Moderated Association of Momentary mindfulness and self-regulation with momentary affect and cognition: An Ecological Momentary Assessment (EMA) Study

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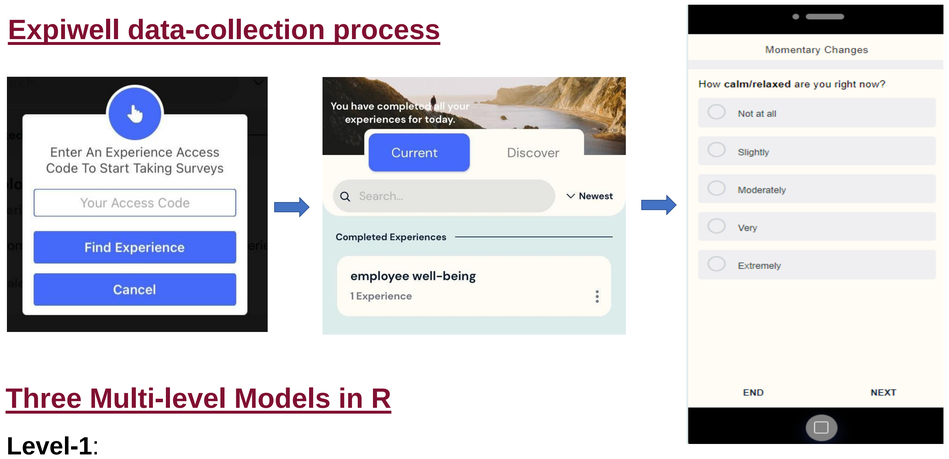
Background

- Problem: College students witness multi-faceted stressors and are vulnerable to the onset of mental and behavioral health problems.
- Potential Strategies: Mindfulness and self-regulation have demonstrated beneficial effects in promoting mental health.
- Literature Gap: The existing studies mostly applied cross-sectional surveys or pre-post intervention design to study the role of mindfulness and self-regulation.
- Study Aim: This study uses Ecological Momentary Assessment (EMA) to test temporal associations of mindfulness and self-regulation levels with emotional and cognitive outcomes within college students' natural environments.

Methods

- Data was collected using Expiwell from 44 college students (*Mean* age=20.5, *SD*= 1.38) during Fall 2021 semester, 6 random times per day for 7 consecutive days.
- Prompts were sent every 2 hours in the participants' self-selected time window (for e.g., 8AM-8PM), and randomly at any time within every 2-hour window.
- Participants had 20 minutes to complete 18 survey items after the prompt was delivered, and a reminder was sent after 5-minutes from the first prompt.

Expiwell data-collection process



Three Multi-level Models in R

Level-1:

Negative Affect$_{ti}$/Positive Affect$_{ti}$/Perceived Cognition$_{ti}$ = β_{0i} + β_{1i} (Time of the Day$_{ti}$) + β_{2i} (Weekend$_{ti}$) + β_{3i} (Day of Week$_{ti}$) + β_{4i} (Energy Expenditure$_{ti}$) + β_{5i} (Location$_{ti}$) + β_{6i} (Social Engagement$_{ti}$) + β_{7i} (Momentary Autonomy$_{ti}$) + **β_{8i} (Momentary Self-regulation$_{ti}$) + β_{9i} (Momentary Mindfulness$_{ti}$) + β_{10i} (Momentary Self-regulation$_{ti}$ × Momentary Mindfulness$_{ti}$)** + e_{ti}

Level-2

$\beta_{01} = \gamma_{00} + \gamma_{01}$ (Age) + γ_{02} (BMI) + γ_{03} (Gender) + γ_{04} (On-campus) + γ_{05} (Race) + γ_{06} (Major) + γ_{07} (Usual Self-regulation) + γ_{08} (Usual Mindfulness) + γ_{09} (Usual Autonomy) + u_{0i}

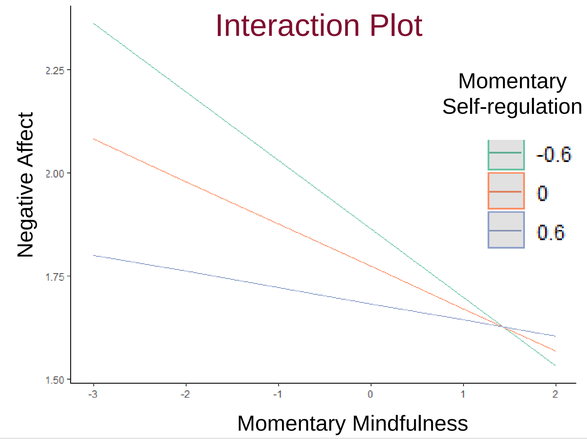
$\beta_{(1\text{-}7,\ 10)i} = \gamma_{(1-7,10)0}$

$\beta_{(8,9)i} = \gamma_{(8,9)0} + u_{(8,9)i}$

Results

N=1104 EMA Observations	Model 1 Perceived Cognition		Model 2 Positive Affect		Model 3 Negative Affect	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
Fixed Effect						
Usual mindfulness	1.205***	.293	-.30	.541	.391	.512
Momentary mindfulness	.521***	.06	.211***	.05	-.109*	.045
Usual self-regulation	-.351	.296	.54	.548	-.523	.518
Momentary self-regulation	.206***	.048	.078^{+}	.042	-.146**	.04
Momentary mindfulness x self-regulation	.01	.031	-.047	.038	.103**	.038
Random Effect						
Intercept variance	.039		.150		.134	
Residual variance	.147		.234		.267	

Note: This model was controlled for Age, BMI, Gender, On-campus or Off-campus Stay, Race, Major, Day of week, Weekend, Time of the day, Energy Expenditure, Outdoor or Indoor Location, Alone or with someone, and Momentary and Usual Autonomy. * p<.05 , ** p<.01, *** p<.001, $^{+}$p<.1



Interpretations:

- Higher levels of momentary mindfulness and self-regulation were associated with higher levels of momentary perceived cognition and positive affect and lower levels of momentary negative affect.
- At any moments when students had both lower mindfulness state and self-regulation than their usual levels, they reported the highest negative affect (see interaction plot on the right).

Conclusion and Discussion

- Our EMA study revealed the time-sensitive associations that students' momentary affect and cognition were each predicted by their momentary mindfulness and self-regulation levels.
  - ✓ Positive affect and perceived cognition can be improved by targeting momentary mindfulness or/and self-regulation.
  - ✓ Negative affect can de decreased significantly by target momentary mindfulness and self-regulation simultaneously.
- To improve momentary positive affect and cognition, health interventions may need to target more frequent practice of mindfulness and/or self-regulations skills in students' typical day-to-day life.
- To decrease negative affect, health interventions may need to target more frequent practice of mindfulness and self-regulation skills *simultaneously* in students' typical day-to-day life to relatively attain more benefits..
- For example, brief mindfulness and self-regulation practices can be integrated in classroom settings before the lecture to promote better momentary cognition and well-being.
- Future studies can test the mediating role of self-regulation between mindfulness and positive affect/cognitive outcome across diverse populations, while accounting for different cultural factors.

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