22 NS
UES 27 ↔ CES-D 27	1.24**	.42	.24	.56**	.19 .16 NS
UES 28 ↔ CES-D 28	.69**	.27	.14	.58**	.23 .13 NS
UES 29 ↔ CES-D 29	.81*	.40	.18	.45	.25 .11 NS
UES 30 ↔ CES-D 30	.74**	.26	.15	.43*	.22 .11 NS

Note. CES-D = Center for Epidemiological Studies Depression Scale; UES = Unpleasant Events scale;

** p < .01,

* p < .05.

^a Cross-process regression effects are not presented for men because they are identical to those for women.

^b $df = 813$.

Table 8

Bivariate ALT CESD-Major Events Latent Parameter Estimates.

	Women			Men			t-test ^a
	Est.	SE	Std. Est.	Est.	SE	Std. Est.	
Factor Means							
D_INT	3.62**	.17	2.11	2.91**	.19	2.19	5.24**
D_LIN	-2.19**	.49	-.80	-1.72**	.49	-.69	NS
D_QUA	.75*	.37	.55	.75*	.37	.55	---
M_INT	.69**	.07	1.25	.69**	.07	1.25	---
M_LIN	1.54**	.31	1.07	1.54**	.31	1.07	---
M_QUA	-1.00**	.24	-1.23	-1.00**	.24	-1.23	---
Factor Variances							
D_INT	2.96**	.56	---	1.76**	.59	---	4.90**
D_LIN	7.54**	2.14	---	6.32**	2.31	---	2.56*
D_QUA	1.83**	.60	---	1.83**	.60	---	---
M_INT	.30	.16	---	.30	.16	---	---
M_LIN	2.08*	.90	---	2.08*	.90	---	---
M_QUA	.66*	.33	---	.66*	.33	---	---
Factor Covariance within domains							
D_INT ↔ D_LIN	-2.83**	.95	-.60	-2.19*	1.05	-.66	2.01*
D_INT ↔ D_QUA	.89	.47	.38	1.09*	.48	.61	NS
D_LIN ↔ D_QUA	-3.37**	1.08	-.91	-3.15**	1.11	-.93	NS
M_INT ↔ M_LIN	-.47	.34	-.59	-.16	.33	-.20	NS
M_INT ↔ M_QUA	.23	.18	.50	.01	.17	.03	NS
M_LIN ↔ M_QUA	-1.14*	.52	-.97	-1.13*	.52	-.96	NS
Factor Covariance between domains							
D_INT ↔ M_INT	.59**	.21	.62	.57**	.17	.78	NS
D_INT ↔ M_LIN	-.91	.52	-.37	-.68	.44	-.36	NS
D_INT ↔ M_QUA	.35	.31	.25	.25	.27	.23	NS

	Women		Men	
D_LIN ↔ M_INT	-.76*	.37	-1.08**	.35
D_LIN ↔ M_LIN	2.71*	1.07	2.39*	1.01
D_LIN ↔ M_QUA	-1.40*	.65	-1.11	.65
D_QUA ↔ M_INT	.25	.18	.56**	.20
D_QUA ↔ M_LIN	-1.23*	.56	-1.12	.61
D_QUA ↔ M_QUA	.72*	.36	.56	.41
				.50

Note.

**
p < .01,

*
p < .05.

D_INT = Intercept of CESD, D_LIN = Linear factor of CESD, D_QUA = Quadratic factor of CESD, M_INT = Intercept of MES, M_LIN = Linear factor of MES, M_QUA = Quadratic factor of MES.
 $df = 813$.

Table 9

Bivariate ALT CESD-Major Events Manifest Cross-Process Regression and Covariance Estimates.

Cross-Process Regression	Est.	SE	β
CES-D 15 → MES 16	-.02	.04	-.05
CES-D 16 → MES 17	-.01	.04	-.02
CES-D 17 → MES 18	-.01	.04	-.01
CES-D 18 → MES 19	.00	.05	.01
CES-D 19 → MES 20	.15*	.07	.18
CES-D 20 → MES 21	.10	.06	.12
CES-D 21 → MES 22	.12**	.04	.18
CES-D 22 → MES 23	.01	.04	.01
CES-D 23 → MES 24	.02	.03	.03
CES-D 24 → MES 25	.07*	.04	.11
CES-D 25 → MES 26	.02	.04	.03
CES-D 26 → MES 27	.05	.04	.08
CES-D 27 → MES 28	.11*	.05	.17
CES-D 28 → MES 29	.02	.06	.04
CES-D 29 → MES 30	.14	.07	.22
MES 15 → CES-D 16	-.09	.23	-.03
MES 16 → CES-D 17	-.21	.13	-.10
MES 17 → CES-D 18	.30	.16	.16
MES 18 → CES-D 19	.34	.14	.20
MES 19 → CES-D 20	-.15	.09	-.11
MES 20 → CES-D 21	-.02	.08	-.02
MES 21 → CES-D 22	.07	.06	.06
MES 22 → CES-D 23	-.01	.05	-.01
MES 23 → CES-D 24	-.06	.04	-.04
MES 24 → CES-D 25	-.04	.04	-.03
MES 25 → CES-D 26	-.06	.06	-.04
MES 26 → CES-D 27	-.07	.06	-.04
MES 27 → CES-D 28	-.08	.08	-.05
MES 28 → CES-D 29	-.04	.09	-.03
MES 29 → CES-D 30	-.11	.14	-.07
Covariance	Est.	SE	ρ
MES 15 ↔ CES-D 15	-.36*	.18	-.17
MES 16 ↔ CES-D 16	.03	.13	.01
MES 17 ↔ CES-D 17	.27*	.13	.11
MES 18 ↔ CES-D 18	-.05	.16	-.02
MES 19 ↔ CES-D 19	-.12	.19	-.04
MES 20 ↔ CES-D 20	.23	.18	.07

Covariance	Est.	SE	p
MES 21 ↔ CES-D 21	.18	.16	.05
MES 22 ↔ CES-D 22	-.12	.13	-.04
MES 23 ↔ CES-D 23	.06	.08	.02
MES 24 ↔ CES-D 24	.20*	.08	.07
MES 25 ↔ CES-D 25	.23**	.08	.09
MES 26 ↔ CES-D 26	.20*	.09	.08
MES 27 ↔ CES-D 27	.16	.08	.06
MES 28 ↔ CES-D 28	.29*	.12	.10
MES 29 ↔ CES-D 29	-.04	.11	-.02
MES 30 ↔ CES-D 30	.03	.12	.01

Note. CES-D = Center for Epidemiological Studies Depression Scale; Major Evt. = Major Events;

**
p < .01,

*
p < .05.

Parameter estimates are presented for the combined sample because the best fitting model constrained them to be equal across gender.