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ESM WORKSHOP SERIES · PART FOUR

Analyze the *Data*

Activities, trajectories, dynamics, multilevel structure — and the papers worth reading first.

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OVERVIEW

Four questions ESM data can answer

Activities and experiences

Mean-level analyses for each activity or experience

Time allocated to an activity or situation; frequencies and levels of behaviors.

Trajectories

The pattern of a variable over time

Daily and weekly rhythms, and level shifts around an intervention or a change.

Dynamics

How variables relate to each other over time

Mediation over time, and questions of causal direction.

Multilevel

Within-individual and between-individual processes

The two can point in different directions — which is the reason to model both.

PART ONE

Activities and experiences

1

Mean-level analyses per activity or experience

The simplest thing ESM data supports, and often the first result worth reporting.

2

Time allocated to an activity or situation

How much of a day goes where — a description that cross-sectional designs cannot produce.

3

Frequencies and levels of behaviors or experiences

How often something happens, and how intense it is when it does.

PART TWO

Trajectories — the pattern of a variable over time

1

Daily or weekly rhythms

e.g., Kahneman et al. (2004). Analyze with time-series methods (Jebb et al., 2015).

2

Level differences around an intervention or organizational change

Discontinuous growth models capture a shift that a single slope would average away (Bliese & Lang, 2016).

3

What to plot first

A trajectory is usually visible before it is significant — plot the raw within-person series early.

PART THREE

Dynamics — how variables relate over time

1

Mediation over time

General SEM for multilevel mediation (Preacher, Zyphur, & Zhang, 2010).

2

Causal direction

Cross-lagged panel models and the random-intercept CLPM (Hamaker et al., 2015).

3

Why the random intercept matters

Without it, stable between-person differences are read as within-person causal effects.

PART FOUR

Multilevel — within and between individuals

1

Understanding within- vs between-individual variability

Variance partitioning (Bliese, 2000) tells you how much of the phenomenon is even within-person.

2

Disentangling processes over time

Multilevel growth models separate change within a person from differences between people.

3

Modeling inertia

Regress a state on its own group-mean-centered lag (Kuppens et al., 2010).

PART FIVE

Other techniques

ESM increasingly captures more than Likert items — and each new modality brings its own analysis.

Qualitative data

Text and audio responses

- Text-mining techniques
- Open- or closed-vocabulary methods

Multimedia data

Photos and video captured in the moment

- New ways of analyzing photo and video data
- e.g., photographing food to estimate calories

Reactivity

Do people change behavior when closely monitored?

- Dewey et al. (2015)
- McCarthy, Minami, Yeh, & Bold (2015) on EMA frequency among adults quitting smoking

Report correlations both ways

1

Between-individual correlations above the diagonal

The relationship across people — what a cross-sectional study would have found.

2

Pooled within-individual correlations below it

The relationship inside a person over time — usually the one the study was run to find.

3

Report both sample sizes

Number of individuals and number of occasions. Reporting both is what lets a meta-analysis use your study at all.

On computing reliability

1

Use a generalizability study where possible

Reliability in intensive longitudinal data is not one number — it depends on which facet you are generalizing over.

2

Between-person and within-person reliability differ

A scale can be reliable across people and unreliable across occasions within a person.

3

Reference

Iida, Shrout, Laurenceau, & Bolger (2012). Using diary methods in psychological research.

Longitudinal analysis in organizational research

1

Fisher, C. D., & To, M. L. (2012). Using experience sampling methodology in organizational behavior.

Journal of Organizational Behavior, 33, 865–877.

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Ohly, S., Sonnentag, S., Niessen, C., & Zapf, D. (2010). Diary studies in organizational research.

Journal of Personnel Psychology, 9, 79–93.

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Wang, M., Zhou, L., & Zhang, Z. (2016). Dynamic modeling.

Annual Review of Organizational Psychology and Organizational Behavior, 3, 241–266.

Further reading

4

Avey, Luthans, & Mhatre (2008). A call for longitudinal research in positive organizational behavior.

Journal of Organizational Behavior, 29(5), 705–711.

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Ballinger, G. A. (2004). Using generalized estimating equations for longitudinal data analysis.

Organizational Research Methods, 7(2), 127–150.

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Zapf, Dormann, & Frese (1996). Longitudinal studies in organizational stress research.

Journal of Occupational Health Psychology, 1(2), 145–169.

IN EXPIWELL

Getting the data into your analysis

ESM data is software agnostic — the platform's job is to hand you a clean, linked export and get out of the way.

Export

Participant responses, from Insights

- Responses export with their submission times
- Surveys already linked per participant

Sensor streams

Wearable and location data alongside responses

- Fitbit, Apple Watch and SensorKit integrations
- Continuous GPS downloads from Insights

Dashboards

Descriptives before the analysis starts

- Project dashboards and charts in-platform
- Shareable with collaborators

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THE SERIES

The ESM Workshop Series

All four parts of the ESM Workshop Series are available at expiwell.com.

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