**Supplemental Materials for:**

# Mentorship and Time Management Behaviors: A Synergistic Approach to Supporting Academic Performance

Author Information

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Method

## Preliminary Analyses

### *Time management behaviors*

Examining the original time management behavior scale, we noticed that it might have two sub-constructs: one focused more on planning, and the other on time management behaviors. Therefore, an exploratory factor analysis (EFA) and parallel analysis (PA) were conducted to examine the internal structure of the original TMB scale and the factors to retain. EFA and Parallel analysis suggested a one-factor structure. However, a close examination of the results indicated that there was a marginal second factor, as the estimated bias for the second factor was only slightly larger than the unadjusted eigenvalue. Follow-up confirmatory factor analysis (CFA) confirmed the two-factor structure, $\chi^2(13) = 56.271$, $p < .001$, CFI = .912, TLI = .858, RMSEA = .104, SRMR = .061, provided better fit than the one-factor CFA, which did not yield an acceptable model-data fit: $\chi^2(14) = 120.929$, $p < .0001$; CFI = .821; TLI = .732; RMSEA = .146; and *SRMR* = .079. Based on the results of a two-factor CFA (see Supplemental Table 1 for factor loadings), three items were grouped as a measure of time management behaviors (see Supplemental Table 3 for the items).

### *Mentoring interactions*

A close examination of the 17 items in the mentoring interaction scale suggested three factors in our sample: (1) discussing career objectives, (2) encouraging self-reflection, and (3) discussing motivation and progress. We conducted a one-factor CFA for each factor, respectively, and a three-factor CFA. The results supported a three-factor structure for the scale. We further conducted a bi-factor model with a general mentoring interaction factor. Compared to the three-factor structure, the bi-factor model showed a significant improvement in the model fit,

as indicated by the AIC and BIC indexes (see Supplemental Table 2). Thus, the three factors were averaged to summarize participants' mentoring interaction levels.

**Longitudinal invariance**

In addition to the confirmatory factor analysis at each time point, we examined longitudinal invariance of the time management behavior measure across the two time points (Supplemental Table 4). First, we compared model 1 (the configural invariance model) and model 2 (the metric invariance model). The metric invariance constraint did not significantly worsen model fit, $\chi 2(2) = 2.68$, $p = .26$. We then compared model 2 (the metric invariance model) and model 3 (the scalar invariance model). Similarly, the scalar invariance constraint did not significantly worsen the model fit, $\chi 2(3) = 6.54$, $p = .09$. Thus, we concluded that the longitudinal invariance held at the scalar level for the time management behavior scale. Longitudinal CFA factor loadings for the time management behavior sub-scales at both time points were provided in Supplemental Table 5. Stata syntax for the final analysis is presented in Supplemental Table 6. Finally, we examined the correlations between number of mentors, contact frequency, and time management behaviors at T2, and found no correlations between these variables ($\beta_{number,\ contact} = .10$, $p = .12$; $\beta_{number,\ mentoring} = .02$, $p = .61$; $\beta_{contact,\ mentoring} = -.01$, $p = .86$).

**Supplemental Table 1**

*CFA Results for Time Management Behaviors*

| *Latent factor* | *Indicator* | *Loading* | *SE* | *z* | *p* | *Standardized Loading* |
|---|---|---|---|---|---|---|
| Time Management Behavior_Factor1 (planning) | Item1 | 1 | - | - | - | .54 |
| | Item2 | .69 | .12 | 5.75 | <.001 | .43 |
| | Item3 | 1.36 | .17 | 7.99 | <.001 | .72 |
| | Item4 | 1.36 | .19 | 7.09 | <.001 | .73 |
| Time Management Behavior Factor 2 (time management) | Item1 | 1 | - | - | - | .61 |
| | Item2 | 1.11 | .13 | 8.85 | <.001 | .76 |
| | Item3 | .78 | .10 | 7.42 | <.001 | .65 |

*Note*. $\chi^2(13) = 56.271$, $p < .001$, CFI = .912, TLI = .858, RMSEA = .104 90% CI [.077, .133],

SRMR = .061

**Supplemental Table 2**

*CFA Results for Mentoring Interactions*

| *Latent factor* | *Indicator* | *Loading* | *SE* | *z* | *p* | *Standardized Loading* |
|---|---|---|---|---|---|---|
| Mentoring – Discussing Career Objectives | Item1 | 1 | - | - | - | .88 |
| | Item2 | 1.00 | .05 | 20.55 | <.001 | .87 |
| | Item3 | .93 | .05 | 18.22 | <.001 | .80 |
| | Item4 | .76 | .05 | 14.92 | <.001 | .71 |
| | Item5 | .76 | .05 | 14.08 | <.001 | .71 |
| Model fit: $\chi^2(4) = 6.63$, $p = .16$, CFI = .997, TLI = .993, RMSEA = .045, SRMR = .016 | | | | | | |
| Mentoring – Encouraging Self-Reflection | Item1 | 1 | - | - | - | .68 |
| | Item2 | 1.47 | .10 | 14.45 | <.001 | .91 |
| | Item3 | 1.17 | .08 | 14.85 | <.001 | .71 |
| | Item4 | 1.28 | .09 | 14.17 | <.001 | .86 |
| | Item5 | 1.37 | .11 | 13.01 | <.001 | .78 |
| | Item6 | 1.12 | .08 | 13.18 | <.001 | .81 |
| Model fit: $\chi^2(7) = 15.12$, $p = .04$, CFI = .994, TLI = .986, RMSEA = .060, SRMR = .018 | | | | | | |
| Mentoring – Discussing Motivation and Progress | Item1 | 1 | - | - | - | .72 |
| | Item2 | 1.29 | .09 | 14.56 | <.001 | .86 |
| | Item3 | 1.15 | .09 | 13.43 | <.001 | .80 |
| | Item4 | 1.07 | .07 | 15.08 | <.001 | .73 |
| | Item5 | 1.19 | .08 | 14.27 | <.001 | .84 |
| | Item6 | .97 | .06 | 15.56 | <.001 | .69 |
| Model fit: $\chi^2(7) = 12.42$, $p = .05$, CFI = .995, TLI = .987, RMSEA = .058, SRMR = .015 | | | | | | |
| Three-factor model<br>Model fit: $\chi^2(112) = 348.21$, $p = <.001$, CFI = .942, TLI = .930, RMSEA = .081, SRMR = .054, AIC = 17244, BIC = 17463 | | | | | | |
| Bi-factor model: Three subscales and one uncorrelated general factor.<br>Model fit: $\chi^2(98) = 265.46$, $p = <.001$, CFI = .959, TLI = .943, RMSEA = .073, SRMR = .043, AIC = 17190, BIC = 17462 | | | | | | |

Note: The bi-factor model containing the three mentoring subscales and a general mentoring interactions factor provided the best conceptual and global model fit. Supplemental Output for the bi-factor model is included at the end of this file.

**Supplemental Table 3**

*Items Included in the Scales Used in the Present Study*

**Mentoring Interactions**

***Factor 1: Discussing Career Objectives***

1. During the progress meetings, [$mentor] provides feedback about my progress in the competencies related to my career.
2. [$mentor] supported me in forging new, relevant contacts for study and career choice-related purposes.
3. [$mentor] follows up on the attainment of my career objectives.
4. [$mentor] discusses with me how I can pursue my career objectives in practice.
5. [$mentor] challenges me to formulate specific and attainable career objectives.

***Factor 2: Encouraging Self-Reflection***

1. [$mentor] challenges me to deepen my reflection.
2. [$mentor] encourages me to analyze my self-image critically.
3. [$mentor] encourages open discussion of my personality traits (such as perfectionism; dominant behavior).
4. [$mentor] challenges me to go beyond the borders of my (sufficient/good) current performance.
5. [$mentor] encourages me to reflect on specific personal experiences.
6. [$mentor] encourages me to reflect on my development.

***Factor 3: Discussing Motivation and Progress***

1. [$mentor] pays attention to my incentives to study (e.g., motivational ups and downs).
2. [$mentor] discusses my experiences with planning and time management.
3. [$mentor] thoroughly discusses lows/problems with regard to my study progress.
4. [$mentor] discusses the balance between my studies and private life with me.
5. [$mentor] discusses with me my insecurities with respect to the choices I need to make about studies/career.
6. [$mentor first name] encourages open discussion of my personal experiences affecting my studies.

**Time Management Behaviors (TMB)**

1. I review my daily activities to see where I am wasting time.
2. During a school day I evaluate how well I am following the schedule I have set down for myself.
   I set priorities to determine the order in which I will perform tasks each day.

**Supplemental Table 4**

*Longitudinal Invariance Models for Time Management Behaviors Sub-Scale*

| *Model* | *1* | *2* | *3* |
|---|---|---|---|
| N | 210 | 210 | 210 |
| Model Fit Statistics | | | |
| $\chi^2$ | 14.349 | 17.034 | 23.572 |
| df | 8 | 10 | 13 |
| *p*-value | .073 | .074 | .035 |
| CFI | .979 | .977 | .965 |
| SRMR | .039 | .050 | .051 |
| RMSEA | .062 | .058 | .062 |
| RMSEA 90% Lower Limit | .000 | .000 | .016 |
| RMSEA 90% Upper Limit | .112 | .104 | .102 |

*Notes.* Model 1, 2, and 3 are the configural, metric, and scalar invariance CFAs (respectively). For Maximum Likelihood estimation, listwise deletion was used for these models to facilitate SRMR estimation in Stata (v. 18).

**Supplemental Table 5**

*Longitudinal CFA Model Results with Scalar Invariance for Time Management Behavior Sub-Scale.*

| *Latent factor* | *Indicator* | *Unstandardized Factor loading* | *SE* | *z* | *p* |
|---|---|---|---|---|---|
| TMB_T1 | Item1 | 1 | - | - | - |
| | Item2 | 1.35 | .14 | 9.66 | <.001 |
| | Item3 | .77 | .08 | 9.13 | <.001 |
| TMB_T2 | Item1 | 1 | - | - | - |
| | Item2 | 1.35 | .14 | 9.66 | <.001 |
| | Item3 | .77 | .08 | 9.13 | <.001 |
| Cov(TMB_T1, TMB_T2) | | .58 | .14 | 4.16 | <.001 |

Note. Model fit: $\chi^2(13)=23.57$, RMSEA=.062, CFI=.965, SRMR=.051

**Supplemental Table 6**

*Stata Syntax for the Final Analysis*

```
* path analysis version of regression (unstandardized) and correction for nesting

        sem (c_tmstr_t5 <- c_mi_t5 c_q203_t5 mi_x_q203 c_tmstr_t2          ///
                        major1 major2 major3 major5)                      ///
                (q106_t6 <- c_tmstr_t5 c_q106_t2 tmb5_x_q1062              ///
                        c_mi_t5 c_q203_t5 mi_x_q203                        ///
                        major1 major2 major3 major5)                      ///
                (<- ax_imp_ment2 ax_imp_ment3          ///
                ax_imp_ment4 ax_imp_ment5 ax_imp_ment6 ax_imp_ment7        ///
```

*Note*. c_tmstr_t5 = time management behaviors (centered, T2), c_mi_t5 = mentoring interactions (centered, T2), c_q203_t5 = contact frequency (centered, T2), mi_x_q203 = mentoring interactions by contact frequency interaction, c_tmstr_t2 = time managment behaviors (centered, T1, control), major1-major5 = dummy-coded major (control), q106_t6 = GPA (T3), c_q106_t2 = baseline GPA (centered GPA, T1), tmb5_x_q1062 = time management by baseline GPA interaction, ax_imp_ment2-ax_imp_ment7 = Top mentor auxiliary variables.