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Examining the Factor Structure of the Trait Meta-Mood Scale While Accounting For Data Point Censoring

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INTRODUCTION

- The Trait Meta-Mood Scale (TMMS) was designed to measure three aspects of meta-mood experience: Attention (paying attention to your emotions), Clarity (knowing what your emotions are), and Repair (changing bad moods into good ones). Previous factor analyses have verified this three-factor structure. However, Palmer et al. (2003) found strong support for a four-factor structure. Therefore, the number of factors underlying the TMMS is unclear.
- Moreover, previous factor analyses of the TMMS did not take into account data-point censoring. Data points are censored when the scores fail to distinguish between people on the low end (or the high end) of a dimension. Censoring can distort analyses and invalidate conclusions. Preliminary analyses of the TMMS data suggests that three of the items have substantial numbers of censored values (item 3, 48%; item 4, 39%; and item 27, 36% of the scores were at the lowest possible value). Therefore, factor analyses should correct for the effect of censoring.

RESEARCH QUESTION

- When we take into account the fact that three of the Trait Meta-Mood items appear to have some censored values, is a 1-factor model, the Salovey and Mayer 3-factor model, or the Palmer et al. 4-factor model a better fit to the data?

METHOD

- 202 participants (65 male and 137 female)
- Ages ranged from 18 to 49 years old (M = 22.70, SD = 6.29).
- The sample consisted primarily of undergraduate students enrolled in PSY 101 and PSY 240 at the University of Nevada, Las Vegas.
- Participants completed the TMMS on the computer as part of a larger study.
- Three confirmatory factor analyses (CFA) were conducted using the R package *lava*. Figures 1, 2, and 3 represent the three models.
- Because *lava* does not report an omnibus chi-square test or other measures of absolute fit for censored models with ordinal data, we relied on the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC) to compare the models.

When accounting for data point censoring, the four-factor model fit the Trait Meta-Mood Scale the best.

RESULTS

- The four-factor model had lower AIC and BIC values than the one- or three-factor models, indicating better model fit. See Table 1.
- So that high scores on the fourth factor would represent skill in meta-mood experience (rather than lack of skill), we reversed this factor and named it Emotional Resilience. All four factors had positive inter-factor correlations.
- High scores on Emotional Resilience indicate:
  - a resistance to negative emotional experiences
  - the toughness to remain stoic in the face of adverse emotions

DISCUSSION

- We replicated Palmer et al.'s (2003) finding that the Trait Meta-Mood Scale has four factors. We extended their study by taking into account data point censoring and by providing a substantive interpretation of the fourth factor.
- Users of the TMMS may wish to calculate scale scores based on all four factors to provide a more detailed description of meta-mood experience.
- Understanding the relationships between the various aspects of meta-mood experience is important. For example, Palmer et al. (2003) showed that Clarity mediates the relationship between Attention and Repair: Paying attention to one's emotions is only associated with repairing bad moods if one understands what those feelings are.
- Similarly, we hypothesize that Emotional Resilience mediates the link between Clarity and Repair: Resilience in the face of negative emotions is not possible without a minimal level of clarity about those emotions, and repair of negative mood is difficult unless an individual is emotionally resilient.
- One limitation of the present study is that we did not use absolute measures of fit to test the measurement models, because the *lava* package does not provide these fit statistics for censored data models of ordinal data. Thus, the four-factor model fit the best, but we do not know if it fit well. Future research could use different statistical programs to obtain absolute fit statistics. One possible program is Mplus, which to our understanding reports absolute fit statistics for censored data models.
- Censoring is an important phenomenon that is too often overlooked in psychological research. Scores from many psychological measures may be censored, and it is important to account for this censoring in multivariate analyses.
- It is our hope that future factor analyses of psychological measures will evaluate whether data points appear to have been censored and, if so, will use analyses that take censoring into account.

Figure 1
General Factor Model

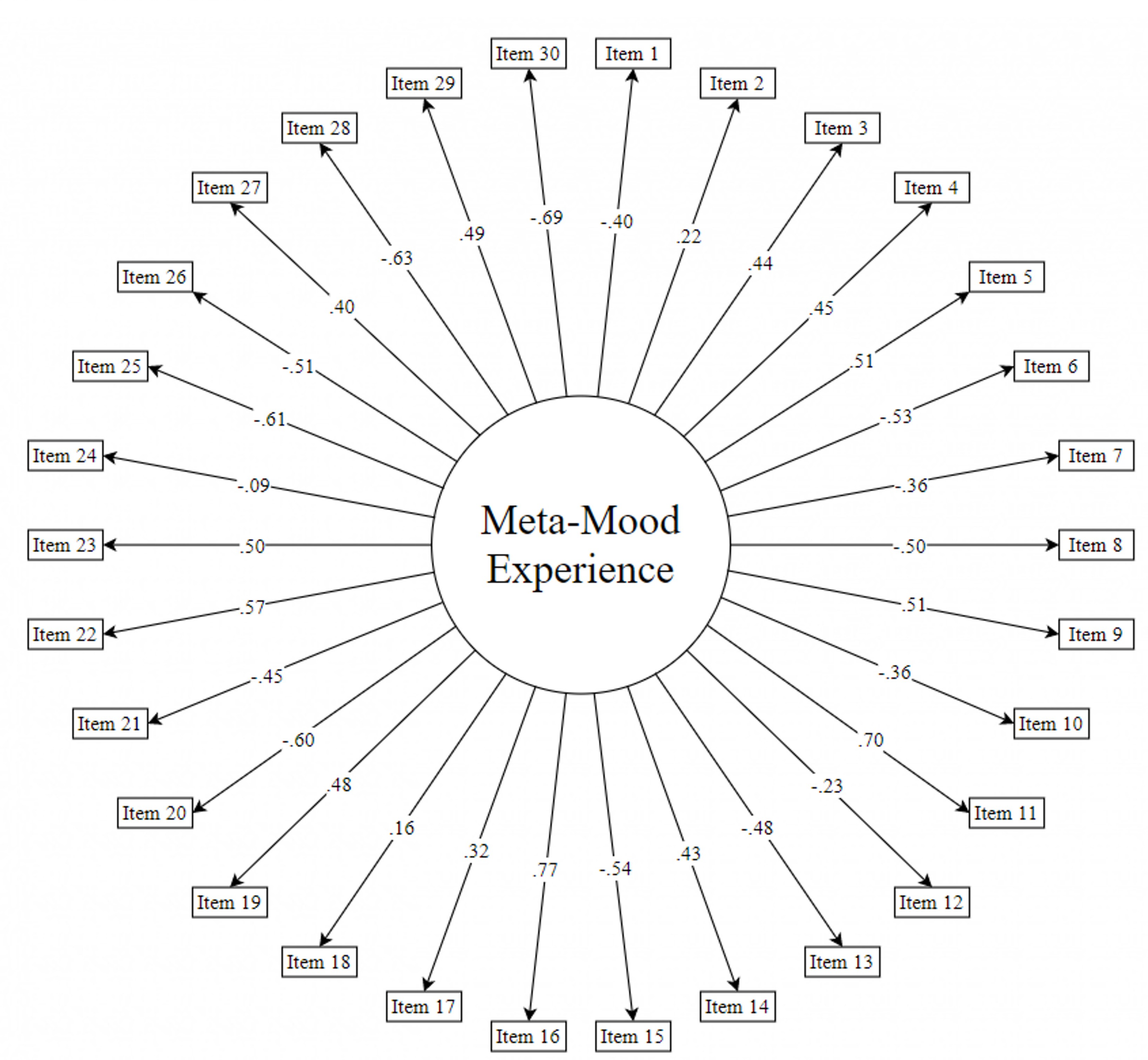

Figure 2
Three-Factor Model (Salovey et al., 1995)

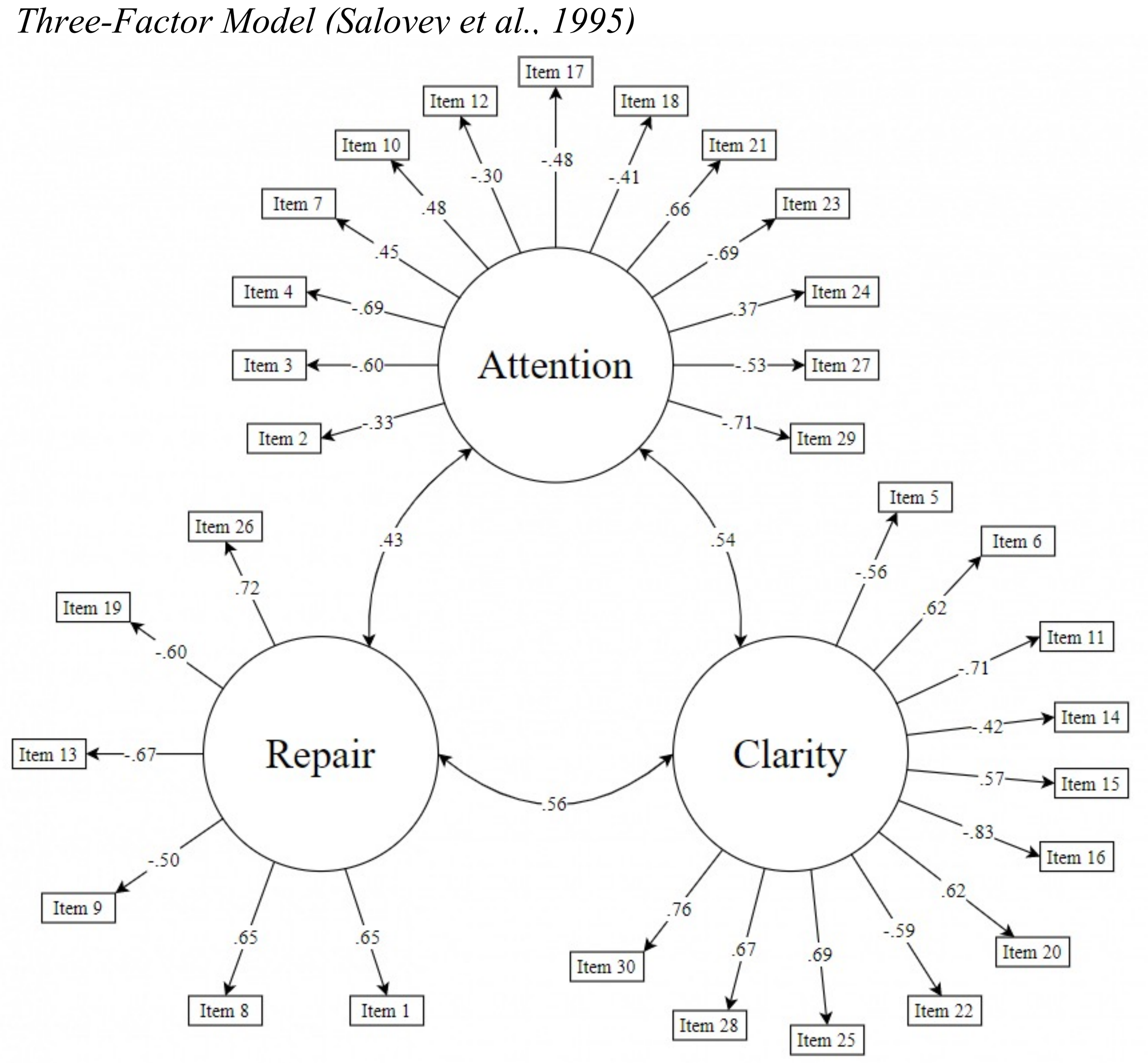

Figure 3
Four-Factor Model (Palmer et al., 2003)

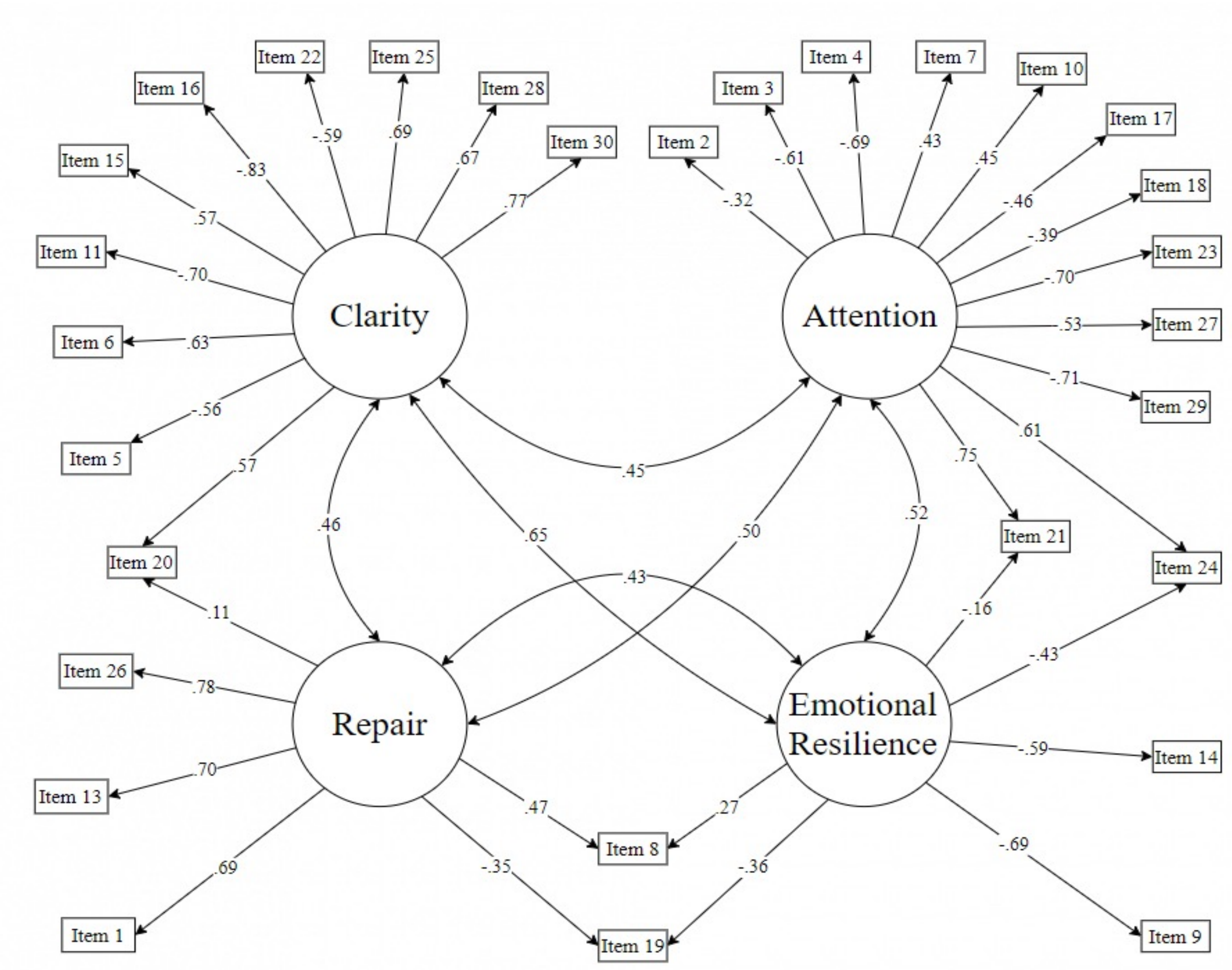

Table 1
Fit Statistics for TMMS Factor Models

Model	AIC	BIC
One Factor	15067.46	15671.31
Three Factor	14583.70	15221.10
Four Factor	14021.00	14688.56

Note. AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion.