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Momentary Rumination and Suicidal Ideation: A Secondary Analysis of an Ecological Momentary Intervention Study

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Key messages:

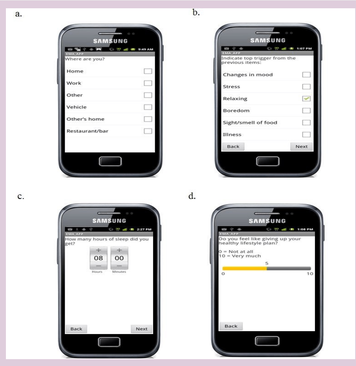
- The ecological momentary intervention (EMI) group shows significant improvements on multiple ecological momentary assessment (EMA) measures, especially alleviation in the momentary rumination, suicidal ideation, and improvement in subjective report of self-meaning in life, as compared to control group.
- Notably, the reduction in the level of momentary rumination appeared more pronounced immediately post-intervention, with a slight attenuation in effect size observed at one-month post-intervention.

Introduction

Background: Major depressive disorder (MDD) is a common mental health disorder, it has 13.2% prevalence rate after COVID-19 in Hong Kong, with critical clinical concerns such as suicidality and rumination (Wong et al., 2023; Popovic et al., 2015; Miranda & Hoeksema, 2007).
Research gaps: EMI as an emergent intervention method (Muñoz et al., 2022), its effect on MDD has been rarely tested in Hong Kong clinical population.
Study goals: Secondary analysis of an existing dataset of people with depression undergoing EMI, their momentary rumination, subject report of self-meaning in life and suicidal ideation are collected as intervention and EMA measures at baseline, immediately post-intervention (T1) and one-month post-intervention (T2).

Method

Participants: Sixty-eight participants diagnosed with major depressive disorder (MDD) based on Diagnostic and Statistical Manual-5 criteria, with 85.3% female, ranging from 18 to 65 years.
Design: This study is based on an interim analysis of an ongoing clinical trial, which embraced a double-blinded, parallel-group randomized controlled design with two arms (Intervention group and Control Group), using repeated ecological momentary assessments (EMAs).
Data analysis: Standard and robust linear mixed models (LMM) were applied to the nested structured data to examine fixed effects (timepoints, group allocation, and time* group interaction) across time (R version 4.3.3, MacOS 15.5), including quadratic terms to capture potential non-linear patterns. Violations of model assumptions were addressed using robust estimation and parametric bootstrapping (1000 iterations). Effect sizes were summarized using marginal and conditional R^2.



Result

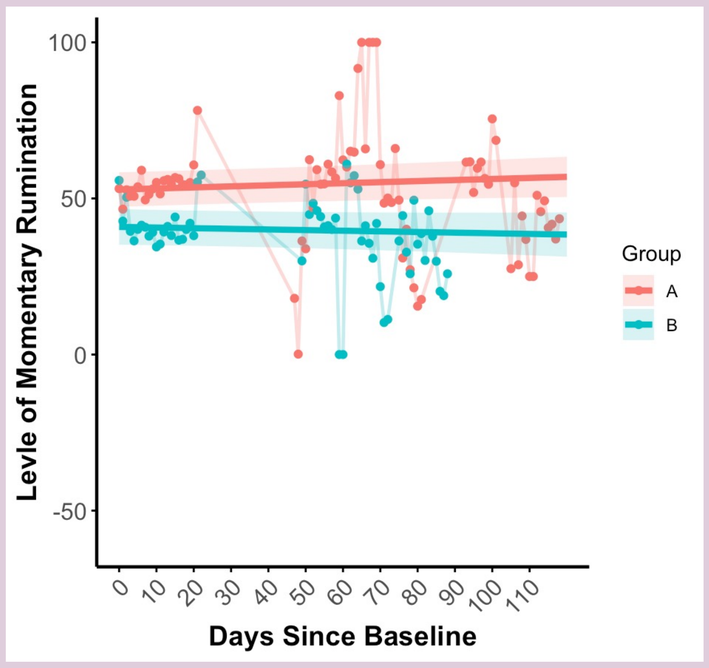


Figure 1. Group momentary rumination of each measurement per relative week from baseline with model-prediction line.

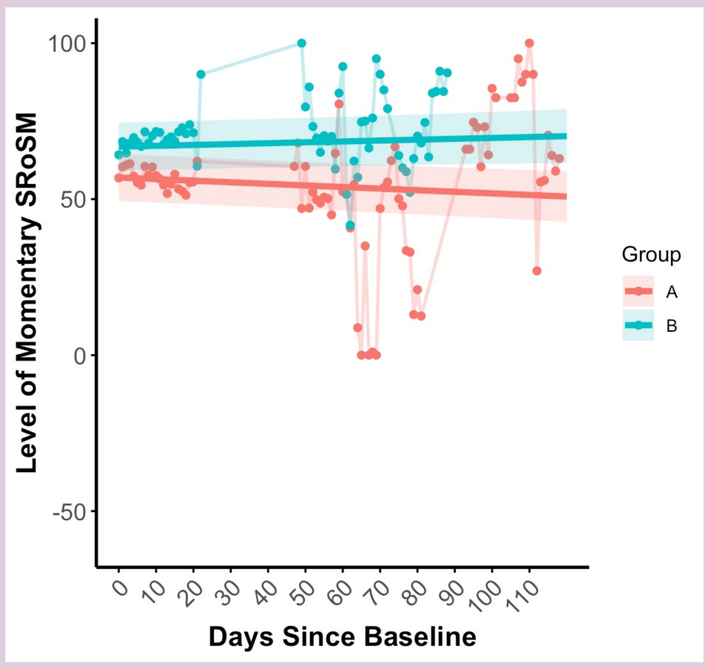


Figure 2. Group momentary subjective report of self-meaning of each measurement per relative week from baseline with model-prediction line.

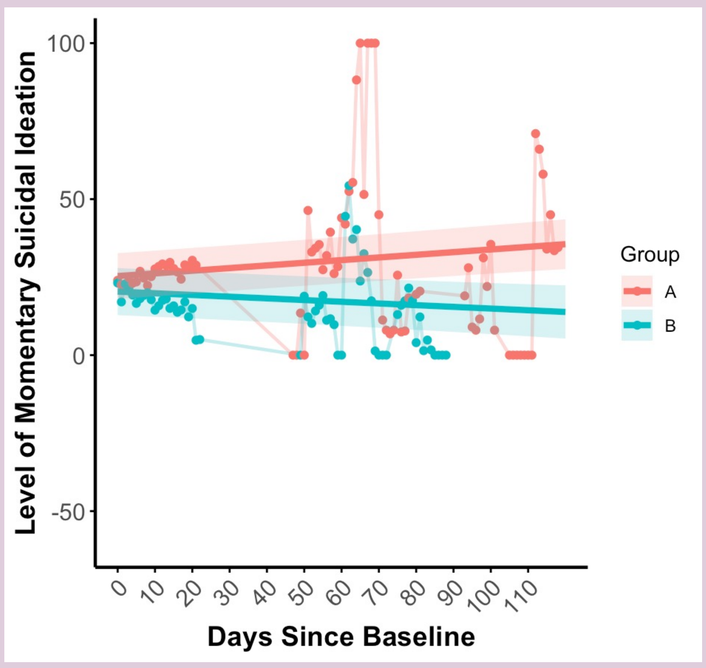


Figure 2. Group momentary suicidal ideation of each measurement per relative week from baseline with model-prediction line.

- **Momentary rumination** was significantly reduced in Intervention Group at both time points compared with control group; however, the magnitude of improvement was of a smaller extent at T2 (T1: B = -6.23, 95% CI [-9.79, -3.73], T2: B = -4.91, 95% CI [-10.44, -3.14] but lower than baseline score.
- Consistent effects were observed for the level of momentary. **subjective report of self-meaning in life**, with control group showing significantly higher scores than intervention group at both T1 and T2 in both models (robust T2: B = 6.51, CI [5.58, 11.96]; standard T2: B = 8.78, $p < .001$).
- Regarding the intensity of **suicidal ideation**, the intervention group's scores significantly decreased at both timepoints (robust T2: B = -7.56, 95% CI [-15.66, -8.58], standard: B = -12.13, $p < .001$), indicating a strong EMI effect during the assessment time points.

Discussions

- Findings align with prior mHealth-based EMI trials (Li et al., 2019), where changes in suicidal ideation were observed following brief psychological interventions. While our EMI was briefer and more frequent in deployment, both studies underscore the modifiability of suicidality through accessible mobile platforms.
- Momentary rumination decreased at T1, and this effect persisted at T2, albeit with a reduced magnitude, suggesting a **potential sustained impact of the EMI on rumination following the completion of the intervention**.
- One limitation shared with previous studies (Li et al., 2019) is the reliance on **self-report indicators**, which may be prone to underreporting. Additionally, our female-dominant sample and the short follow-up period restrict the generalizability and long-term interpretability of the findings.

Conclusion

- This secondary analysis demonstrates that brief ecological momentary interventions significantly reduce momentary rumination and suicidal ideation among individuals with MDD.
- By targeting real-time cognitive-affective fluctuations, EMI offers a promising low-burden strategy to attenuate self-harming thoughts in daily life.

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