Appendix Section 4: Study 2- CFA description

Step 4: Confirmatory factor analysis: Would the results differ if items were aggregated and latent factors were examined? One argument against the preceding analyses could be that they rely too heavily on particular items, which could be strongly affected by random or systematic error. To address this possibility, we identified six clusters of items (chosen based on similar angular location) and subjected this subset of items to confirmatory factor analysis and structural equation modeling. Items were chosen to reflect Positive Activation (PA: happy, pleased, delighted, satisfied); Negative Activation (NA: sad, blue, unhappy, depressed); High Energetic Arousal (High EA: energetic, lively, alert, full-of-pep); Low Energetic Arousal (Low EA: sluggish, sleepy, tired, drowsy); High Tense Arousal (High TA: scared, tense, nervous, afraid); and Low Tense Arousal (Low TA: content, at-ease, relaxed, calm). The first two clusters (PA and NA) were chosen to assess the latent factor underlying happiness and sadness. The other four clusters were chosen because they are bipolar markers of the two relatively-independent dimensions of mood (e.g., Thayer, 1986). We use these as anchors for the space, allowing us to locate PA and NA in relation to established dimensions.

Using the SEM package in R (Fox, 2004), we analyzed the structure of the correlations between the 24 items. We examined a series of models, ranging from 6 uncorrelated clusters to the final model of 6 correlated clusters. With the very large sample size we had, we placed somewhat more reliance on Goodness of Fit indices that reflect the size of the residual correlations as compared to the original correlations rather than conventional estimates of fit (e.g., Chi Square or change in Chi Square) that compare the residuals to their standard error.

Figure A-5 presents both the measurement and the structural models of this analysis. The items, as well as the latent factors, are situated approximately in accordance with their angular location in the exploratory analyses of steps 2 and 3. With the exception of the Chi Square, which reflects the large sample size, this model showed adequate goodness of fit (Chi-square(237) = 4722.4, $p<.001$; GFI = 0.90; Adjusted GFI = 0.87; RMSEA = 0.07).

As can be seen, each of the six clusters created was measured quite reliably by its respective items (Cronbach's alpha for PA: .86; NA: .90; High EA: .91; Low EA: .92; High TA: .81; Low TA .82). Of greater interest to us are the intercorrelations of the latent factors. These allow us to examine the location of the PA latent factor (which includes happiness) and of the NA latent factor (which includes sadness), with respect to each other as well as with respect to the latent factors of energetic and tense arousal.

Three findings are of note. First, PA is strongly associated with both high energetic arousal (.77) and low tense arousal (.72). In contrast, NA's association with high tense arousal (.55) and with low energetic arousal (.29) is weaker. One way to interpret this difference in levels is by seeing PA as more laden with arousal, and NA as more reflective of affect and less of non-affective arousal. As speculative as that is, however, the different levels are indicative of the separability of PA and NA.

Second, PA clearly shares a considerable, and almost identical, amount of variance with both high EA and low TA. In contrast, NA leans towards more strongly towards high TA (and has a considerably weaker association with low EA).

Finally, it is worthwhile to compare the three pairs of clusters (PA-NA; high and low EA; high and low TA) as pairs of putatively bipolar markers. Clearly, high and low EA

are good candidates for bipolarity with a latent correlation of -.59. Interestingly, both High with Low TA and PA with NA have weaker association (rs = -.38 and -.36 respectively). The former is affected by more skew and yet is stronger than that found in the latter.