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DIFFERENTIAL AFFECT STRUCTURE IN DEPRESSIVE AND ANXIETY DISORDERS

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A dynamic model of affect suggests that positive and negative affect (PA and NA) are normally relatively independent of one another, whereas the heightened apprehensiveness and narrowed cognitive attention in persons with anxiety may contribute to a more unidimensional affect structure. This possibility was examined in a sample of 230 patients seeking treatment for anxiety and depressive disorders in the Netherlands. Two methods, a multiple-group confirmatory factor analysis (CFA) and Fisher's z test of correlations, were used to test these predicted relationships within a sample of persons diagnosed with either a depressive or an anxiety disorder. Both methods supported these predictions, with the depressed group exhibiting relatively independent PA and NA while the anxious group's affects were more strongly inversely correlated.

Researchers have identified two primary dimensions of affect, one characterized by the activation of positive states and another by the activation of negative states (Watson and Vaidya, 2003). Each of these affective dimensions provides unique information about the person's level of emotional well being, and prior studies have shown that stressful situations as well as other life events can influence the reports of positive (PA) and negative affect (NA, Zautra *et al.*, 2000). These affective dimensions may also be useful in differentiating the unique profiles of people with affective disorders such as anxiety and depression (Clark and Watson, 1991). Recent investigations into the underlying factor structure of PA and NA (Reich *et al.*, 2003) suggest further that there may be significant differences between people with anxiety and depression not only in their levels of PA and NA, but also in the relationship between these core affects. This study examines both differences in level of PA and NA and the relationship between them for patients diagnosed with anxiety and depression.

Anxiety and depression appear to have much in common with one another. They both are characterized by high levels of psychological distress (Massion *et al.*, 1993; Wells and Sherbourne, 1999), they tend to co-occur in the same individual (Mineka *et al.*, 1998; Kessler *et al.*, 1996), and they are often treated with the same pharmacological agents (Gorman and Kent, 1999). None the less, these clinical conditions have

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distinctive symptom profiles (Mineka *et al.*, 1998), and appear to engage different neural structures (Liotti *et al*., 2000; Reiman *et al.*, 2000). Some investigators have sought to explain potential underlying differences between anxiety and depressive disorders in terms of relative levels of positive and negative affect (Brown *et al.*, 1998; Clark and Watson, 1991; Kendall and Watson, 1989). Negative affect appears to play a substantial role in both anxiety and depression. Such is not the case for positive affect however. Clark and Watson (1991) saw deficits in positive affect as indicative only of depression, suggesting that only negative affective states were common to both conditions to varying degrees. Demonstrating the common importance of negative affect, Watson and Clark (1994) report elevated levels of NA in a mixed psychiatric sample used for comparative norming of the PANAS-X (Positive and Negative Affect Schedule-Expanded) scale, a result consistent with previous findings (e.g. Watson and Clark, 1984; Watson *et al.*, 1988).

Positive affect deficits are not found in all psychiatric disorders, however. In particular, Kendall and Watson (1989) view anxiety as a relatively pure state of high NA, with virtually no PA deficit. In contrast, PA in depressives should be suppressed below standard population norms. Factor loadings of various mood terms suggestive of anxiety or depression have supported this distinction. Anxiety-related terms loaded significantly only on NA. Depression-related items loaded high on NA but also showed significant, oppositely valenced loadings on PA (Kendall and Watson, 1989). Brown *et al.* (1998) found that the pattern of relationships described above resulted in the best fit of data derived from clinical populations.

People may differ not only in levels of PA and NA, but also in the degree of relationship between these dimensions. Recently, Zautra *et al.* (1997) have suggested that the structure of the relationship between PA and NA varies in response to stressful conditions that increase uncertainty over present and/or future events. Under normal conditions in which a person's cognitive and affective resources are not taxed by stressful conditions, one would expect to find PA and NA arrayed in a two-factor form. Assessment of the same person under stressful conditions would reveal that the two affects acquire a more unidimensional structure. Zautra *et al.* (2002) discuss the mechanism by which this simplification of structure occurs. Stress produces uncertainty, which in turn increases information processing requirements (Ursin and Olff, 1993). The increased informational demands on the person during stressful episodes are thought to narrow the availability of cognitive resources needed to fully evaluate PA and NA separately, leading to a higher inverse correlation. Linville (1985, 1987) has shown that under stress normally uncorrelated processes, such as PA and NA, can become negatively correlated and such simplification of cognitive processing may be beneficial in times of stress as it encourages more rapid response to events (Paulhus and Lim, 1994). Research has demonstrated this stress effect on the PA and NA relationship with both "naturally occurring" negative events (illness, bereavement) as well as experimentally induced stress (Zautra *et al.*, 2000).

These effects may also extend to the group of clinical conditions classified as anxiety disorders. Barlow (1991) identified chronic apprehension and uncertainty as central to anxiety disorders. According to his model, the person appears to be in a state of constant readiness to defend against potentially stressful events. The normally transient and adaptive response to stress discussed by Paulhus and Lim (1994) becomes more persistent and creates long-term demands for cognitive resources. This defensive posture is similar to a chronic stressor and may influence the relationship between PA and NA in those with an anxiety disorder according to the dynamic model of affect proposed by Zautra *et al.* (1997). This model would predict that anxiety, with its attendant hypervigilance against possible threat, would impose cognitive demands similar to those of stressful events. Like external stressors, anxiety would narrow affective focus, resulting in a more unidimensional structure for PA and NA. One would expect, therefore, to find a significant inverse correlation between PA and NA factors in anxious populations. Depressed persons lack this perceived stress or uncertainty component in their syndrome, and so one would expect correlations between PA and NA that are more typical of the general population, even with relatively low levels of PA and high levels of NA.

Using this theoretical framework we set out to test how depression and anxiety differed both in level of PA and NA, and in relationship between these affective states. Three predictions were formed. First, in accordance with previous research by Clark and Watson (1991), individuals diagnosed with depression were expected to show significantly lower scores on positive affect than patients with anxiety disorders. Based on an expected narrowing of affective space under conditions of uncertainty, those in the anxiety group were predicted to show a significant inverse correlation between PA and NA. The depression group was predicted to have a low, non-significant correlation between PA and NA leading to a third prediction: that the intecorrelations between PA and NA would be more strongly linked in persons suffering from an anxiety disorder in comparison to those with a depressive disorder.

METHOD

Participants

Participants were consecutive patients seeking treatment at the anxiety and mood disorders unit of the Maastricht Community Mental Health Center, The Netherlands. All patients participated in the study after giving written informed consent. They were interviewed using the Structured Clinical Interview for DSM-III-R (SCID-I; Spitzer *et al*., 1992) by trained therapists. All persons with a clear primary anxiety or depressive disorder were eligible to participate, resulting in a total study population of 230 participants: 157 with an anxiety disorder diagnosis, and 73 with a depression diagnosis. In the depressed group, 36 were diagnosed with major depression and 37 with depression-melancholic type. Among the anxious patients, 43 were diagnosed with social phobia, 12 with simple phobia, 30 with panic disorder, 18 with panic disorder and agoraphobia, five with agoraphobia without panic, 14 with obsessive-compulsive disorder, 20 with generalized anxiety disorder and 15 with post traumatic stress disorder. The relatively small number of patients in the sub-types of depression and anxiety did not permit analysis of data by sub-group in this study. Participants completed all study instruments at the mental health center.

Standard demographic information was obtained for each participant. 47.4% of the anxious participants were married, and 56.2% of depressed patients as well, a non-significant difference. The groups were marginally different in gender composition: 36.3% of the anxious patients were male, compared with 47.9% of the depressed patients ($p < 0.10$). Further, there were small differences in age composition between groups. The average age of the depressed cohort was 40.7, compared with 34.6 for the anxiety group ($p < 0.05$). In light of these demographic differences, analyses of group differences in level and correlation between PA and NA were examined covarying the effects of age and gender. Controlling for differences in age and gender had no effect on the results obtained. Consequentially, the results are reported without any correction for age and gender.

Measures

All participants filled in a paper and pencil version of the Dutch translation of the Positive and Negative Affect Schedule (PANAS; Watson and Clark, 1988). The PANAS has two 10-item scales composed of adjectives measuring positive affect (PA, e.g. "alert", "active", and "interested") and negative affect (NA, e.g. "jittery", "hostile", and "ashamed"). The PANAS instrument in this study measured affect states during the previous week. Alpha reliabilities of previous Dutch translation were 0.83 and 0.79 for the NA and PA scales, respectively (Peeters *et al.*, 1996), comparable to those obtained with the original English version of the scales. The current sample yielded alphas of 0.89 for PA and 0.85 for NA.

RESULTS

Initial Analyses

As predicted, the overall level of PA was significantly lower in depressed participants (mean: 1.56, SE: 0.54) compared with those with anxiety (mean: 2.46, SE: 0.72), $t\ (228) = -9.41$, $p < 0.001$. In this sample, depressed participants also showed higher scores on NA (depression group mean: 3.64, SE: 0.80; anxiety mean: 2.81; SE: 0.91), $t\ (228) = 7.00$, $p < 0.01$. Prior to examination of latent factor models of PA and NA, the simple correlations between PA and NA were compared for each group. As predicted, anxious patients showed a significantly higher inverse correlation between PA and NA ($r = -0.32$, $p < 0.01$) than was found for depressed participants ($r = -0.04$, ns) as tested with a Fisher's z difference between correlations: 2.025, $p < 0.05$. This test of the differences in PA and NA relationships between groups was followed by a more thorough analysis of the latent variables.

Multiple-Group SEM

To test our hypotheses about the structure of affect in these two groups we used a two-group confirmatory factor analysis approach, using MPLUS 2.01 (Muthén and Muthén, 1999) for Windows to analyse the full data set of 20 PANAS items. The multiple-group CFA approach had several benefits. First, it permitted a test of the measurement invariance of PA and NA across the two clinical groups. Second, by constraining successive elements of the model across groups it was possible to test the equality of important model parameters across groups using nested models and chi-square difference tests. By using this technique, it was possible to test for differences in the relationship of affects in the groups within the likelihood of the entire model while also minimizing the impact of measurement error and distributional problems that may impact the z test of correlations.

Fourteen of the 20 PANAS items exhibited significant skew (often positive skew for PA items and negative for NA, although this was not uniform), threatening the assumption of multivariate normality necessary for covariance structure analysis. To alleviate problems from skew, item parcels were created for the latent variable model indicators (West *et al.*, 1995). Parallel parcels (Cook *et al.*, 1988) were created so that each was as close to the overall positive or negative affect mean as possible. Three parcels were necessary for each factor for adequate model identification. Each parcel consisted of three or four individual items, was non-significantly different from the overall PA or NA mean, and had satisfactory skew and kurtosis.[1]

The Baseline Model

Our a priori model posited two correlated latent factors, one for positive affect and one for negative affect. Each of the three positive parcels loaded on the PA factor and each of the negative parcels loaded on the NA factor. No loadings across the positive/negative dimension were included (i.e. no negative parcels loading on PA). This baseline model served as a test of "configural invariance", a check to determine if the same pattern of factor loadings held across the groups if all parameters were freely estimated within the bounds of minimal constraints required for model identification. For model identification, the latent factor variances were fixed at 1.0, allowing estimation of all parcel loadings. The single latent variable covariance parameter was then equivalent to the correlation of the PA and NA factors. The mean structure of the model was identified by fixing the latent factor means of group 1 (anxiety) to a value of 0 and constraining each latent factor's first parcel intercept to equality across groups.

Several fit indices were used to evaluate fit of the model. This strategy gives a more accurate picture of model results, as it is more robust against changes to a model that might differentially impact on a particular index (Hu and Bentler, 1999). Indices used were chi-square, which would also allow a test of incremental model changes as constraints were added, the root mean square error of approximation (RMSEA; Browne and Cudeck, 1993), the standardized root mean square residual (SRMR), and the comparative fit index (CFI).

Table I contains a summary of fit indices for the baseline and later models. As shown, the baseline model fit the data very well, with a non-significant chi-square (15.482), and RMSEA and SRMR values below those that are considered acceptable for good model fit (0.07 for RMSEA, 0.08 for SRMR). The CFI indicated good fit as well, as it was well above the customary 0.9 threshold (CFI = 1.0).

[1] Because the PA and NA factors are well-defined, "parallel parcels" were deemed satisfactory since they were constructed wholly within the well-defined factors of PA and NA (see Bandalos and Finney, 2001). Positive parcel 1 included items "alert", "excited", and "enthusiastic"; parcel 2 included "interested", "proud", and "determined"; and parcel 3 was made up of "attentive", "inspired", "strong", and "active". The ten negative items divided into parcel 1 with "hostile", "nervous", and "distressed"; parcel 2 with "ashamed", "scared", and "afraid"; and parcel 3 with "irritable", "guilty", "jittery", and "upset".

TABLE I Fit indices for alternative models

Model	χ^2	*df*	χ^2*:df*	*CFI*	*RMSEA*	*SRMR*	*Model Comparison*	$\Delta\chi^2/df$
1. Baseline	15.482	16	0.968	1.000	0.000	0.037	None	
2. Baseline + loadings invariant	24.453	22	1.115	0.996	0.031	0.115	Model 1 vs. 2	1.495
3. Model 2 + factor covariance invariant	27.253	23	1.185	0.993	0.040	0.136	Model 2 vs. 3	2.800*

Note: *: significant at $p < 0.10$.

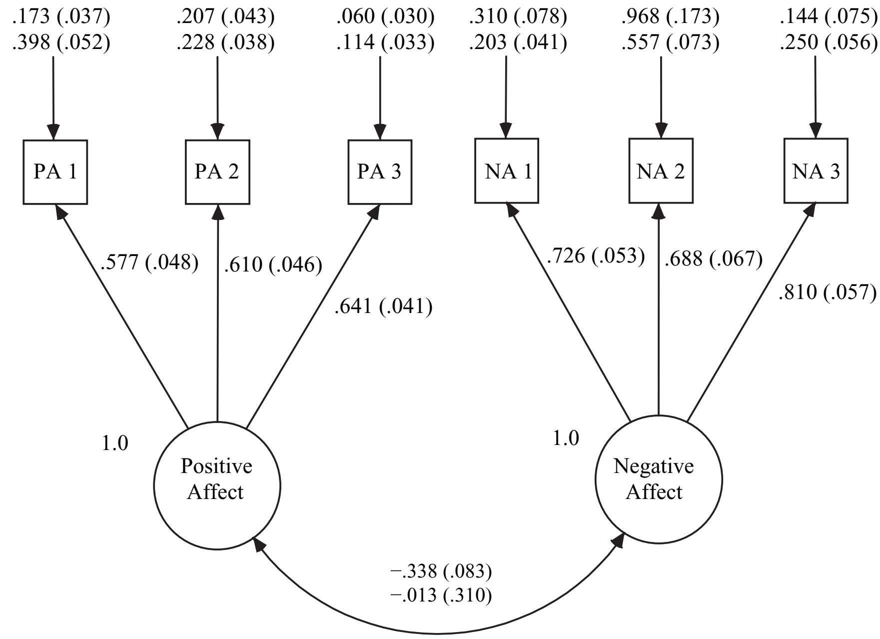
Testing for Invariance

Increasing degrees of restriction were added to the baseline model to evaluate the invariance of measurement across the two groups. The procedure may be found in more detail in Widaman and Reise (1997). First, the baseline model was modified so that the factor loadings were constrained to be equal across the groups and this change was evaluated with a chi-square difference test. Table I depicts the change in χ^2 /df as well as the significance tests. The two groups demonstrated invariance of factor loadings as revealed by a non-significant χ^2 difference of 8.971 (df = 6). As the two groups exhibited invariance at this level of the covariance structure, it was possible to compare the PA-NA correlation directly, on the same scale, as well as to test the parameter of interest, the single latent factor covariance. PA and NA were inversely correlated in the anxiety group, $r = -0.34$, $p < 0.001$. This relationship was not significant in the depressed group, $r = -0.01$. As shown in Table I, constraining this parameter to equality across the two groups worsened the model's fit, with a χ^2 difference of 2.80 ($p < 0.10$). The correlation of the latent PA and NA factors was marginally significantly different across the two clinical groups. The final model, with parameter estimates, is shown in Figure 1.

DISCUSSION

The results of this study indicate that anxiety and depression differ both in level and in the relationship between PA and NA. As predicted by Clark and Watson (1991), depressed patients showed significantly lower PA than those with anxiety. In this study, depressed participants also showed higher NA than their anxious counterparts. Also as predicted, the groups differed in affective relationship. Consistent with Zautra *et al*.'s (1997) model, participants with anxiety disorders appeared to exhibit a more simplified affect structure as suggested by the significant inverse correlation between PA and NA. The depressed participants displayed no such narrowing of affective range. In fact, the depressed group exhibited a correlation that was suggestive of no relationship between positive and negative affect.

This perspective on the experience of affects may offer new insights into the nature of these disorders and the treatments worthy of close examination. However, this representation must be considered within the context of an ongoing debate about the true structure of affective experience. The two-factor model of affect, with relatively



Note: Single parameter values indicate invariant values across groups. Upper values represent parameter values for anxiety group, lower represent depressed group values.

FIGURE 1 Latent factor structure of positive and negative affect for patients with either an anxiety disorder or a depressive disorder.

independent positive and negative components is not the only representation currently in use. Some research has supported a single dimension of affect, with positive and negative at either end (Russell and Carroll, 1999) and some have argued that differences between the two models are methodological artifacts. Some have proposed that a weaker inverse correlation between PA and NA comes about as a side effect of strongly skewed distributions and restriction of response range in negative affect (Russell and Feldman Barrett, 1999). Inspection of the descriptive characteristics of the affect parcels reveals a pattern of means inconsistent with a range restriction or non-normal variable explanation. In the present study the anxiety group had the higher inverse correlation but also had a lower level of negative affect. Although positive affect was lower in the depressed group, there was ample variance in depressed participant‘s PA scores to yield a high inverse correlation with negative affect, if present in the data. As a check on possibility of range restriction, correlations between PA parcels and the total score on PA were computed separately for the two patient groups and inspected for differences. Within PA, the (corrected) correlations between parcels and total scores ranged from 0.66 to 0.75 for the depressed group and 0.65 and 0.77 for the anxiety group: essentially equivalent sets of correlations. None of the parcels had problematic skew or kurtosis.

Putting aside this unsettled issue, it may be arguable whether the observed difference in correlations is meaningful. The anxiety group’s correlation, while significant, was only −0.32 and is not indicative of a truly single dimension where positive and negative are directly inverse of one another. In fact, some community samples have found correlations of this magnitude (Watson and Clark, 1994). Nevertheless, the results are consistent with Zautra *et al*.'s model (1997) that stands between these two strict interpretations of affect structure. The two groups revealed a predicted difference in their affective experience and those in the anxiety group showed a more mutually exclusive system of PA and NA experience. If those with anxiety disorders have a more simplified affect structure, this may be an important consideration in treatment, suggesting that a greater emphasis on awareness and emotional regulation would be fruitful (Davis *et al.*, in press).

The SEM analysis presented here may seem unnecessary when examining correlations and the difference between them. However, this approach has several advantages. First, when examining more than one group, as was done here, one can establish the measurement invariance, or lack thereof, of important constructs in both the mean and covariance structures of the data. In this case, the depressed and anxiety groups displayed invariant factor loadings, allowing one to compare correlations with identical scaling. Second, one may test differences in nested models. This advantage was used to test the difference between the two PA-NA correlations. Finally, as discussed above, the potential impact of distributional anomalies in the data was minimized through the use of item parceling.

This investigation has several shortcomings. One drawback is the lack of a non-clinical control group. Without this, there is no strict standard for determining the normative form of the affect relationship. However, considerable factor analytic work with the PANAS indicates that the weak PA-NA association found in the depressed group is typically found in most healthy samples (Watson and Clark, 1994). However, as mentioned above, analyses of data from some community samples and psychiatric patients (Watson and Clark, 1994) have yielded inverse correlations between PA and NA comparable to those found in the current investigation for the anxiety group. While the correlations between affects observed in the study represent the upper and lower bounds of correlations reported by Watson and Clark (1994), the finding that depressed participants deviate from the typically higher relationship found in other psychiatric samples suggests that the two disorders may differ in their experience of the two affects. In sum, the results only permit comparisons between patients with depression and anxiety; those results should not be generalized to infer differences between either group and healthy controls.

The clinical sample used in this investigation raises questions about generalizability. First, there is the possibility that self-selection has a role in the results. All participants were voluntarily seeking treatment at a mental health center, and so the experience of their disorder, as well as of positive and negative affect, may differ from those who do not seek treatment (Gallo *et al.*, 1995). Those with more or less severe problems may exhibit a different pattern of results. An additional complication is the lack of screening for psychoactive medication at the time of the study. Some of the patients would conceivably be on medication as part of their ongoing treatment. However, as mentioned previously, many of the same medications are used to treat each of these conditions, although this is by no means strictly uniform in practice (Roy-Byrne, 1999). As such, medication may be an unmeasured but reasonably comparable influence for both groups, but may still impact observed differences by lessening participants' problems and thus diluting the comparison of two different clinical groups. Another concern is that there is significant variation among cases of anxiety and depression. Considerable heterogeneity characterizes both anxiety and depressive disorders and some conditions, such as generalized anxiety disorder, appear to be more highly related to depression than others (Brown *et al.*, 1998). The sample used for this investigation was composed of several subtypes of each disorder. Future research into affect relationships as a differentiating factor in depressive and anxiety disorders should include examination of the diagnostic sub-groups.

In spite of these shortcomings, the findings presented here represent an intriguing new approach to differentiation between the two disorders that may further illuminate the role of affect in clinical problems. Future research should examine the role of the structure of affective experience in predicting the course of these and other disorders as well as any impact additional but temporary stressors may have on affect structure. Differing effects of treatment may also provide clues as to the role of simplified affective structure such as that found in this investigation.

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