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A Trait-State-Error Model of Adult Hassles Over Two Years: Magnitude, Sources, and Predictors of Stress Continuity

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Abstract

There are stable individual differences in exposure to stressful circumstances over time. The current study employed a latent trait-state model to estimate the magnitude of that stability and its sources. Adults (N = 327; age M = 43.9 years, SD = 6.15) provided reports of hassles and depressive symptoms every three months for two years. A Trait-State-Error model suggested that 60% of the variance in self-reports of hassles was attributable to stable, between-persons factors. Of the remaining variance, 20% was attributable to an autoregressive factor and 20% was attributable to either unique state factors or error. Moreover, average depressive symptoms, family income, and family conflict reported at baseline were significant predictors of the stable trait factor. These findings suggest that adults' self-reports of stressful experiences show marked stability over time, and that this stability may have significant implications for understanding the occurrence and impact of stress.

Keywords

stress; hassles; stress continuity; stress generation; depressive symptoms

Stress prospectively predicts a range of behavioral (e.g., depression; Hammen, 2005) and medical (e.g., cardiovascular disease, Yusuf et al., 2004) disorders, contributes to physiological dysregulation (Ganzel, Morris, & Wethington, 2010), and is a key etiological factor in widely applied vulnerability-stress theories of psychopathology (e.g., Abramson et al., 2002). As such, greater understanding of the factors that contribute to individual differences in stress occurrence is critical to understanding the incidence of psychopathology. Numerous studies have demonstrated that there is considerable rank-order stability in individuals' reports of stress over time (Hammen, Hazel, Brennan, & Najman, 2012; Kanner, Coyne, Schaefer, & Lazarus, 1981; Pearlin, Schieman, Fazio, & Meersman, 2005). No study to date has attempted to model what factors maintain that stability. Both simple autoregression and the influence of stable traits could account for correlation in stress

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reports over time, but the relative contribution of each is unknown. As a result, it is currently unclear to what extent self-reported stressors represent unique, independent reports of current events, or are simply samplings of ongoing stressful conditions. The current study employed a latent trait-state modeling approach (Kenny & Zautra, 2001) to evaluate the structure of continuity in a widely used measure of daily hassles, and then modeled the relative contributions of key variables believed to predict hassle occurrence over time.

Hassles have been described as "irritating, frustrating, distressing demands that to some degree characterized everyday transactions with the environment" (Kanner et al., 1981, p. 3). Hassles have been demonstrated to be independent prospective predictors of both poorer physical health (e.g., flu symptoms, back pain, headaches; DeLongis et al., 1988) and mental health symptoms (e.g., depressive symptoms; Hutchinson & Williams, 2007). Indeed, some studies have found hassles to be more powerful predictors of adverse outcomes than major stressful events (Chamberlain & Zika, 1990; Jandorf et al., 1986), and it has been proposed that one pathway through which major life events lead to adverse health outcomes is through promoting greater numbers of daily life hassles (c.f., DeLongis, Coyne, Dakof, Folkman, & Lazarus, 1982; Johnson & Sherman, 1997; though for limitations see Harkness, 2008).

Traditional stimulus conceptualizations of stress have often considered stress exposure to be "a probabalistic feature of particular environmental conditions" or even "apparently random and relentless" (Monroe, 2008, pp. 35 and 37, respectively). While stress is indeed ubiquitous, it is not randomly distributed across individuals. There is considerable rank order stability in reports of life events over multiple years (Hammen et al., 2012; Pearlin et al., 2005), and Kanner and colleagues (1981) found that hassles measured one month apart were highly correlated (mean r =.79). Such data suggest that individuals who experience higher levels of stress at one time point are likely to experience greater levels of stress at other time points relative to other individuals. Several factors might account for this continuity.

Perhaps most parsimoniously, a simple autoregressive model in which stressful conditions at one time point predict stressful conditions at another time point would adequately account for stress continuity. Individuals who were previously exposed to major lifetime adversities (such as early childhood adversities) are often more likely to experience greater life stress in adulthood (Hazel, Hammen, Brennan, & Najman, 2008; H. A. Turner & Butler, 2003). Likewise, Cole, Nolen-Hoeksema, Girgus, and Paul (2006) found moderate autoregressive effects amongst negative life events in children. Similar effects would be expected for hassles if a given set of hassles was relatively enduring, leading an individual to report the same hassles at closely spaced reports, while those hassles may desist between more broadly spaced reports. For example, a person taking a semester-long college course may report similar academic and family hassles 3 months apart, but would not be expected to report the same hassles 3 months after the course. Autoregressive effects might also be expected if stressors themselves often lead to subsequent stressors. For example, a discrete stressful event, such as a car accident, could lead to a long series of medical, financial, and logistical difficulties that continue to challenge the individual months later.

Observed continuity of stress conditions would also be expected if stable, relatively enduring factors promoted greater levels of stress over time. Such factors might include a wide range of personal and environmental variables that lead to chronically stressful conditions. Amongst adults, a range of demographic factors, including younger age, a history of divorce, and lower socioeconomic status, are associated with greater self-reported life stress (H. A. Turner & Turner, 2005; R. J. Turner, Wheaton, & Lloyd, 1995). Stable personality traits, such as neuroticism, and heritable factors are also predictive of greater exposure to life events reported during interviews (Foley, Neale, & Kendler, 1996; Kendler, Neale, Kessler, Heath, & Eaves, 1993). Taken together, these findings suggest that individuals who experience highly stressful conditions at one time point are highly likely to experience other stressful conditions subsequently because one or more enduring, trait-like factors contribute to greater stress at both time points.

Hassles provide unique issues with regard to the stable factors that maintain them. The study of hassles has always assumed that several “cognitive-phenomenological” factors may greatly affect both which and how events are reported, ranging from whether an event is remembered to perception of demands (Kanner et al., 1981, p. 5). While these same issues affect nearly all measures of stress, serious methodological critiques of hassles as a construct have been offered (Dohrenwend, Dohrenwend, Dodson, & Shrout, 1984; Monroe, 2008). Most notably, measures of hassles are more sensitive to individual reporting biases than interview measures of discrete stressful life events (e.g., Brown, 1989). For example, neuroticism is a reasonably stable personality trait that is often conceptualized as sensitivity to environmental stress (and thereby tendency to complain of such stress; Espejo et al., 2011). To the extent that individuals exhibit stable tendencies to over or under-report stressors relative to others, stable, between-persons differences in hassle reports would emerge.

Taken together, there are at least two broad sorts of influences that might contribute to correlations in reports of stress over time. First, a simple autoregressive model of stress continuity, either by the reporting of similar hassles on closely spaced forms or by one hassle leading to another, might account for hassle continuity. Second, the existence of larger trait factors, such as environmental (e.g., SES) or personological (e.g., neuroticism) factors, might account for hassle continuity over time either by promoting stable differences in the stressfulness of environments or differences in reporting on them. Any remaining variance in measures of hassles that is not a result of either stable factors or autoregression might be considered the sum of unique factors operating at a given time point and measurement error. To date, the overall magnitude of stability of hassles and the relative contribution of each factor is largely unknown.

Estimates of relative contributions to reports of stress have important implications for etiological theories of psychopathology, as well as the study of stress generation. Vulnerability-stress theories of psychopathology (e.g., Abramson et al., 2002), typically assume that stressors act as a proximal trigger of psychopathology in vulnerable individuals, and studies continue to be designed that predict outcomes of interest from life events or hassles measured at a single time (e.g., Bockting et al., 2006). However, if indeed there is a marked autoregressive effect, it suggests that an elevated stress score at any given time is

likely indicative of a history of elevated stress. To the extent that there is a significant trait contribution, a high hassles point-estimate likely indicates a stable propensity towards greater stress (or reporting) than other individuals. In such cases, a single report of stress could represent environmental influences that are continuous over years or, worse still, traits that are associated with the vulnerability itself.

Likewise, studies examining the predictors of stress occurrence (such as stress generation studies; Hammen, 2006) would be greatly informed by a knowledge of what type of processes account for the greatest percentage of variance. To the extent that stress reports are largely a result of stable trait factors, it would be inefficient for stress researchers to focus acutely on unique factors promoting stressors. Alternatively, to the extent that stress continuity is maintained autoregressive effects, stable, trait like contributors to stress (e.g., SES) might be safely deemphasized. Along these lines, Uliaszek and colleagues (2011) noted that failure to account for stress continuity might lead to several problems, especially an overestimate of the effects of prior psychopathology on current stress levels (i.e., the stress generation effect).

The Trait-State-Error (TSE) model proposed by Kenny and Zautra (1995) provides an explicit empirical model of the relative contribution of the factors described above. As depicted in Figure 1, TSE models decompose the variance in observed repeated measurements into three sources: 1) a stable “trait” factor representing that which is considered to be stable and unvarying over the time period observed; 2) an autoregressive factor representing the extent to which conditions at one time point predict conditions at the next time; and 3) a unique state/error factor representing a mixture of measurement error and the unique influences on a measure at each time. When the relative contributions of each factor are assumed to be constant within the sample over time, the TSE model provides a partitioning of the variance of observed reports into that which is attributable to trait, state, and unique factors. The percentage of variance attributed to unique and error factors would provide an upper bound for the degree to which individual reports of stress might be considered to be reports of unique variations in the environment.

Kenny and Zautra’s (1995) original work applied the TSE model to a study of unpleasant daily experiences reported by older adults aged 60 to 80. They found that 27% of the older adult’s monthly report of negative events could be accounted for by a stable trait factor, and another 34% of the variance could be attributed to the autoregressive factor. The TSE and similar models (e.g., Cole et al.’s, 2005, TSO model) have since been applied to several other constructs, including symptoms of psychopathology in youth (e.g., Cole et al., 2005; Prenoveau et al., 2011) and personality traits (Anusic, Lucas, & Donellan, 2012; Prenoveau et al.), To our knowledge, no further investigations have used it to assess contributors to stress over time.

Thus, the first aim of the current study was to apply the TSE model within a more diverse sample of adults over a longer period of time than that examined by Kenny and Zautra (1995). They assessed only adults over age 60, half of whom were physically disabled or had recently lost their spouse, over a period of 9 months. The current study employed a sample of adults, ranging in age from 29 to 63, recruited from the general community and

assessed every three months for two years. These eight waves of data enabled estimation of both the magnitude of stress continuity over time, as well as the relative variance in stress reports generated by stable, autoregressive, and random factors.

To the extent that the TSE model confirmed the existence of stable, trait-like contributors to reports of stress, the second aim of the paper was to identify which factors predict the trait factor. The TSE is inherently agnostic as to the substantive interpretation of each factor, yet prior literature suggests several socioeconomic, social, personological, and behavioral factors that have been shown to increase the likelihood of stress exposure (Liu & Alloy, 2010; Pearlin, 1989; R. J. Turner et al., 1995). Thus, by examining potential predictors of the trait factor using the available variables in our dataset, we aimed to better characterize which factors provide stable influences on individual differences in hassles.

The current study employed a sample of 327 adults, ranging in age from young adulthood to middle age. Every three months for two years participants completed a report of the hassles they had encountered in their everyday life over the past month, as well as their depressive symptoms over the last week. It was predicted that the TSE model would adequately represent the pattern of self-reports of hassles over the two years of the study, and that there would be both a significant stable, trait-like factor and a significant autoregressive factor. It was further predicted that the trait-like factor would be predicted by demographic factors (e.g., income, marital status, age), social factors (e.g., family environment, social support), lifetime history of major depressive disorder, and average levels of depressive symptoms.

Method

Participants

Participants were 300 women and 27 men recruited as parents in a longitudinal study of youth aged 11–14. They were recruited for a study of adolescent development using newspaper and other community advertisements in two cities, Chicago, IL, and Montreal, Quebec. Participants ranged in age from 29 to 63 (M = 43.9, SD = 6.2) and had a median family income of $45,000–60,000. As reported by Abela and Hankin (2011), there were no differences at baseline between the two recruitment sites in terms of child gender or age, mothers' education, fathers' education, family income, or parental partner status (all p's > .05). Chicago youth were more likely to be non-White (Montreal: 23.2%; Chicago: 45.3%; $\chi^2(1) = 17.36$, $p < .01$) Previous publications from this dataset have examined rumination, co-rumination, and self-injury in youth (Abela & Hankin; Hankin & Abela, 2011; Stone, Hankin, Gibb, & Abela, 2011).

Procedure

For baseline data collection, participants presented to the research offices in their home city. Participants completed an informed consent process, signed consent forms, and completed an extensive battery of questionnaires and interviews. After the baseline assessment, participants completed follow-up interviews by phone every three months for two years, during which questionnaires were administered to participants verbally. Participants provided data at an average of 6.74 (SD = 1.61) of the 8 follow-up sessions, with 249

(76.2%) participants completing the final, 2 year assessment. Because of the possibility that participants experiencing greater hassles might be more likely to drop out of the study, a mixed effects logistic regression was conducted in which drop out was modeled as a function of follow-up month and the most recent hassles score (standardized to provide more meaningful odds ratios). While month of follow-up predicted timing of study dropout (*OR* = 1.63 per month, $p < .01$), hassles did not (*OR* = 1.18 per *SD*, $p = .39$). Similarly null results were found when hassles were person-centered to reflect idiographic increases or decreases in hassles.

Measures

Hassles—The Parental Hassles Scale is a 53-item adaptation of the updated version of the Hassles and Uplifts Scale (DeLongis, Folkman, & Lazarus, 1988). Participants were asked to rate "How much of a hassle has each of these items been for you over the past month?" on a 5-point scale ranging from 0 ("Not at all") to 4 ("Extremely"). Items included a range of individuals (e.g., "your spouse"), roles (e.g., "your work load"), and circumstances (e.g., "legal matters"). This version was revised from previous versions (DeLongis et al., 1982) in order to reduce redundancy and to remove items that might reflect medical or psychological symptoms.

Demographics—At baseline, participants were asked to report their annual familial income on a scale of 1–8 in $15,000 increments; these were treated in analyses as a continuous variable. Participants also reported their age, and whether they had a spouse or similar domestic partner who lived in the home (married/partnered = 1; unmarried/separated/divorced = 0); 68% reported such a partner (Chicago: 61.0%; Montreal: 70.7%; $\chi^2(1)$ 2.60, $p < .11$). Descriptive statistics for all study variables can be found in Table 1.

Lifetime History of Depression—A trained diagnostician administered the Structured Clinical Interview for DSM-IV (SCID; First et al., 2002) at the baseline assessment. Interviews underwent at least 40 hours of training, had to demonstrate 100% agreement with the principal investigator's ratings on gold-standard interviews, and received one hour of weekly group supervision and review. Participants were considered to have had a history of depression if they met lifetime criteria for a major depressive episode or episode of mixed anxiety and depression. Seventy-eight (33%) participants met criteria.

Depressive symptoms—Depressive symptoms were assessed using the Beck Depression Inventory – II (Beck, Steer, & Brown, 1996), a 21-item inventory assessing several DSM-IV symptoms of depression. The BDI has been used widely and has an extensively studied factor structure (Vanheule, Desmet, Groenvynck, Rosseel, & Fontaine, 2008). In the current study, alphas at each time point ranged from .88 to .93.

Family Environment Scale—The Family Environment Scale (FES; Moos & Moos, 1986) consists of 90 true/false items designed to assess relationships, personal growth, and system maintenance within families. In the current study we used only the Cohesion ($\alpha = .73$; e.g., "Family members really help and support one another"), Conflict ($\alpha = .71$, e.g., "We fight a lot in our family"), Intellectual-Cultural Orientation ($\alpha = .67$; e.g., "We often

talk about political and social problems"), Active-Recreational (α = .63; e.g., "We often go to the movies, sports events, camping, etc."), Moral-Religious Emphasis (α = .69; e.g., "Family members have strict ideas about what is right and wrong"), and Organization (α = .63; e.g., "Being on time is very important in our family") subscales. These six subscales have demonstrated robust validity (Sanford, Bingham, & Zucker, 1999). The Achievement, Expressiveness, Independence, and Control subscales were omitted due to low internal consistency estimates (all α's < .55; c.f., Boyd, Gullone, Needleman, & Burt, 1997), as well as concerns about validity (Sanford et al.).

Social Support—Perceived social support was measured using the Social Support Questionnaire Short Form (Sarason, Sarason, Shearin, & Pierce, 1987). In the current study, the mean score of the 12 satisfaction items (e.g., "Whom can you really count on to be dependable when you need help?") was used as the measure of social support (SSQ-Satisfaction; SSQS; α = .97). Sarason et al. reported that the SSQS is inversely correlated with loneliness and depressive symptoms, and positively correlated with social skills and family cohesion (the latter as measured by the FES).

Data Analysis

The basic TSE model is illustrated in Figure 1. In order to facilitate interpretation and model identification, the path coefficients from the trait factor to each observed variable and from each occasion factor to each observed variable were set at 1. Error variances (ε) were constrained to be equal across time points, as were occasion disturbances (ζ), and the magnitude of the autoregressive paths (β). In order to maintain consistency of variance partitioning across time, the variance of the first occasion factor was constrained to equal $\zeta(1-\beta^2)^{-1}$. All modeling was performed using Mplus 6.11 (Muthen & Muthen, 2010) using maximum likelihood estimation. Because of the relatively large sample size, the chi-square test of model fit was significant for each of the models presented below. Thus, model fit was qualitatively assessed using the comparative fit index (CFI), root mean squared error of approximation (RMSEA), and the standardized root mean square residual (SRMR). Good fit is presumed to be indicated by CFI's above .95, RMSEA no larger than .06, and SRMR below .09 (Hu & Bentler, 1999).

Results

Correlations and descriptive statistics of continuous variables are displayed in Table 1. As predicted, hassles were strongly correlated with each other across time. Participants' BDI scores were comparable to those in other community samples of adults (e.g., Hunt, Auriemma, & Cashaw, 2003), and average BDI was highly correlated with hassles over time. Mixed modeling confirmed that BDI was predictive of hassles at each time point (b = 1.09, SE = 0.26, $p < .01$), but this relationship was not moderated by gender (b = 0.02, SE = 0.28, p = .93). There were no sex differences in most variables, including average levels of hassles and depressive symptoms (all p's > .05). However, male participants were on average older (M = 47.8, SD = 7.3) than females (M = 43.5, SD = 5.9; $t(25.6) = 2.80$, $p < .01$), more likely to be partnered (males: 88%; females: 66%; $\chi^2(1) = 4.97$, p = .03), and

reported slightly lower FES Active-Recreational orientation (males: $M = 5.2$, $SD = 1.9$; females: $M = 6.1$, $SD = 2.0$; $t(22.8) = -2.08$, $p = .04$).

Aim 1: Trait-State-Error Modeling of Stress Continuity

The TSE model applied to the eight waves of hassles data fit the data acceptably; model results and fit indices are reported as Model 1 in Table 2. This initial partitioning suggested that the trait factor accounted for 60% of the variation in reports of hassles, with the remainder of the variance equally split between the autoregressive factor (20%) and unique state/error (20%). A considerable autoregressive path coefficient of .86 also suggested that the level of hassles encountered at one time point was strongly predictive of the level of hassles at the next time point, above and beyond the constant contribution of the trait factor.

Aim 2: Predictors of Trait Contribution to Hassles

Models 2, 3, and 4 in Table 2 were run in order to evaluate the contribution of various factors to the trait-like factor. In Model 2, the trait factor was regressed onto family income, partner status, and age. Family income was allowed to correlate with both partner status and age, due to their high correlation in the sample (Spearman's $\rho = .45$; $r = .26$, respectively). As noted in Table 2, age and income were both associated with smaller trait contribution to hassles score, suggesting less trait-like stability amongst older individuals and those with higher incomes. Partner status, however, was not significantly associated with the trait factor.

In Model 3, the trait factor was regressed onto participants' mean BDI score across all available time points and the participant's history of depression at time of entry into the study, as well as participant age and income. As noted in Table 2, BDI was a robust predictor of the trait factor, with individuals reporting higher levels of depression symptoms also having hassles maintained at significantly higher levels by a trait-like factor. After controlling for BDI scores, however, lifetime history of depressive episodes was not predictive of trait contribution to hassles. The sample size in the current study did not allow for a stable multiple groups analysis among those with and without lifetime histories of depression (see Cole, Martin, & Steiger, 2005, for a discussion of sample size and instability in TSE models).

Because of the large number of social environment variables, in Model 4 social support (SSQS) and each of the family environment variables were used as predictors of the trait factor. SSQS was not a significant predictor of trait contributions to hassles, nor were several of the FES scales. Family cohesion predicted lower trait levels of hassles, whereas family conflict and morality orientation were associated with higher levels of trait contribution to hassles.

Finally, the trait factor was regressed onto each of the significant predictors from the previous models simultaneously in order to estimate their associations controlling for the other predictors. Mean BDI, income, and family conflict continued to be the only predictors of trait levels of hassles. Family cohesion and morality orientation no longer predicted the stable trait factor after controlling for the other predictors in the model. For clarity and to

minimize the chance of overfitting the final model, insignificant predictors were not pruned, nor were Lagrange multiplier or Wald tests consulted to improve model fit.

Discussion

While previous studies have found that reports of hassles are correlated over time, the sources underlying this stability have remained unclear. The current study is the first to estimate the degree of that stability in a broad community sample of adults over two years. The variance of stressful hassle reports was successfully partitioned into that which is attributable to stable trait, autoregressive, and state/error factors, each of which will be discussed in turn. The stable trait-like factor accounted for 60% of the variance in reports of hassles, suggesting that the majority of variation in reports of hassles was attributable to between-person differences that were stable over the two years of the study. Predictors of this trait factor were evaluated in models 2–5. As noted previously, stable between-persons differences in hassles may emerge from both differences in the frequency and severity of stressors encountered or the rate at which those stressors are remembered and reported.

The most pronounced predictor of these stable trait differences was participants' average level of depressive symptoms. This is consistent with stress generation research, in which it has been repeatedly demonstrated that individuals with substantial depressive symptomatology experience greater levels of acute stressors to which they themselves have contributed (Liu & Alloy, 2010). Thus, it might be expected that individuals with greater depressive symptoms do indeed encounter more stressors in their everyday lives and that the increased stress is reflected in their reports of hassles. At the same time, BDI scores tend to be highly correlated with measures of neuroticism (Jylhä & Isometsä, 2006) and dysphoric individuals may be more likely to remember and report negative events. As shown in Table 2, in models in which BDI was controlled (models 3 and 5), the residual variance of the trait factor was markedly reduced compared to models 2 and 4 in which BDI was not controlled. Part of that reduction likely represents neurotic individuals' tendency to negatively report on their experience. Even with those reductions, however, the trait residual variance was still roughly twice as large as the autoregressive and state/error variances, suggesting substantially unaccounted for trait variance. That is, the sizeable trait contribution is largely due to factors other than reporting biases.

Other variables also proved predictive of trait variance. Consistent with prior epidemiological work (R. J. Turner et al., 1995), individuals with lower incomes, on average, reported greater levels of stress. The fact that the effect persisted even after controlling for depressive symptoms and family environment suggests that economic factors themselves may be a strong driver of the effect. For example, individuals with lower incomes may be more likely to live in neighborhoods that are more crowded or have longer commutes; be unemployed or work at jobs that they would like to leave, but cannot afford to do so; or be unable to use money to intervene early in potentially stressful situations (c.f., Pearlin et al., 2005). These and other factors might in turn contribute to greater hassles for those who experience them.

Family conflict was further identified as a stable predictor of hassles, despite the fact that very few items on the hassles measure dealt with relationships with family members. Previous research has demonstrated that individuals who have personality factors and interpersonal styles that lead to greater conflict tend to report higher levels of stressful events (Daley, Hammen, Davila, & Burge, 1998). Alternatively, individuals who experience greater family conflict may simply have fewer psychological or interpersonal resources with which to cope with outside stressors. It should also be noted that a moral-religious emphasis in the family was associated with greater hassles in Model 4, while family cohesion was associated with fewer. Neither of these associations survived simultaneous testing with depressive symptoms and family income in Model 5. On the other hand, family cohesion and conflict are negatively correlated and which variable is more strongly correlated with hassles in Table 1 depends on the time point. Thus, strong conclusions about the lack of association with cohesion are not warranted.

The autoregressive factor accounted for an additional 20% of variance, with the path coefficient estimated at .86. By extension, the total autoregressive effect between two time points one year apart would be .57, generally considered a large effect within behavioral research (Cohen, 1992). Many factors could contribute to this effect. Perhaps most parsimoniously, reports close in time are more likely to be influenced by the same situations, or even be the same hassles. Hassles have been theorized to be a proximal mediator of major acute life events (DeLongis et al., 1982), and there is little reason to believe that they could not similarly mediate the effects of chronic stressors lasting weeks or months. For example, the same 4-month bout of chemotherapy may lead to similar hassles reported at contiguous time points, but not 8 months later after the end of acute treatment. Another possibility is that many stressors lead to future stress and hassles (Pearlin, 1989). Longitudinal studies of stress should be careful to account for these effects, as the failure to control for autoregressive effects would be expected to inflate the estimated influence of other predictors with which baseline levels of stress are correlated.

Finally, only 20% of the observed variance in reports of hassles was attributable to the residual terms representing unique, situation specific variation and error. Because TSE models do not allow for explicitly modeling error variance (see Cole et al., 2005, for alternative models that do), 20% represents an upper bound for the amount of hassles attributable to the unique circumstances at any given time.

The extent to which the current findings for hassles might be similar to those found for other measures of stressors is unknown. At least three factors might affect the extent of the continuity and the relatively partitioning of variance for any given measure of stress. First, the conceptualization of the stress itself would strongly determine the magnitude of correlations over time. Episodic stressors, by definition, should have an acute onset and relatively brief duration. The same event would not be expected to be reported consistently at multiple contiguous time points, and there may be less likelihood of one acute event leading to another. This would likely result in a lower autoregressive effect. Measures of stress also vary in the extent to which they assess event occurrence (i.e., whether something specific happened), which requires simple recognition and recall of the event, or stressor severity (i.e., how impactful the stressor was), which invites more elaborate subjective

processing. Thus, measures that assess stressor severity would be more likely to demonstrate a greater stable trait contribution on account of individual differences in reporting. Similarly, formats that allow for less subjective judgment by participants (either through extensive, rigid questionnaire instructions or filtering of participants' reports through a skilled interviewer) might be expected to result in lower trait values.

Taken together, these features present intriguing possibilities for future research. The present study's Hassles Scale (a self-report Likert scale of minor, highly repeatable events) might be expected to have a comparatively large trait contribution, as well as a sizeable autoregressive effect. By contrast, the use of semi-structured life event interviews with standardized prompts and clear criteria for what constitutes an "event" would be perhaps least likely to show significant trait effects. Nonetheless, the continuity in acute stressors demonstrated in previous studies (Hammen et al, 2012; Uliaszek et al., 2012), the stress generation literature (Liu & Alloy, 2010), and sociological research (Pearlin et al., 2005) all converge to suggest that trait and autoregressive effects likely exist even for these stressors. Indeed, in the current study there was still a large trait contribution to hassles even after controlling for average depressive symptoms which roughly indexes many factors, including pessimism, neuroticism, and stress sensitivity. Future studies would do well to evaluate the magnitude and sources of stability in other stress measures. Doing so would inform not just studies of stressor impact and generation (i.e., do hassles or life events exhibit continuity because of their relationship to chronic stressors?), but also help to inform efficient and theoretically grounded measurement of stress.

The current study has several strengths and limitations. The sample was ascertained from community sources in two cities and represents a wide range of ages. The eight waves of data over two years provided a broad view of the stability of stress over time. On the other hand, the sample was composed largely of women, and there was no explicit measure of response bias, limiting interpretation of the trait factor. Nonetheless, the current study for the first time quantifies both the magnitude of hassle stability as well as its sources. Future studies should also consider integrating latent trait-state models of stress with those of psychopathology and other stress-related outcomes.

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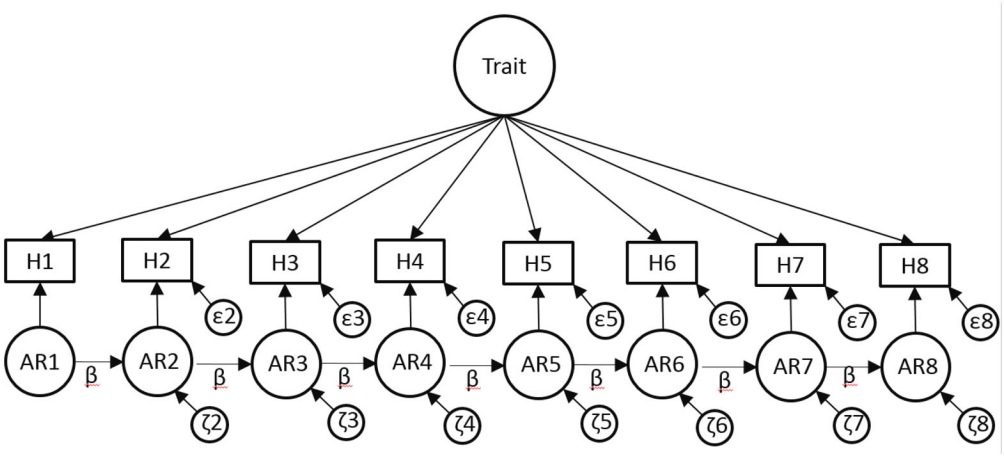

Figure 1.

Basic Trait-State-Error Model of hassles reported every three months. H: self-reported hassles. AR: Autoregressive factor. All pathways from predictors to observed variables are fixed at 1.

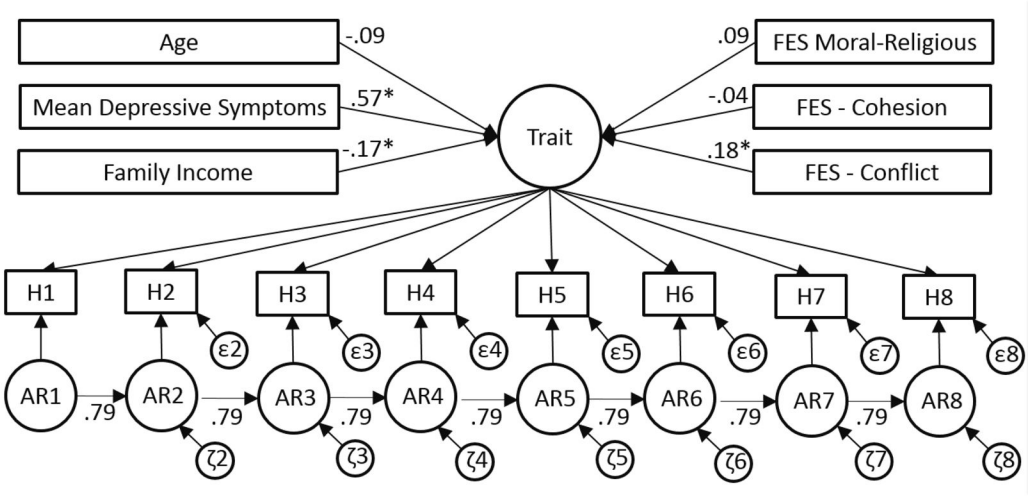

Figure 2.

Path coefficients of Model 5. All pathways from predictors to observed variables are fixed at 1. H: self-reported hassles. AR: Autoregressive factor. Autoregressive Path, β = .79, $p < .01$. *: $p < .05$.

Table 1

Pairwise deleted correlations and descriptive statistics of continuous variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 Income																		
2 Age	.26*																	
3 SSQS	.08	.02																
4 FES Coh	.16*	.14*	.05															
5 FES Con	−.05	−.08	−.01	−.48*														
6 FES Cul	.19*	.16*	.04	.46*	−.26*													
7 FES Act	.25*	.08	.11	.34*	−.21*	.47*												
8 FES Mor	−.16*	−.15*	.04	.10	−.09	.11	.06											
9 FES Org	.01	−.08	.07	.39*	−.30*	.13*	.13*	.29*										
10 *M* BDI	−.24*	−.06	−.07	−.23*	.18*	−.12	−.26*	−.11	−.18*									
11 Hassles 1	−.28*	−.18*	.00	−.27*	.20*	−.06	−.19*	.04	−.14*	.55*								
12 Hassles 2	−.22*	−.13*	−.03	−.23*	.24*	−.05	−.17*	−.04	−.16*	.51*	.76*							
13 Hassles 3	−.25*	−.12	−.06	−.26*	.22*	−.12	−.17*	−.04	−.24*	.60*	.75*	.74*						
14 Hassles 4	−.33*	−.16*	−.13	−.26*	.21*	−.05	−.17*	.01	−.18*	.60*	.69*	.76*	.74*					
15 Hassles 5	−.22*	−.13	−.07	−.22*	.18*	−.06	−.20*	−.08	−.21*	.58*	.72*	.74*	.77*	.74*				
16 Hassles 6	−.16*	−.12	.03	−.14	.17*	.01	−.12	−.05	−.15*	.48*	.67*	.72*	.76*	.75*	.75*			
17 Hassles 7	−.20*	−.26*	−.07	−.16*	.17*	−.02	−.11	−.01	−.21*	.59*	.72*	.70*	.73*	.69*	.69*	.74*		
18 Hassles 8	−.23*	−.20*	−.06	−.27*	.27*	−.03	−.19*	.14*	−.13*	.47*	.70*	.69*	.66*	.69*	.74*	.70*	.82*	
n	309	311	246	260	260	260	260	260	260	314	297	282	261	233	226	215	229	249
M	4.20	43.86	4.85	6.96	3.12	6.74	5.99	4.35	5.48	6.74	30.10	29.96	29.74	29.34	29.82	27.73	30.81	35.02
SD	2.27	6.15	1.34	2.04	2.12	1.88	2.00	2.27	2.09	5.95	19.69	19.81	19.38	19.43	18.78	18.66	20.57	24.04

Note:

* $p < .05$. Hassles 1 – Hassles 8 refers to hassles scores at each of the 8 waves of data collection.

SSQS: Social Support Questionnaire – Satisfaction; FES: Family Environment Scale. Coh: Cohesion; Con: Conflict; Cul: Intellectual-Cultural; Active-Recreational; Mor: Moral-Religious; Org: Organization; *M* BDI: Mean BDI across all available time points.

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Frequencies of dichotomous variables (depression history and partner status) are given in the Measures section.

Table 2

Structural equation model summary.

	Model				
	1	**2**	**3**	**4**	**5**
Variances					
Trait	258.99				
Trait Residual		227.2	138.51	226.4	122.20
Autoregressive Factor	84.95	80.00	69.54	74.63	71.53
State/Error, ε	84.44	84.18	84.36	80.25	75.65
Autoregressive Path, β	0.86	0.84	0.82	0.81	0.79
Predictors of Trait Factor					
Income		−0.25*	−0.15*		−0.17*
Age		−0.15*	−0.16*		−0.09
Partner		−0.09			
Mean BDI			0.62*		0.57*
History of Depression			> −0.01		
SSQS				−0.02	
FES Cohesion				−0.22*	−0.04
FES Conflict				0.18*	0.18*
FES Intellectual-Cultural				0.15	
FES Active-Recreational				−0.14	
FES Moral-Religious				0.17*	0.09
FES Organization				−0.13	
χ^2	75.74	100.18	130.18	136.06	145.92
df	32	54	63	81	74
p	<.001	<.001	<.001	<.001	<.001
CFI	0.97	0.97	0.96	0.96	0.95
RMSEA	0.07	0.05	0.06	0.05	0.06
SRMR	0.08	0.06	0.07	0.06	0.06

Note:

* $p < .05$.

BDI: Beck Depression Inventory; SSQS: Social Support Questionnaire – Satisfaction; FES: Family Environment Scale.