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One Factor, Three Factors, Four: Which One Fits the Trait Meta-Mood Scale More?

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Introduction

- Emotional intelligence is an individual's ability to identify and regulate emotions in themselves and others.
- The Trait Meta-Mood Scale (TMMS; Salovey et al., 1995) measures meta-mood, the "ongoing process associated with moods whereby individuals continually reflect upon their feelings, monitoring, evaluating, and regulating them" (Salovey et al., 1995, p. 127).
- Salovey and colleagues found three factors: the attention given to emotions, how an individual repairs their mood, and the clarity of an individual's mood at any given moment.
- However, Palmer et al. (2003) found support for a four-factor structure. We interpreted the fourth factor as Fortitude because the items that loaded onto this factor judged if the participant let certain moods overwhelm their emotions.
- Previous factor analyses of the TMMS did not account for data point censoring, a phenomenon where the value of a measurement is only partially known (Gijbels, 2010). Rating scales with censored data fail to distinguish between scores on the low (or high) end of a dimension.
- If censored data are not accounted for, they can distort analyses and skew results. Methods have been created that correct for the effects of censored data. Holst et al. (2015) built on previous research about censored data to produce a method that allows for censoring on both variables and implemented that method in the R package *lava*.
- Our research seeks to determine which factor structure fits the data the best – the one-factor model, three-factor model (Salovey et al., 1995), or the four-factor (Palmer et al., 2003) model – while taking into account possible data point censoring.

Method

- 202 participants
  - 65 identified as male and 137 identified as female.
  - Primarily undergraduate students enrolled at UNLV.
  - All were between the ages of 18 and 49 (M=22.70, SD=6.29).
- The Trait Meta-Mood Scale (Salovey et al., 1995) is a questionnaire made of 30 questions with responses ranging from: 1 (*strongly disagree*), 2 (*disagree*), 3 (*neutral*), 4 (*agree*), 5 (*strongly agree*). The items are grouped into three scales: Attention, Clarity, and Repair.
- Three confirmatory factor analyses were conducted using the R package *lava*. See Figures 1, 2, and 3.
- Within *lava,* we specified items 3, 4, 19 , and 29 as having censored values.
- 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.

Results

- When we accounted for possible censored values on some of the TMMS items, the four-factor structure fit the data best.
- The four-factor model had the lowest values for both AIC and BIC (see Table 2).

Discussion

- The results from the confirmatory factor analysis showed that the four-factor model provides the best fit. This can impact future revisions and changes to the TMMS and studies of emotional intelligence. If a fourth factor (referred to here as Fortitude) is added to the previous factors of Attention, Clarity, and Repair, studies should examine its relation to other measures of mood management and emotional regulation.
- Another important finding of our study is that there are multiple data points that may be censored. Items 3, 4, 19, and 29 were left censored as participants obtained the lowest score because the items could not distinguish between low levels of the dimension they were intended to measure. The censoring that occurred in the items were likely caused by the extreme wording used.
- Within our study we used a confirmatory factor analysis in R package *lava* to account for censoring on different factor models one, three, and four. Future research could also use the four-factor model to examine its applicability to other measures of emotional intelligence.
- While the four-factor model seems to show the best fit for the data, there are a few limitations to consider. One limitation of our study is the lack of diversity with our participants. All of those who participated in our study were college students at UNLV. More research could be done to determine results among participants of other ages or from other backgrounds (e.g., young adults who are not in college). A more diverse sample group could provide insightful data into the effects of the different factor models on a more generalized scale that can be representative of the whole US population.
- Another limitation of our study is that we did not use absolute measures of fit in our analyses. More research could be done to examine the results of an absolute measure of fit, and whether these absolute measures of fit also show the four-factor model to be most accurate. While the performance of the four-factor model with these analyses is not yet known, our current data shows significant support for the results of the four-factor model when censored data is accounted for.

A *four-factor* model of the Trait Meta-Mood Scale is the best fit when accounting for censored data

Table 1

Goodness of Fit Statistics for TMMS Factor Models

Model	AIC	BIC
One-factor	15191.24	15795.09
Three-factor	14713.67	15351.07
Four-factor	14153.66	14821.21

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

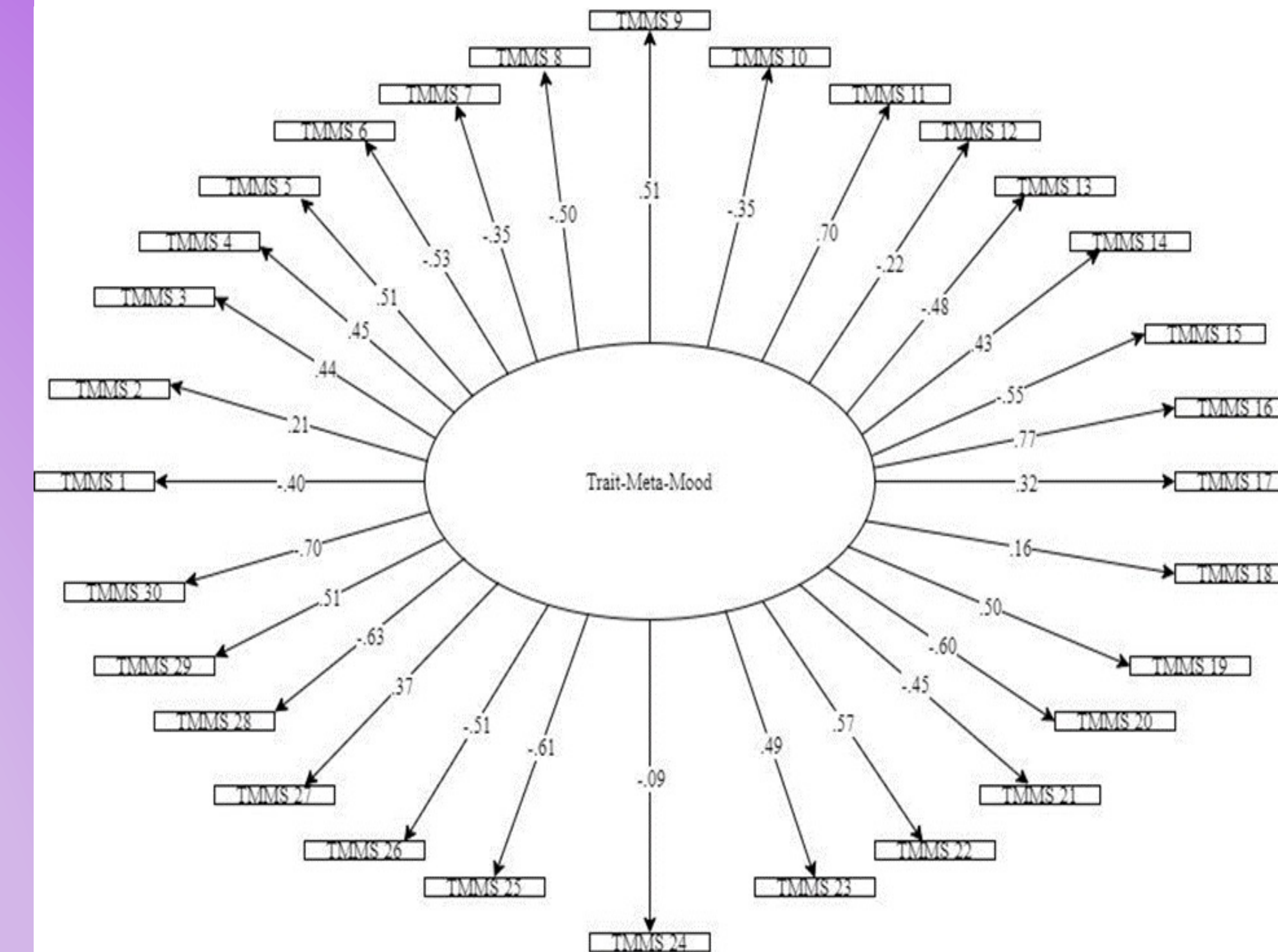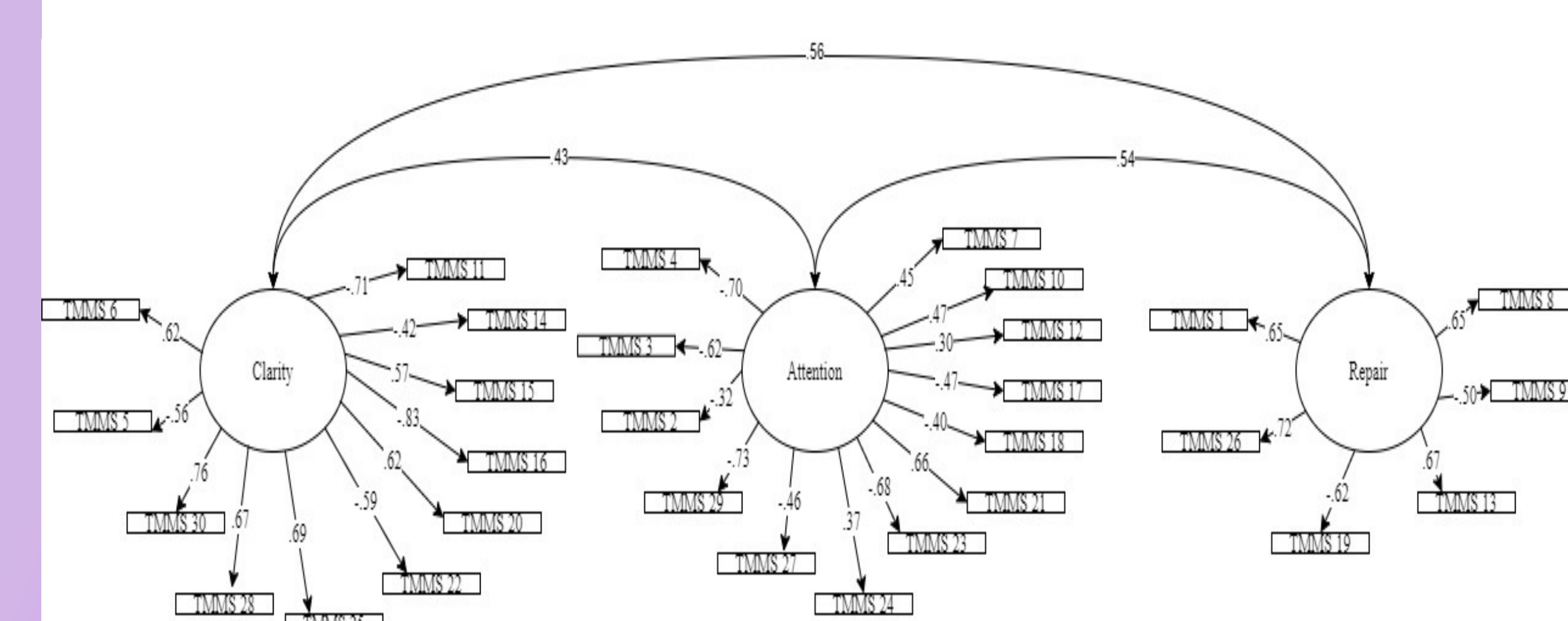**Figure 1**
General Factor Model

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

Note: Because the phrasing of the TMMS items indicated a lack of attention, we reversed the scoring of items that load onto it in order to create a positive association between the scores and attention levels.

Figure 3
Four-Factor Model (Palmer et al., 2003)
Note: Item 12 was excluded from the four-factor model because it did not have salient loadings onto any of the factors. Because the phrasing of the TMMS items indicated a lack of attention and fortitude, we reversed the scoring of items that load onto those factors to create a positive association between the scores and attention levels.