Foundations & Applications of Experience Sampling Methodology (ESM) & Ecological Momentary Assessment (EMA)

By Dr. Louis Tay

Special Acknowledgements: Andy Jiang for conducting additional literature searches for recent papers

Graduate Seminar Syllabus

Key Resources:

- **Platform**: The teaching version of the ExpiWell Platform will be used throughout the class to implement your ESM, EMA, and Ambulatory Assessment Project. Go to www.expiwell.com to create your account for the class. Download the ExpiWell iOS or Android apps.

- **Quick Overview of ESM and EMA**
  - Check out a webinar on ESM and EMA here: https://youtu.be/Y80JwwMX3ts?feature=shared

- **Texts**: There are no textbooks used for the class, but there are excellent resources that I recommend.
Grading

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<tr>
<th>#</th>
<th>Component</th>
<th>Percentage</th>
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<tr>
<td>1</td>
<td><strong>Class Participation</strong>: Summarizing papers, leading discussions each week</td>
<td>15%</td>
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<td>2</td>
<td><strong>Initial Research Proposal</strong>: Write a 2-page research proposal that provides key research questions and rationale for why ESM, EMA, and Ambulatory Assessment is the right tool in APA format</td>
<td>15%</td>
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<td><strong>Research Presentation</strong>: Collect test data and showcase proposed steps for implementing your research study</td>
<td>30%</td>
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<td>4</td>
<td><strong>Research Report</strong>: Write a 15-page research paper introducing your study and proposed methods and analysis</td>
<td>40%</td>
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Class Schedule

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<tr>
<th>Week</th>
<th>Topic</th>
<th>Student Leader</th>
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<tr>
<td>1</td>
<td>What is ESM, EMA, DRM, and Ambulatory Assessment?</td>
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<td>2</td>
<td>Overview of Implementing a Study</td>
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<td>3</td>
<td>Applications to Different Research Domains</td>
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<td>Issues in Scheduling: Participant Burden and Compliance</td>
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<td>5</td>
<td>Self-Reports &amp; Short Scales in ESM</td>
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<td>6</td>
<td>Ecological Momentary Interventions and Just-in-time Adaptive Interventions (JITAI)</td>
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<td>7</td>
<td>Issues in Participant Recruitment, Management, and Compensation</td>
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<td><em><strong>Research Proposal Due</strong></em></td>
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<td>8</td>
<td>Data Management, Basic Descriptives, and Visualization</td>
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<td>9</td>
<td>Psychometric Assessment of ESM scales: Reliability and Validity</td>
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<td>10</td>
<td>Basics of Multilevel Modeling</td>
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<td>11</td>
<td>Modeling Within-Person changes</td>
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<td>12</td>
<td>Advanced Modeling Techniques</td>
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<td>13</td>
<td>Future of ESM, EMA, and Ambulatory Assessment</td>
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<td>14</td>
<td><em><strong>Research Presentations</strong></em></td>
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Week 1: What is ESM, EMA, DRM, and Ambulatory Assessment

Key Issues:

- Background and history
- Definitions
- Societies and research groups
- Technology platforms

Readings:


**DRM**


Societies and Groups:
• Society for Ambulatory Assessment: https://ambulatory-assessment.org/
• Daily Life at Work Listserv
Week 2: Overview of implementing an ESM and EMA study

Key Issues:

- A broad overview of practical issues and issues for consideration
  - Scheduling
  - Compensation
  - Participant management
  - Analysis
- Assessment vs intervention

Readings:


Week 3: Applications of ESM and EMA to different Domains

Key Issues:

- Applications to different domains of study
- What types of processes can we learn using ESM/EMA/Ambulatory methods
- What are the specific issues to consider for specific phenomena or populations

Readings / Resources (Pick 4 readings):

Clinical


Emotions and Well-Being


Family

Developmental


Personality


Physical Activity


Organizational


Week 4: Issues in Scheduling: Participant Burden and Compliance

Key Issues:

- Types of Schedules & Effects
- Participant Burden and Compliance
- Event-based triggers & Reminders

Readings (Pick 4 readings):


Week 5: Self-Reports and Short Scales in ESM

Key Issues:

- Short scales and Single item scales
- Ways to adapt scales for ESM
- Types of ESM scales and response options
  - Immediate
  - Past window
- Scale shortening procedures

Readings:


Week 6: Ecological Momentary Interventions and Just-in-time Interventions (JITAI)

Key Issues:

- Understanding EMI and JITAI
- Practical recommendations for EMI and JITAI
- Ways to implement event triggers and personalization on ExpiWell for EMIs and JITAI

Readings:


ExpiWell Event-Triggers and Personalization:

https://support.expiwell.com/portal/en/kb/articles/event-triggering-30-1-2022

Week 7: Issues in Participant Recruitment, Management, and Compensation

Key Issues:

- Screening participants and creating screeners
- Attention checks during baseline surveys
- Viewing participant engagement
- Factors affecting participant engagement
- Compensating participants via Amazon Gift Cards

Readings:


ExpiWell Screening, Attention Checks, and Participant Logs:


[https://support.expiwell.com/portal/en/kb/articles/paying-participants](https://support.expiwell.com/portal/en/kb/articles/paying-participants)

[https://support.expiwell.com/portal/en/kb/articles/logs](https://support.expiwell.com/portal/en/kb/articles/logs)
Week 8: Data Management, Basic Descriptives, and Visualizations

**** Lecture Format ****

Key issues:

- Managing collected data
- Learning how to use R
- Creating R script for basic descriptives and visualisations

Resources:


For a basic introduction:
https://www.youtube.com/watch?v=XhDdhTQQoCs&list=PLbkhiRA2P3qLPRhbHfwJ82RyIsL5PL3HL&index=3

More advanced visualizations:
https://www.youtube.com/watch?v=HPJn1CMvtmI&list=PLtL57Fdbwb_C6RS0JtBojTNOMVlgpeJkS

R Resources:

https://education.rstudio.com/learn/beginner/
Week 9: Reliability and Validity of Self-Reported Data

Key Issues:

- Reliability with g-theory
- Psychometric isomorphism
- Isomorphism of predictive validity evidence across levels
- Analyzing response times

Papers:


Resources:


https://doi.org/10.1186/s12966-020-00932-9

https://doi.org/10.1123/jpah.2019-0152

https://doi.org/10.1016/j.adolescence.2013.10.005
Week 10: Basic Analysis with Multilevel Modeling

Key Issues:

- Within Person Nested Data
- Rationale for multilevel modeling
- Understanding random effects: intercepts & slopes
- Growth Curve Models

Readings:


Resources:

Multilevel Models Workshop (Tutorial in R)
Part 1: https://www.youtube.com/watch?v=n9gYDxR8bjI
Part 2: https://www.youtube.com/watch?v=ezb5znKdDeo

Applied Multilevel Models (Tutorial in R)
Part 1: https://www.youtube.com/watch?v=e5cvYhDgNeo
Part 2: https://www.youtube.com/watch?v=RncVw2_V9mM
Part 3: https://www.youtube.com/watch?v=s6V--jLAUmI
Part 4: https://www.youtube.com/watch?v=V2LUZBEUF9o&t=1s

Online Book (Chapter 8): https://bookdown.org/roback/bookdown-BeyondMLR/ch-multilevelintro.html
Week 11: Modeling within-person changes

Key Issues:

- Issues of Centering
- Time-dependent error structures
- Autoregressive effects
- Predicting random effects

Readings:


Resources:

Multilevel Modeling for Intensive Longitudinal Data with Michael Russell
[https://www.youtube.com/watch?v=8lxXU5iHA](https://www.youtube.com/watch?v=8lxXU5iHA)
Week 12: Advanced modeling techniques

Key Issues:

- Introduction to
  - General Cross-Lagged Models
  - Mixed Models
  - Time Series Models

Readings:


Week 13: Future of ESM techniques

Key Issues:

- Mobile sensing
- AI/ML
- Wearable sensors
- Privacy/Ethical issues

Readings:


