2020

Predictors and Correlates of Psychological Health Through Ecological Momentary Assessment

Briana Squires
Binghamton University--SUNY

Stacy Ellenberg
Binghamton University--SUNY

Michael Georgescu
Binghamton University--SUNY

Dori Polovsky
Binghamton University--SUNY

PREDICTORS AND CORRELATES OF PSYCHOLOGICAL HEALTH THROUGH ECOLOGICAL MOMENTARY ASSESSMENT

Briana S. Squires, Michael Georgescu, Dori M. Polovsky, Stacy Ellenberg, M.S., Steven J. Lynn, Ph.D., ABPP

State University of New York

Introduction

There is a growing need for more accessible and cost-effective mental health services and interventions for the global populations who have mental disorders.

Smartphone-based mental health apps attempt to elicit behavior change over time through its diversity of approaches such as text message reminders (Edwards et al., 2016).

Mindfulness-based mHealth treatments have shown promise in promoting well-being, reducing depression, and preventing relapse in depression (Mani et al, 2015).

Dugas, Gao and Agarwal (2020) suggested that mHealth effectiveness is mixed. Eight (44.4%) of eighteen studies reviewed reported nonsignificant differences in improvement in mindfulness compared to the six studies (33.3%) reporting significant improvements.

Digital and mHealth technologies have the potential to serve not only as tools for psychological treatment (smartphone-based mental health apps), but for assessment (ecological momentary assessment, or EMA) purposes as well.

EMA refers to the process of asking participants to report upon thoughts, feelings, and behaviors multiple times daily using a smartphone, in order to map fluctuations and trajectories as they occur naturally in the environment, across longitudinal periods of time.

Few researchers have examined the ways in which assessing psychological variables through EMA may be impacted by demographic factors. In one study, Turner and colleagues (2017) found that use and engagement rates of EMA may be subject to variation due to age, cultural backgrounds, and prior education of the specific population in question.

More research is needed to better understand the complexities of eliciting and assessing behavior change and mindfulness as it is administered through technological means.

Hypothesis

In the current study, we examine how demographic variables (age/education/race/ethnicity/year in college) in an undergraduate sample predict fluctuations in psychological variables of anxiety, depression, dissociation, fatigue, stress, irritability, sleep, and productivity, across two weeks.

Method

Inclusion criteria: (1) ownership of a smartphone; (2) over age 18, and (3) enrollment as a student at Binghamton University. Exclusion criteria: non-English speaking.

Participants were first administered an online questionnaire to assess for demographic variables. Then participants were randomly assigned to one of three experimental conditions using a random number ordering process: (1) EMA with mindfulness questions, (2) EMA without mindfulness questions, and (3) no EMA.

Participants assigned to EMA conditions met with research staff to download survey-administering app **MetricWire** onto smartphone.

Participants were asked to take surveys up to three times daily for two weeks on smartphone, allowing for a total of 42 completed surveys.

Participants were asked to report upon current depression, stress, irritability, productivity, fatigue, and sleep.

Surveys required about 5 minutes to complete. All surveys contained the equivalent battery. Mindfulness EMA participants received 30-item morning surveys and 27-item day surveys. Non-mindfulness EMA participants received 22-item morning surveys and 19-item day surveys.

Multilevel Modeling (MLM) with restricted maximum likelihood (REML) was used to analyze EMA data.

MLM was used to examine (1) trajectories of change (how variables may increase or decrease over the span of two weeks) for all outcomes, and (2) demographic differences in trajectories of change (whether fluctuations differed significantly based on demographic characteristics, including sex, race, ethnicity (Latino/Hispanic), age, and year in college).

Results

The undergraduate participant sample (n=103) identified as 60.9% female, 11% Latino/Hispanic, 65% Caucasian, 6% Black/African American, 15% Asian, 9% of Multiple-Races, with a mean age of 19 (SD= 1.24). All participants were in college with nearly half (47.8%) being freshmen.

Analyses revealed a significant time effect for stress (p=.000); anxiety (p=.001); irritability (p=.002); and sleep disturbances (p=.004), such that all variables improved over two weeks for all participants. Fatigue, depression, productivity and dissociation did not significantly change. Anxiety is modeled in Table 1.

After covarying for demographic variables, analyses revealed that trajectories of change for anxiety significantly differed by sex (Table 2). While dissociation was found to significantly differ by race, this finding must be interpreted with caution, as a random, unexplained spike in dissociation was observed on Day 9, which is likely responsible for this difference.

Discussion

Though we cannot conclude that EMA was the sole factor for significant improvement, it may be the case that increased self-monitoring (through taking surveys on a smartphone 3/daily for two weeks) may be linked to improvement in these types of high-arousal states (irritability/anxiety/sleep/stress) and not other states (fatigue, depression, dissociation).

Trajectories of change significantly differed based on sex (Table 2) across two weeks, with female participants generally reporting higher levels of anxiety.

One limitation is that the current study's population was comprised of a limited, small sample of undergraduate students in a college community in a region of the Northeast United States. This sample was not representative of sex, racial, and ethnic norms in the population and may not generalize to the broader population.

Future studies could potentially examine whether EMA for behavior change can be used for longer time durations to regulate anxiety and stress during major life transitions such as a career change or divorce.

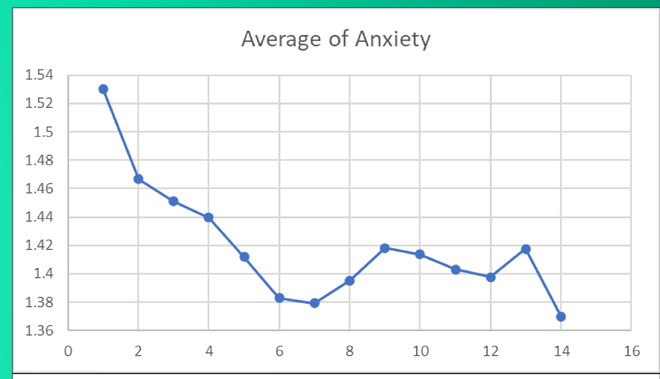

Table 1: Significant improvement in anxiety across 2 weeks

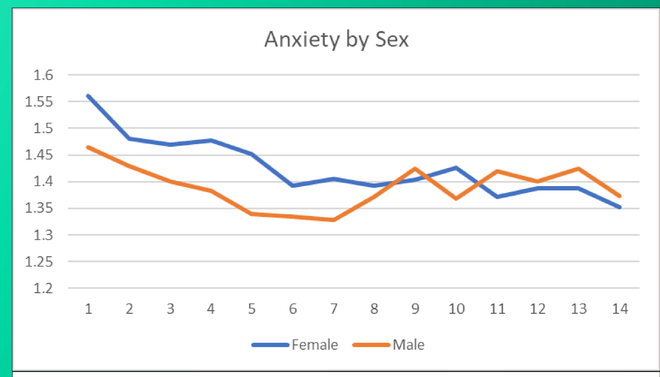

Table 2: Significant difference in anxiety by sex across 2 weeks

References

1. Dugas, M., Gao, G. G., & Agarwal, R. (2020). Unpacking mHealth interventions: A systematic review of behavior change techniques used in randomized controlled trials assessing mHealth effectiveness. *Digital Health, 6*, 205520762090541l.
2. Edwards, E. A., Lumsden, J., Rivas, C., Steed, L., Edwards, L. A., Thiyagarajan, A., ... & Taylor, S. (2016). Gamification for health promotion: systematic review of behaviour change techniques in smartphone apps. *BMJ open, 6(10)*, e012447.
3. Mani, M., Kavanagh, D., Hides, L., & Stoyanov, S. (2015). Review and Evaluation of Mindfulness-Based iPhone Apps. *JMIR mHealth and uHealth*, *3*(3), e82.
4. Turner, C.M., Coffin P., Santos, D., Huffaker, S., Matheson, T., Euren, J., DeMartini, A., Rowe, C., Batki, S., & Santos, G-M. (2017). Race/ethnicity, education, and age are associated with engagement in ecological momentary assessment text messaging among substance-using MSM in San Francisco. *Journal of Substance Abuse Treatment, 75*, 43-48.