Aging and Symptoms of Anxiety and Depression: Structural Invariance of the Tripartite Model

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Negative affect measures were evaluated in a cross-sectional community sample of adults aged 18–93 (N = 335) to examine the structure of neuroticism, anxiety, and depressive symptoms in young, middle, and older adult cohorts. Structural equation modeling was used to contrast 3 nested models: a 1-factor general distress model; a 2-factor high negative–low positive affect model; and a 3-factor “tripartite model” reflecting a higher order Negative Affect factor that is common to depression and anxiety problems and 2 lower order factors, Low Positive Affect (mostly specific to depression) and Arousal (specific to anxiety/panic). As expected, the tripartite model fit best for all age groups. Further, multigroup analyses indicated age invariance for the tripartite model, suggesting the model can be effectively applied with older populations.

Keywords: anxiety, depression, tripartite model, aging, older adults

As the baby-boomer generation ages, there has been a growing interest in mental health issues among older adults (U.S. Department of Health and Human Services, 2003). At the same time, there has been a separate literature that is trying to better understand the structure of negative affect, particularly relations among anxiety and depression (see Clark & Watson, 1991). The current study brings these two fields together, examining the structural variance of anxiety and depression symptoms across adulthood. Specifically, this study evaluates the fit of prominent models designed to explain the relationship among markers of negative affect and determines whether there is structural invariance across age cohorts (in other words, whether the relationships among the constructs are consistent). To address this question, we used a cross-sectional sample to examine relationships among the constructs of anxious arousal, low positive affect, and high negative affect. The current study was conducted in a large community-based sample of adults divided into young, middle, and older adult age groups.

The selection of models to evaluate the structure of negative affect symptoms was based on popularity of the models in clinical and personality literatures and the presence of empirical support for relations among measures of neuroticism, anxiety, and depression. Clearly, this approach cannot capture all the major theories or all types of negative affect (in fact, the interest was in outlining the relationship among anxiety and depression symptoms, not other negative emotions, like anger and so forth). Nonetheless, the three models selected are both influential and theoretically derived and have relevance for understanding how the structure of negative affect might be expected to vary across adulthood. The first model combines symptoms of negative affect to create a single General Distress factor. The second model partitions the symptom measures to generate a two-factor model that distinguishes the absence of positive affect and presence of negative affect. Finally, the third model, known initially as the “tripartite model” (see Clark & Watson, 1991; Clark, Watson, & Mineka, 1994) and later adapted as the “integrative hierarchical model” (Mineka, Watson, & Clark, 1998), proposes a two-level structure. It includes a higher order factor of General Negative Affect (akin to neuroticism) that is common to depression and anxiety problems and two lower order factors, Low Positive Affect (mainly specific to depression) and Arousal (such as feelings of tension and shakiness; specific to anxiety/panic). These three models are outlined in greater detail below—in each case, we consider how different relationships among the three factors (Anxious Arousal, Low Positive Affect, and High Negative Affect) might uniquely fit the structure of emotion for older adults.

Rationale for Anxious Arousal, Low Positive Affect, and High Negative Affect as One Factor

The evaluation of a single General Distress factor can be thought of as a baseline model in some respects, but it also has theoretical justification. Support for this conceptualization comes from the substantial rates of comorbidity across mood and anxiety disorders, which have led to recent advances in treatment that focus on treating “negative affect syndrome” rather than artificially isolating single disorders (see Barlow, Allen, & Choate, 2004). Most studies that have used structural modeling techniques to examine anxiety and depression symptoms have found a large...
negative affect factor that explains substantial variance in both types of disorders (Mineka et al., 1998). Further, there is some suggestive evidence that there is more mixed anxiety and depression in older relative to younger samples (e.g., Flint, 1994), highlighting the importance of testing a single-factor model that does not force divisions between categories of negative affect across age groups.

The description of negative affect as a single General Distress factor has the advantage of parsimony but is also not without its drawbacks. Although there is considerable overlap between anxiety and depression, the distinctions still appear to be meaningful. As Clark and Watson (1991) noted, the comorbidity data can be reversed to point out that roughly half of all persons diagnosed with depression do not have an anxiety diagnosis, suggesting they are distinct disorders. Moreover, Wetherell, Gatz, and Pedersen (2001) found that although anxiety and depression were highly related in their longitudinal analysis with a sample ranging from 29–95 years of age, a model with two distinct anxiety and depressive factors fit the data better than a single factor. Further, Shapiro, Roberts, and Beck (1999) found that three factors emerged from their analysis of the Cognition Checklist (a measure of the cognitive and affective dimensions of anxiety and depression) in a community-dwelling older sample (ages 65–93), suggesting a more complicated structure than just one distress factor. In consequence, it is anticipated that the one-factor model will not provide a good fit to the data in the current study.

Rationale for Anxious Arousal, Low Positive Affect, and High Negative Affect as Two Factors

In numerous personality models, such as Tellegen’s (1985) circumplex model of emotions, two major factors emerge: Positive and Negative Affect. Further, there has been suggestion in the clinical literature that disorders would be more appropriately represented in a dimensional framework that outlines low levels of positive affect and severity of negative affect (see Barlow, 2000). There is ongoing debate about the independence of these two factors (see conflicting views in Green, Goldman, & Salovey, 1993; Tellegen, Watson, & Clark, 1999; Watson & Tellegen, 1985), but it does seem clear that they have unique relations to other relevant mental and physical health variables (see Clark & Watson, 1991). Moreover, in an earlier iteration of what would become the three-factor model, Watson, Clark, and Carey (1988) noted support for a two-factor model in which Negative Affect was common to depression and anxiety and low positive affect was specific to depression. Further, merging neuroticism and negative affect into one dimension and extraversion and positive affect into another, Watson, Gamez, and Simms (2005) highlighted how effectively these two factors differentially relate to specific forms of psychopathology (the first dimension relates to distress across depression, anxiety, and other disorders, whereas the second dimension relates more specifically to depression and social anxiety). It is important to note that Watson et al.’s (2005) findings are also consistent with the three-factor integrative hierarchical model (described below) but highlight the value of examining Positive versus Negative Affect factors to explain anxiety and depression.

In general, it is expected that this model will fit the current data more closely than the one-factor model but will still not provide a good fit because of the lack of distinction between anxiety and depression symptoms (see also Wetherell et al., 2001). With respect to aging differences, there is some evidence that positive and negative affect may not show parallel structures across age groups. Specifically, Beck et al. (2003) found a three-factor solution on the Positive and Negative Affect Schedule among older participants with generalized anxiety disorder rather than the usual two factors. They did not compare across age groups (i.e., they assessed only older adults) and used a clinical sample, making comparisons with the current study difficult, but their intriguing results highlight the importance of exploring age differences in the two-factor model.

Rationale for Anxious Arousal, Low Positive Affect, and High Negative Affect as Three Factors

The tripartite model (Clark & Watson, 1991; Clark et al., 1994) describes the relationship among measures of negative affect by positing a higher order Negative Affect factor and two lower order factors specific to the unique components of depression and anxiety (Low Positive Affect and Anxious Arousal, respectively). This model has extensive empirical support (see review in Mineka et al., 1998), is applicable to both nonclinical and patient samples (Watson et al., 1995), and integrates both personality traits and clinical symptoms. Notably, the tripartite model takes into account the overlap between neuroticism, anxiety, and depression symptoms but also allows for unique components.

In more recent writings, the model has been revised on the basis of concerns that the Anxious Arousal factor was not characteristic of all anxiety disorders but reflected the unique component of panic disorder. The revised model, termed the “integrative hierarchical model” (Mineka et al., 1998), strives to better account for the heterogeneity among the anxiety disorders (see Watson et al., 2005) and thus focuses more at a diagnostic level to distinguish specific anxiety and mood disorder diagnoses. The integrative hierarchical model retains the higher order Negative Affect factor that is common to both anxiety and depressive disorders. The primary change is that the lower order Anxious Arousal factor is specific to panic. Further, although the lower order Positive Affect factor continues to be mostly specific to depression, it is also thought to reflect part of the unique component of social phobia (see Watson, & Clark, 1995). It is important to point out that we refer to this model as the “three-factor model” because it does distinguish between the Anxious Arousal, Low Positive Affect, and High Negative Affect factors. However, the model does not posit that all three factors are components of anxiety or of depression; rather, each disorder cluster has one common higher order factor (Negative Affect) and one relatively unique factor (Anxious Arousal or Low Positive Affect).

Because the current study focuses at the symptom rather than diagnostic level, the distinctions between the tripartite and integrative hierarchical models are minimized. However, it is important to note that we refer to the arousal factor in the current study as likely specific to anxiety/panic because we are not examining the divisions within the anxiety disorders and thus cannot tease apart the specificity of the factor at that level. Also, given that our focus is at the symptom level, our approach is more consistent with the tripartite model, so we refer to the three-factor model as the tripartite model throughout this article (rather than as the integrative hierarchical model). Our decision to examine the structure of anxiety and depression at the symptom versus diagnostic level...
follows from our primary interest in examining age differences; in this case, relying on diagnostic categories can be problematic because criteria have often not been validated in older samples. A related concern is that prevalence rates for clinical disorders are likely underestimated in older cohorts (e.g., Fuentes & Cox, 1997; Hersen & Van Hasselt, 1992).

Given the theoretical and empirical support for the three-factor model, it is expected that this model will provide the best fit across all age groups. Of interest, we are aware of only one prior study that specifically examined the tripartite model using an older adult population (though see excellent work differentiating anxiety and depression symptoms and positive and negative affect in older samples by Beck et al., 2003; Shapiro et al., 1999; Wetherell et al., 2001, among others). In an important first evaluation, Cook, Orvaschel, Simco, Hersen, and Joiner (2004) used confirmatory factor analysis to identify a three-factor model among psychiatric outpatients aged 55–87 (N = 131, mean age = 64 years). This model was superior to one- and two-factor models, providing initial support for the application of the tripartite model in an older clinical population. The authors were not able to directly test for age invariance because their sample was composed of one age group, but they did find a similar structure to that obtained on a separate younger sample. These promising results set the stage for the current study, which can extend the evaluation by (a) comparing across age groups within the same sample, (b) evaluating the model in a community (rather than patient) sample to evaluate a wide symptom range, (c) using structural equation modeling (SEM) to contrast nested models to more directly compare factor structures, (d) testing age invariance in a larger sample with greater representation of old-old persons (age 75+; see Scogin & Rohling, 1989), and (e) examining the hierarchical structure of the tripartite model (e.g., Cook et al., 2004, looked at interrelations among three factors but did not evaluate a higher–lower order factor structure).

The paucity of studies testing for age invariance in the tripartite model in older samples is significant because although the model does have broad support, it has not always generalized to different age cohorts. For instance, Ollendick, Seligman, Goza, Byrd, and Singh (2003) found that the tripartite model did not best reflect the relationship between anxiety and depression in a sample of children and adolescents (a two-factor model provided a superior fit to their data). Further, there is reason to expect a unique relationship between the Anxious Arousal and Negative Affect factors for older adults, relative to younger samples, because equivalent levels of arousal may differentially signify subjective distress across age groups. For example, there is some indication of smaller autonomic nervous system arousal in older adults (Appenzeller, 1994). However, Spar and LaRue (1990) observed that older patients often express anxiety in terms of physiologic arousal (e.g., motor tension) and the term “agitation” is sometimes used interchangeably with anxiety in older populations (Yesavage & Taylor, 1991). These intriguing findings lead to the prediction that reporting symptoms of arousal may be more normative in older, relative to younger, cohorts. Thus, we hypothesize that the tripartite model will be the best fitting model across all age groups but that structural variance will be observed in terms of weaker relationships between anxious arousal and negative affect in the older cohort.

### Participants

Participants were 335 community-dwelling individuals between the ages of 18 and 93 (64% female) recruited through newspaper advertisements, flyers, and referrals from other participants. Criteria for participation included completing at least 11 years of education and the ability to come to the lab for three separate testing sessions. Characteristics of the participants are reported by age in Table 1. All participants were screened for cognitive impairment with the Mini-Mental State Exam (Folstein, Folstein, & McHugh, 1975), and 1 participant who scored below 20 was subsequently excluded from the analyses. Ethnicity was reported as ~78% Caucasian, 12% African American, 2% Asian, and 4% American Indian; 5% indicated other or a multiracial–ethnic background, of which 2% reported having a Hispanic or Latino origin.

### Materials

A variety of self-report measures were selected to assess the hypothesized components of the key models (negative affect, anxious arousal, and low positive affect). Selection was based on the measures’ validity in older samples.

- The State–Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) is composed of two subscales (State and Trait Anxiety). Both 20-item subscales have good psychometric properties. The STAI has been investigated in a sample of older adult outpatients with mixed psychiatric disorders (Kabacoff, Segal, Hersen, & Van Hasselt, 1997) and demonstrated good reliability (though there may be some differences in the factor structure across age cohorts). The four-item General Well-Being subscale of the Center for Epidemiological Studies—Depression Scale (Radloff, 1977) was used to reflect low positive affect. It has strong psychometric properties and has been shown to identify depressive symptoms in elderly samples (e.g., Arean & Miranda, 1997; Hertzog, Van Alstine, Usala, Hultsch, & Dixon, 1991).

#### Table 1

**Sample Characteristics**

<table>
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<th>Education</th>
<th>Age group</th>
<th>Total</th>
<th>Age r</th>
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<td>n</td>
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<tr>
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<td>15.8</td>
<td>15.9</td>
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<tr>
<td>SD</td>
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<tr>
<td>M</td>
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<tr>
<td>SD</td>
<td>1.2</td>
<td>1.4</td>
<td>1.8</td>
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</table>

*Note.* Health is a self-reported rating on a scale of 1 (excellent) to 5 (poor). Age r reflects the correlation of each measure with age. MMSE = Mini-Mental State Exam.

$p < .05$. 

### Method
The Neuroticism subscale of the International Personality Item Pool Questionnaire (Goldberg, 1999; 50-item version) consists of 10 items measuring negative affect, consistent with the five-factor model of personality (e.g., Costa & McCrae, 1992). Prior research with older samples has suggested a similar factor structure of personality dimensions across age cohorts (see Small, Hertzog, Hultsch, & Dixon, 2003), and the International Personality Item Pool Questionnaire scales have been used with persons between the ages of 22 and 90 (Goldberg, in press). The Positive and Negative Affect Scale (PANAS; Watson, Clark, & Tellegen, 1988), a 20-item scale assessing negative and positive affect, demonstrates good psychometric properties and has been shown to be valid and reliable in a sample aged 18 to 91 (see Crawford & Henry, 2004). Participants completed the State version of the scale. As noted in Table 2, all measures had moderate to high reliability. Table 2 also lists the descriptive statistics of questionnaires according to age group and notes mean age group differences on the scales.

To assign scale items to indicators for the models, we parceled items so that the indicators could be combined in different configurations to create the nested one-, two-, and three-factor model structures. We computed parcels by taking the arithmetic mean of items for each parcel. This parcel assignment served to (a) lessen the number of parameters being estimated, (b) ensure a more normal distribution of indicators, (c) make sure that variables loading on the same factor would have relatively similar reliabilities, and (d) balance the number of indicators loading on each latent variable. Ultimately, this approach increases the power and reliability of the model comparisons.

We used two guidelines to create 11 manifest variables. First, we assigned positively valenced items (e.g., “I feel pleasant,” “I was happy”) to variables reflecting a Low Positive Affect latent variable. Likewise, we assigned negatively valenced items to either the Anxious Arousal or Negative Affect latent variables, depending on whether items reflected bodily arousal (“I am tense”) or general negative affect (“I feel inadequate”). Second, we assigned items from the same original scale to the same indicator (i.e., all the positively valenced items from the PANAS comprised one indicator), given that these groupings were based on previously established interitem consistency. In this way, 11 manifest, or observed, indicator variables were created that could be combined in different ways to reflect the three models being compared. All indicator assignments were based on face validity, a check of intercorrelations among indicators within a latent construct, and a review of the literature indicating empirical support for a given subscale’s construct and discriminant validity. For instance, on the basis of this review, the Trait subscale of the STAI was used as an indicator of general negative affect (rather than being specific to anxious arousal) because of studies indicating that it assesses negative mood more broadly rather than anxiety specifically (e.g., Creamer, Foran, & Bell, 1995; Endler, Cox, Parker, & Bagby, 1992; Feldman, 1993). Table 3 lists the variable names and items used to create each variable. Figure 1 outlines the tripartite model to illustrate the allocation of indicators to their latent constructs.

### Procedure

**Study procedure.** Participants completed measures as part of a larger study designed to investigate the effects of aging on executive functioning and memory. Participants reported to the laboratory on three separate occasions, completing the State subscale of the STAI at the start of each session and all other questionnaires between the first and third sessions.

**Modeling procedure.** The purpose of the current study is two-fold. The first is to examine three competing models of negative affect and determine which model provides the best fit. The second is to investigate whether the structure of this best-fitting model is invariant across different age groups. Age was divided by double decades to create three age groups: 18–39 years old (n = 90), 40–59 years old (n = 133), and 60 years old and over (n = 112). The groups were divided in this manner to create young adult, middle adult, and older adult groups that are approximately the same size.

To build “true score” latent constructs of Negative Affect, Anxious Arousal, and Low Positive Affect, correlations among the manifest variables within each latent factor were evaluated to determine the empirical support for the selected combination of indicators. Next, a series of nested models were compared using

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1 We also computed parcels using the arithmetic totals of items, but this provided the same pattern of results as the first method. Therefore, we report results using arithmetic means. It is important to note that we recognize that the choice to create parcels makes direct comparison with other studies that use the same instruments slightly more difficult, but we believe the advantages for power, validity, and so forth outweigh this disadvantage.
In this study, we examined two types of metric invariance. Metric 1 specifies the values of all lower order factor loadings to be equal across the three age groups; Metric 2 is a more stringent test that specifies the lower and higher order loadings to be equivalent across age groups. (Higher order loadings are the coefficients connecting latent constructs, and lower order loadings are the coefficients from the latent constructs to the 11 manifest variables.)

Results

As evident in Table 2, which presents mean age group differences on the scales, the older group tended to report less negative affect and more positive affect relative to the younger groups. Table 4 presents the correlations among the variables. In general, variables within a latent factor correlated more highly with one another than with variables on the other factors, supporting the grouping of indicators on their respective latent constructs.
Model Comparisons

To compare the three models directly, we needed to create nested models such that one could be transformed into another by changing a single constraint. This was accomplished by changing only the higher order loadings (paths connecting the latent constructs) to vary the number of factors in the models. The baseline model was a one-factor model, in which all variables were subsumed under a single Negative Affect construct (created by setting the higher order loadings connecting the latent Negative Affect construct to the Anxious Arousal and Low Positive Affect constructs to 1.0). The two-factor model was created by freeing the constraint between the Negative Affect and Low Positive Affect constructs so that it was no longer set to 1.0. Thus, the two-factor model consisted of one construct representing Low Positive Affect and one construct representing both the presence of Negative Affect and Anxious Arousal. Finally, the tripartite model was created by additionally freeing the constraint connecting the Negative Affect and Anxious Arousal constructs, creating three separate factors.

Model comparisons were made by comparing the change in chi-square between models as a function of the change in degrees of freedom (see Table 5). As expected, the one-factor model provided the poorest fit to the data, followed by the two-factor model (which improved the fit relative to the one-factor model). The tripartite model provided the best fit in direct model comparisons and was the only model that had an acceptable root-mean-square error of approximation (RMSEA) of less than .08 (as recommended by Browne & Cudeck, 1993, lower numbers are better) and a comparative fit index (CFI) and normed fit index (NFI) above .90 (indicating an acceptable fit according to Hu & Bentler, 1999; numbers closer to 1.0 indicate a better fit). Figure 1 presents the tripartite model and the standardized coefficients for the entire sample. The three constructs of the tripartite model exhibited moderate to strong convergent validity because the majority of the lower order loadings are in the moderate to large range. Further, the superior fit of the tripartite model over the one- and two-factor models suggests adequate discriminant validity, in that the three constructs represent distinct dimensions (even though the standardized coefficient from the Negative Affect to Low Positive Affect construct is quite large; see follow-up analysis below that supports their separation). Moreover, comparisons within each age group paralleled the analysis above, with the tripartite model providing the best fit, relative to the other models, for all age groups (see Table 5). Finally, because the models are nested, a direct comparison of change in chi-square per change in degree of freedom can be tested for significance. Consistent with the other fit statistics, the tripartite model fit significantly better than both the one-factor and two-factor models in the overall sample as well as within each age group.

An alternative view of the associations among the constructs is to regard the relations among the three constructs as being merely correlated and without a predictive relationship, as reported by Cook et al. (2004). Evaluating Cook et al.’s model also provides a confirmatory factor analysis to check the proposed three-factor structure. The fit of a three-factor model in which the three constructs were correlated with one another was examined (correlations connecting the latent factors: Anxious Arousal with Positive Affect = -.37, Anxious Arousal with Negative Affect = .50, and Positive Affect with Negative Affect = -.92). The fit of this model was fairly comparable with the fit of the tripartite model, \( \chi^2(41, N = 335) = 117, \) RMSEA = .07, and the NFI (.93) and CFI (.95) had identical values to the tripartite model. These results provide further support to the three-factor structure.

A final model comparison was conducted given that the standardized coefficient from the Negative Affect construct to the Low Positive Affect was quite large (~1) in the tripartite model. Thus, we decided to examine a fourth model in which these two constructs were combined by constraining the factor loading between the two constructs to 1.0, which essentially creates one Affect construct. In this way, we could check that we were not artificially separating the factors. The resulting model fit indicated that the post hoc two-factor model in which the Negative Affect and Low Positive Affect constructs were combined actually fit substantially worse, \( \chi^2(43, N = 335) = 266, \) RMSEA = .13, than both the original two-factor model and the tripartite model. Thus, the dis-

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**Table 4**

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<th>Variable</th>
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</table>

Note. Reliabilities are presented in parentheses.

* p < .05.
tinction between the Low Positive Affect and Negative Affect latent factors in the tripartite model appears justified.

Structural Invariance of the Tripartite Model

After determining that the tripartite model was the best representation of negative affect in our cross-sectional sample, we examined the structural invariance of the model across age groups. To evaluate configural invariance, the presence of the paths (but not the specific coefficient values) from the latent variables to each of the 11 manifest variables were specified to be the same for each age group, as were the higher order paths from Negative Affect to the Anxious Arousal and Low Positive Affect constructs. The tripartite model exhibited configural invariance because all loadings were significant at the \( p < .05 \) level for all age groups, implying an appropriate structure to describe negative affect for each group.

Metric invariance was examined by first constraining 8 of the 11 lower order factor loadings to be equivalent across the age groups (one loading for each construct was set to 1.0 to identify the factor structure) and comparing the fit to the baseline configural invariance model. We term this test Metric 1. For a model to exhibit metric invariance, the fit of the model should not be significantly different from the fit of the configural model. As is evident in Table 6, the change in chi-square per degree of freedom change between the configural and Metric 1 model was not significant, indicating no significant loss in fit. The same was true for the more restrictive test of metric invariance (Metric 2), which demonstrated that the lower and higher order loadings did not significantly differ across age groups. Inspection of the other fit statistics provides additional support that the metric invariance models did not fit substantially worse than the configural model because the CFI values were identical across the three models and the NFI values were comparable.

Finally, although these results point to the consistency of the tripartite structure and relationships among the latent factors across age groups, the structural invariance tests do not speak to potential age differences in the mean levels of the primary constructs. To test for age differences in the latent means of the three constructs (Anxious Arousal, Low Positive Affect, and High Negative Affect), we first constrained the factor loadings and intercepts of the manifest variables to be equal across the three age groups. (The variances of the latent constructs were allowed to vary across groups.) Next, the young group was selected as the reference group by constraining the latent means to be equal to zero for the young group and allowing the latent means to be freely estimated in the middle and older groups. The results are presented in Table 7, which shows that the latent means for...
the Negative Affect and Low Positive Affect constructs in the ages 60–93 group were significantly different from the latent means for the young group, indicating less negative affect and more positive affect in the older group. In contrast, the latent means of constructs for the 60–93 group were significantly different from the latent means for the young age group.

The youngest age group was selected as the reference group by constraining their latent means to be equal to zero so that the other groups could be compared with them.

** p /H11021.01.

### Table 7

<table>
<thead>
<tr>
<th>Age group and factor</th>
<th>Estimate of latent mean</th>
<th>Critical ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ages 40–59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative Affect</td>
<td>−.047</td>
<td>−0.77</td>
</tr>
<tr>
<td>Anxious Arousal</td>
<td>−.060</td>
<td>1.00</td>
</tr>
<tr>
<td>Low Positive Affect</td>
<td>.038</td>
<td>0.73</td>
</tr>
<tr>
<td>Ages 60–93</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative Affect</td>
<td>−.278</td>
<td>−5.00**</td>
</tr>
<tr>
<td>Anxious Arousal</td>
<td>−.012</td>
<td>−0.18</td>
</tr>
<tr>
<td>Low Positive Affect</td>
<td>.219</td>
<td>3.91**</td>
</tr>
</tbody>
</table>

**Note.** The youngest age group was selected as the reference group by constraining their latent means to be equal to zero so that the other groups could be compared with them.

* * p < .01.

### Discussion

The structural invariance of negative affect measures was evaluated in a large community sample of adults aged 18–93 to examine the structure of anxiety and depressive symptoms in young, middle, and older adults. It was hypothesized that a one-factor model reflecting a single General Distress factor would be a poor fit to the data, whereas a two-factor model reflecting the presence of negative affect and absence of positive affect would be a somewhat improved fit but still not sufficient to distinguish the unique components of anxiety and depression. It was expected that a three-factor tripartite model would provide the best fit to the data. Results confirmed these hypotheses, with the fit progressively improving from the one- to the two- to the three-factor model. This pattern was consistent both within and across the age groups, suggesting the tripartite model fit best for all age groups. Further, alternative models, which varied the relationships between the Negative Affect, Anxious Arousal, and Low Positive Affect factors, were either comparable with or worse than the tripartite structure, supporting the hypothesized tripartite model.

The second primary goal of the study was to investigate the age invariance of the tripartite model across three cohorts to determine whether the relationships among the higher order negative affect factor and the lower order anxious arousal and low positive affect factors were comparable across young, middle, and older adult samples. Results suggested that the tripartite model exhibited considerable age invariance across groups. There was strong evidence for configural invariance across age, indicating the same combination of latent factors and associated manifest variables across groups. Metric 1 invariance, a more stringent test, was also supported across the age groups. Further, the strongest test of invariance, Metric 2, was supported, suggesting that the magnitude of the unstandardized lower and higher order loadings are approximately equivalent across age cohorts. Taken together, these findings suggest the tripartite model can be effectively adapted in older community samples and that the structure of anxiety, depression, and neuroticism symptoms is mostly invariant across adulthood.

### Comparison of Alternative Models of Negative Affect

Rather than testing all possible models of the relation among depressive and anxiety symptoms, we chose to focus on models that could be contrasted to one another to compare fits. We selected models that were both theoretically derived and had interesting properties with respect to potential age differences. Results supported the hypothesis that the single-factor general distress model would be a poor fit to the data. As expected, the model could be rejected both relative to other models, across all three age groups, and in absolute terms. This suggests that even in older populations where there is purported to be more mixed anxiety and depression (e.g., Flint, 1994), it is still important to distinguish between different symptom presentations. In fact, there was no evidence that the one-factor model was a better fit for the older (relative to younger) group.

As anticipated, the two-factor model fit better than the one-factor model but worse than the tripartite model. Of importance, despite a very strong relationship between the Positive and Negative Affect factors, the finding of a better fit when the Low Positive Affect factor was distinguished from the Negative Affect factor suggests important information is lost by not discriminating between the factors (supporting Watson & Tellegen’s, 1985, argument for separating the factors). Looking at the positive and negative factors highlights how examining structural relationships versus mean differences can provide very different information. Although age invariance was observed across the structural tests, there were important differences in mean levels for these two factors across age groups. Specifically, the older group reported less negative affect and more positive affect relative to the youngest group.

From an assessment perspective, these findings suggest that the same components make up positive and negative affect for older and younger adults, but they endorse the constructs at different levels. The critical question then concerns whether lower mean levels reflect different or similar levels of psychopathology across age groups. The oft reported finding that anxiety and mood disorders are less prevalent in older populations (e.g., Flint, 1994; Regier et al., 1988) would suggest that the lower mean symptom endorsement in older populations is reflective of lower rates of psychopathology. However, we are hesitant to assume the connection is this simple, given that numerous researchers have suggested that prevalence rates are likely underestimated in older cohorts (e.g., Fuentes & Cox, 1997; Hersen & Van Hasselt, 1992). Further, subdiagnostic threshold symptoms can be quite serious in older adults (Schaub & Linden, 2000), causing significant disruption in daily living, harmful consequences for physical health, and predicting future psychiatric disorder (see Fisher & Noll, 1996; Helmchen, Linden, Kurtz, & Birklhofer, 2002; Himmelfarb & Murrell, 1984; Wetherell, Le Roux, & Gatz, 2003).

Results supported the hypothesis that the three-factor tripartite model would provide the best fit. The model provided the best fit for all three age groups and was a significant improvement to the two-factor model. (These results suggest the tripartite model is
clearly a better fit than the other models examined, but it should be noted that the fit statistics for the within-group analyses indicated only a moderate fit for the age-specific models in an absolute sense, in that not all fit statistics surpassed standard thresholds for the fit indices.) Of importance, the model provides a theoretically coherent structure that integrates a higher order personality trait (negative affect, akin to neuroticism) with lower order symptom measures and effectively captures both unique and common elements of anxiety/panic and depressive symptoms. Further, these findings are consistent with those of Cook et al. (2004), who used an older clinical sample.

**Evaluation of Invariance Across Age Groups**

The tripartite model was used to evaluate structural invariance across age groups, with findings indicating few age differences. For instance, no significant differences were found in the higher order loadings across age groups, suggesting that the Negative Affect, Anxious Arousal, and Low Positive Affect factors were related in comparable ways in the young, middle-aged, and older adult groups. This finding is particularly notable because it suggests there is even invariance with respect to anxious arousal. Age variance had seemed plausible because of questions about unique autonomic nervous system arousal patterns in older adults (see Appenzeller, 1994) and the tendency for older patients to express anxiety in terms of physiologic arousal (Spar & LaRue, 1990). The current results suggest that anxious arousal may be as significant an indicator of distress in older groups as it is in younger patients. Even though somatic symptoms may be reported in place of psychological symptoms more frequently in older persons, they may still be just as valid markers of distress. This suggests that researchers and clinicians should be cautious about using measures that try to control for differences in somatic symptoms in older patients by omitting these symptoms from mental health assessments (see Schein & Koenig, 1997).

It is important to interpret our age-invariance findings within the extensive literature on emotional functioning and aging. Isacowitz, Charles, and Carstensen (2000) hypothesized emotional maturation with age (see also Carstensen, Gross, & Fung, 1997; Labouvie-Vief, 1997), whereas others suggest that emotional experience appears to be quite similar across adult age groups (e.g., Lawton, Kleban, Rajagopal, & Dean, 1992). Conversely, Baltes (1997) suggested that fewer resources are available to manage personality-relevant challenges in old age; so late life may be associated with more negative emotional adaptation. The current results lead to different conclusions depending on whether one focuses on the findings of structural invariance (perhaps most consistent with Lawton et al.’s, 1992, suggestion of comparable emotional experience across age groups) versus the evidence for mean differences. The findings of less negative affect and more positive affect in the older (relative to younger) group are more in line with Carstensen and colleagues’ (1997) expectations of increasing emotional health with age. However, it will be important to evaluate these models in a sample with a larger old-old group to determine whether Baltes’ prediction will have consequences for the structure and mean levels of negative affect in late life. It is interesting to note that findings from a recent comparison of mean differences on personality dimensions between younger (age 65–79 years) and older (age 80–100 years) elderly adults suggested few age differences between the groups, including no age difference in mean neuroticism levels (Weiss et al., 2005).

**Limitations**

These results should be understood in light of the study’s limitations. In particular, the study relied on self-report symptom measures, so there is no way to evaluate convergent validity of the proposed negative affect constructs with other standard mental health indicators, including clinical interviews and diagnostic measures. In addition, the sample has some limitations in that the older group included a broad age range, which may obscure differences between young-old (60–75 years old) and old-old (75 + years old) adults; nonetheless, this sample had a reasonable representation of old-old participants relative to many previous studies. The sample was also a community-based, rather than patient, sample, which was preferred for this evaluation at the symptom level but limits the clinical applications. Further, the sample was predominantly Caucasian, relatively healthy physically, and well-functioning cognitively, potentially limiting generalizability of the findings. Notwithstanding, the sample demonstrated a broad range of symptoms, with approximately 20% scoring above standard cutoff scores that indicate risk for clinically significant depression and anxiety (e.g., on the Center for Epidemiological Studies—Depression Scale and STAI).

Finally, we recognize that the sample size may be considered small for SEM multigroup comparisons. However, we believe the sample of 335 participants was adequate, given that we focused on hypothesis-driven comparisons and compared nested models so that just one parameter was changed in each model (limiting the number of parameters to be estimated). In addition, it has been suggested that a minimum ratio of 5 participants to every one estimated parameter should be used in SEM (Bentler, 1988). Thirty-five parameters were estimated in the tripartite model, indicating that the sample was likely sufficient for the model comparisons. It is possible, though, that the age invariance analyses lacked precision to detect small differences across age groups because of low power. To help address this possible lack of precision, we examined the difference in fit with a less conservative $p$ value of .10 and found the tripartite model still exhibited Metric 1 and 2 invariance, reinforcing our findings.

**Clinical Implications and Conclusion**

Given the use of a nonclinical sample, implications for assessment and therapy can only be speculative and await examination in elderly patient samples. Nonetheless, these results suggest that relations among anxiety and depressive symptoms are similar on self-report measures, as long as measures are used that have some validity for older samples. This is an encouraging finding in that it suggests that symptoms that have shown mean-level age differences may still be comparable indicators of distress. It is also interesting to note that our support for the three-factor tripartite model shows some parallels with research on personality dimensions. Costa and McCrae (1992; also see McCrae & Costa, 1992) demonstrated a similar hierarchical structure in which Neuroticism was a higher order personality factor with six lower order factors, including Anxiety and Depression. Akin to the current study, their structure integrates personality and symptom measures and sug-
gests that the facets of neuroticism help explain the specific relations among anxious and depressive symptoms. Future research that teases apart which aspects of the neuroticism personality construct are stable versus variable across anxiety and depressive episodes, and in particular how age influences these outcomes, will help further integrate and/or disentangle personality and psychopathology factors.

Finally, the findings of age invariance are consistent with the notion that therapeutic interventions in younger adults that retain existing distinctions between anxious and depressive symptoms might be extended to older adults. In support of this position, initial reviews of treatments extending cognitive–behavioral techniques for depression (Zalaquett & Stens, 2006) and anxiety (Wetherell, Lenze, & Stanley, 2005) to older adults have generally shown promise. Many open questions remain about the nature of negative affect in older populations, but the current results suggest that the structure of negative affect, anxious arousal, and low positive affect is remarkably invariant across adulthood.

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