Daily Associations of Emotion and Fatigue in College Students during the Early Stages of the COVID-19 Pandemic: An Application of Dynamic Structural Equation Modeling

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M3 Conference
June 2023
Purpose of Study

• Assess the reciprocal (i.e., bidirectional) relationship between:
  o Feelings of fatigue
  o Affect (negative and positive)

• Do these associations vary across individuals?
Background

- **Fatigue** (Smets et al., 1995): harmless occurrence due to
  - insufficient sleep
  - lack of relaxation
  - increased physical activity
  - everyday life stress

- Mental fatigue may **diminish** ability to **regulate emotions** (Grillon et al., 2015).
• **Emotion Regulation (ER)** (Gross & John, 2003): A process helping individuals determine
  o how long emotions last
  o how intense emotions are felt and conveyed

• ER can up- or down-regulate (Koole, 2009; Lewczuk et al., 2022).
  o negative affect (i.e., undesirable feelings)
  o positive affect (i.e., desirable feelings)

• ER takes effort and may **lead to fatigue** (Van Dellen et al., 2012; Lewczuk et al., 2022).
Measures Used in This Study

- **Negative Affect**
  - Nervousness
  - Anxiety
  - Sadness
  - Dejection
  - Anger
  - Hostility

- **Positive Affect**
  - Happiness
  - Cheerfulness
  - Content
  - Enthusiasm

- **Fatigue**
  - Spent
  - Depleted
  - Drained
Data Collection

- Responses recorded on a 5-point Likert scale
- Scores averaged to yield composite scores:
  - Negative affect
  - Positive affect
  - Fatigue
Parent Study

• An IRB approved study examining
  o alcohol use, drinking motives, coping mechanisms, and daily stressors, among college students
  o during early stages of the COVID-19 pandemic

• Data Collection
  o *Micro-longitudinal* design
  o Data collected electronically *daily for 21 days* (May/June of 2020)
Participant Sample in This Study

- 54 undergraduate and graduate students
- From University of Rhode Island
- Predominantly *female* (86%)
- Predominantly *white* (85%)
- 18-40 years old (M = 29.19, SD = 4.46)
Method

- **Dynamic Structural Equation Modeling (DSEM):** the temporal relationships of fatigue and positive/negative affect (21-day period).

- **DSEM** (Hamaker et al., 2021, Zhou et al., 2021):
  - State-of-the-art statistical method
  - Combines *time-series analysis* with *multilevel SEM*
  - Allows *time-lagged associations* between multiple variables
  - Investigates *individual differences* in these associations
Method: DSEM

- Assumes data are **missing at random**
  - use all the available data without removing cases
  - reduce estimation bias and increase statistical power, as compared to traditional ad hoc methods (e.g., listwise deletion, mean substitution)

- In the current study, DSEM:
  - assesses the **bidirectional associations** between fatigue and affect at a **daily level**
  - considers how associations vary from **person-to-person**
Model Specification

Within

\[ \phi_{FF} \]
\[ \phi_{FA} \]
\[ \phi_{AF} \]
\[ \phi_{AA} \]
\[ \mu_F \]
\[ \mu_A \]

Between

\[ \phi_{FF} \]
\[ \phi_{FA} \]
\[ \phi_{AF} \]
\[ \phi_{AA} \]
\[ \mu_F \]
\[ \mu_A \]
• Mplus version 8.0 was used for the analysis, with:
  o Latent mean centering
  o Estimator = Bayes
  o Algorithm = Gibbs
  o 50,000 iterations
Model 1: The reciprocal relationship of negative affect and fatigue

\[ \text{Fatigue}_{t-1} \xrightarrow{\phi_{FF} = 0.230^*} \text{Fatigue}_t \]
\[ \text{NegAft}_{t-1} \xrightarrow{\phi_{NN} = 0.339^*} \text{NegAft}_t \]

Within

\[ \phi_{FF} \quad \phi_{FN} \quad \phi_{NF} \quad \phi_{NN} \quad \mu_F \quad \mu_N \]

Between
**Model 2: The reciprocal relationship of positive affect and fatigue**

\[
\begin{align*}
\text{Fatigue}_{t-1} & \rightarrow \phi_{FF} = .257^* \rightarrow \text{Fatigue}_t \\
\text{PosAff}_{t-1} & \rightarrow \phi_{PP} = .287^* \rightarrow \text{PosAff}_t \\
\phi_{FP} \rightarrow \phi_{PF} \rightarrow \text{Fatigue}_t & \rightarrow \zeta_{F,t} \\
\phi_{PP} \rightarrow \text{PosAff}_t & \rightarrow \zeta_{P,t}
\end{align*}
\]
Discussion

• **Unidirectional association** between fatigue and negative affect

• **No association** between fatigue and positive affect

• **Negative affect predicted following-day fatigue:**
  o higher negative affect during COVID-19
  o extra effort to down-regulate
  o elevated fatigue on the following day

• **Positive affect did not predict following-day fatigue:**
  o Down-regulating negative affect may take more efforts than up-regulating positive affect
Limitations

• Small sample size
  - Limited power for between-person associations

• Limited diversity of sample:
  - Predominantly white
  - Predominantly female
  - Mostly young adults

• Only one assessment per day:
  - Might not capture transient emotion regulation and fatigue within a day.
Future Directions

• Explore if momentary relationships between affect and fatigue remains:
  o with more frequent assessments within a day
  o using a larger and more diverse sample
  o beyond the pandemic time period


Acknowledgement

Special thanks to **Dr. Amy Stamates** and **Dr. Manshu Yang** for providing us with the data and helping us throughout the project.
Thank You!

Any Questions?

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