Preact Digital: Feature Database Documentation

Leona Hammelrath Tessa Meyer

2025-03-03

Introduction

Study protocol link

Design

> Glossary
>
> beep = xxxx
> measurement burst = xxxx

Data Structure

Folder Structure
[insert folder/file tree]

EMA Data

Introduction

This section outlines the eight EMA constructs and provides an item-level overview.

Files:

- `ema_content.pkl`: binary file format storing the ema relevant for analyses
- `ema_meta.pkl`: xxx

Load the .pkl file:

```
import pickle

# load the .pkl file
with open('data.pkl', 'rb') as f:
    loaded_data = pickle.load(f)

print(loaded_data)
```

Details `ema_content.pkl` file:

No.	Column name	Description	Data type	Scale level	Variable Level
1	`id`	Unique identifier wearable and ema data within subproject 6 (SP6)	`str`		
2	`for_id`	Unique identifier across all PREACT subprojects and redcap	`str`		
3	`timestamp_item_completion`	Timestamp at which a single item was completed	`datetime64`	interval	
4	`timestamp_beep_completion`		`datetime64`	interval	
5	`timestamp_beep_expiration`		`datetime64`	interval	

No.	Column name	Description	Data type	Scale level	Variable Level
6	measurment_burst	Measurement burst describes the measurement point in the longitudinal study (Baseline (T0), after 20 therapy sessions (T20), or after therapy end respectively 365 days after therapy start (TPost)	int	ordinal	0 = T0 1 = T20 2 = TPost
7	schedule_chronotype	Depending on their individual sleep-wake rhythm participants can choose to receive beeps between 07:30 and 21:30 (lark) or 09:30 and 22:30 (owl)	int	nominal	24 = T0 lark 25 = T0 owl 33 = T20 lark 34 = T20 owl 38 = TPost lark 39 = TPost owl
8	response	Chosen response by participant	int	ordinal, nominal, binary	
9	item	Question/item title	str		
10	beep_per_person_id	Unique beep identifier. Date and number of beep per customer	str		
11	date	Date on which the question was generated	datetime64		

No.	Column name	Description	Data type	Scale level	Variable Level
12	`study_version`	Numerical coding of study version: the long version covers the whole	`str`		long short
13	`ema_burst_start`	Absolute start EMA measurement burst (i.e. intended start according to study protocol)	`datetime64`		
14	`ema_burst_end`	Absolute end EMA measurement burst (i.e. intended end according to study protocol)	`datetime64`		
15	`season`	Describes the four seasons	`str`	nominal	1 = Spring 2 = Summer 3 = Fall 4 = Winter
16	`time_of_day`	Time of day stratified into five categories (Early Morning = xx)	`str`	nominal	1 = Early Morning 2 = Morning 3 = Fall 4 = Winter

Methods: Hierarchical Data Structure

1. **Level 1: Measurements (Observations)**
    - Each person records data 8x/day over 14 days
    - This results in 112 measurements per wave (8x14)
2. **Level 2: Days**
    - Measurements (Level 1) are nested within days (Level 2)

- Each wave has 14 days

3. **Level 3: Waves (Measurement points)**
   - Each person goes thorugh three waves (long version)
   - Days (Level 2) are nested within waves (Level 3)
4. **Level 4: Individuals (Participants)**
   - Waves (Level 3) are nested within participants (Level 4)

EMA constructs and item-level overview

The EMA measurement includes the following constructs:

1. Affect
2. Emotion regulation
3. Situational context
4. Significant events
5. Social context
6. Therapeutic agency
7. Physical fitness
8. ECG control

Affect

- Description: At each beep, participants were asked about their current affective state
- Construct: PANAS-X subscales Haney et al. (2023)
- 17 Items

Show Items

Variable	Item	Scale	Scale Endpoints	Measurement Time
	How … do you feel right now?			
`anxious`	anxious	1-2-3-4-5-6-7	not at all - very much	all beeps

Variable	Item	Scale	Scale Endpoints	Measurement Time
nervous	nervous	1-2-3-4-5-6-7	not at all - very much	all beeps
attentive	attentive	1-2-3-4-5-6-7	not at all - very much	all beeps
relaxed	relaxed	1-2-3-4-5-6-7	not at all - very much	all beeps
calm	calm	1-2-3-4-5-6-7	not at all - very much	all beeps
irritable	irritable	1-2-3-4-5-6-7	not at all - very much	all beeps
angry	angry	1-2-3-4-5-6-7	not at all - very much	all beeps
fatigue	fatigue	1-2-3-4-5-6-7	not at all - very much	all beeps
cheerful	cheerful	1-2-3-4-5-6-7	not at all - very much	all beeps
happy	happy	1-2-3-4-5-6-7	not at all - very much	all beeps
ashamed	ashamed	1-2-3-4-5-6-7	not at all - very much	all beeps
dissatisfied_myself	dissatisfied with myself	1-2-3-4-5-6-7	not at all - very much	all beeps
self_confident	self-confident	1-2-3-4-5-6-7	not at all - very much	all beeps
shy	shy	1-2-3-4-5-6-7	not at all - very much	all beeps
downcast	downcast	1-2-3-4-5-6-7	not at all - very much	all beeps
sad	sad	1-2-3-4-5-6-7	not at all - very much	all beeps
lonely	lonely	1-2-3-4-5-6-7	not at all - very much	all beeps

Emotion regulation

- Description: At each beep, participants were asked to rate the intensity and controllability of their most negative thought since the last beep. Then, we assessed the use of different ER strategies since the last beep
- Construct: RESS-EMA scale Medland et al. (2020)

- 6 Items (covering reappraisal, rumination, suppression, distraction, relaxation, acceptance)

Show Items

Variable	Item	Scale	Scale Endpoints	Measurement Time
	Think about the strongest negative feeling since the last beep [since waking up].			
`er_intensity`	How intense was this feeling?	1-2-3-4-5-6-7 (1 = neutral)	not at all - very much	all beeps (except the first of the day)
`er_intensity_morning`	How intense was this feeling?	1-2-3-4-5-6-7 (1 = neutral)	not at all - very much	first beep of the day
`er_control`	How controllable was the situation that triggered this feeling?	1-2-3-4-5-6-7 (4 = neutral)	not at all - very much	all beeps (except the first of the day)
`er_control_morning`	How controllable was the situation that triggered this feeling?	1-2-3-4-5-6-7 (4 = neutral)	not at all - very much	first beep of the day

Variable	Item	Scale	Scale Endpoints	Measurement Time
	As a reaction to the negative feeling …			
er_relaxation	I tried to breathe deeply	1-2-3-4-5-6-7	not at all - very much	all beeps
er_rumination	I kept thinking about what was bothering me	1-2-3-4-5-6-7	not at all - very much	all beeps
er_reappraisal	I considered the situation from different perspectives	1-2-3-4-5-6-7	not at all - very much	all beeps
er_distraction	I tried to distract myself	1-2-3-4-5-6-7	not at all - very much	all beeps
er_suppression	I tried to hide my feelings	1-2-3-4-5-6-7	not at all - very much	all beeps
er_acceptance	I tried to accept the situation	1-2-3-4-5-6-7	not at all - very much	all beeps

Situational Context

- Description: At each beep, participants were asked to specify activities they had pursued in the preceding 2 hours from a given set of 9 common activities. Participants were able to select multiple options simultaneously. Subsequently, they were asked to evaluate how much they enjoyed the respective activities
- Construct: Self-constructed, based on the DIAMONDS scale Rauthmann & Sherman (2016) and the WARN-D study protocol Fried et al. (2022), a similar longitudinal digital

phenotyping study. We aimed to find a balance between sparsity of items and high degree of situational coverage.

- 2 Items

Show Items

Variable	Item	Scale	Scale Endpoints	Measurement Time
	How did you spent the time since the last beep [since waking up]? (Multiple answers possible)			

Variable	Item	Scale	Scale Endpoints	Measurement Time
situation_1	[ ] Work or study [ ] Housework or errands [ ] Caring for children/relatives [ ] Eating/drinking/personal hygiene [ ] On the move (e.g., in the subway) [ ] Smartphone/social media [ ] Leisure activity, rather passive (e.g., watching a movie, reading) [ ] Leisure activity, rather active (e.g., sports, outings) [ ] Something else			all beeps (except the first of the day)
situation_1_morning				first beep of the day

Variable	Item	Scale	Scale Endpoints	Measurement Time
situation_2	How much did you enjoy this activity?	-2, -1, 0, 1, 2	not at all - very much	all beeps (except the first of the day)
situation_2_morning	How much did you enjoy [activity]?	-2, -1, 0, 1, 2	not at all - very much	first beep of the day

Significant Events

- Description: Participants were asked to think about the most important event since the last beep and how pleasant they perceived it
- Construct: Self-constructed
- 1 Items

Show Items

Variable	Item	Scale	Scale Endpoints	Measurement Time
event_general	Think of the most significant moment (situation/experience) since the last survey. How did you perceive it?	-2, -1, 0, 1, 2	very unpleasant - very pleasant	all beeps (except the first of the day)

Variable	Item	Scale	Scale Endpoints	Measurement Time
event_general_morning	Thinking of the most significant moment (situation/experience) since waking up. How did you perceive it?	-2, -1, 0, 1, 2	very unpleasant - very pleasant	first beep of the day

Social context

- Description: Participants were asked if they had social contacts since the last beep, how (online/ in person/ phone) and how agreeable the contact was.
- Self-constructed
- 3 Items

Show Items

Variable	Item	Scale	Scale Endpoints	Measurement Time
event_social_1	Have you had social contacts since the last survey?	binary: yes/no		all beeps (except the first of the day)
event_social_1_morning	Have you had social contacts since waking up?	binary: yes/no		first beep of the day

Variable	Item	Scale	Scale Endpoints	Measurement Time
event_social_2	How did the social contact take place?	multiple choice: [ ] online [ ] by phone [ ] in person		all beeps
event_social_3	How did you experience the social contacts?	-2, -1, 0, 1, 2	very unpleasant - very pleasant	all beeps

Therapeutic Agency (TA)

- Description: Participants were asked about Therapeutic Agency (TA) in everyday life
- Construct: Self-constructed based on the Therapeutic Agency Inventory (TAI) Huber et al. (2019). The original TAI contains 3 subscales, covering in-session activities, passivity towards the therapist and out-of-session activities. As we were interested in assessing therapeutic agency in everyday life, our TAI-EMA items are based on the "out-of-session activities" subscales and cover cognitive and behavioral aspects of TA
- 4 Items

Show Items

Variable	Item	Scale	Scale Endpoints	Measurement Time
	Prompted by my therapy today, I have … / Today I have …			
ta_behavioral_1	implemented ideas or tasks from therapy	1-2-3-4-5-6-7	not at all - very much	1x/day, 8th beep

Variable	Item	Scale	Scale Endpoints	Measurement Time
ta_behavioral_2	I tried to think differently about things	1-2-3-4-5-6-7	not at all - very much	1x/day, 8th beep
ta_cognitive_1	I thought about something that was discussed in therapy	1-2-3-4-5-6-7	not at all - very much	1x/day, 8th beep
ta_cognitive_2	I done something to improve my situation	1-2-3-4-5-6-7	not at all - very much	1x/day, 8th beep

Physical Fitness

- Description: Participants were asked how physically healthy they had felt today on the last beep of the day
- Construct: Self-constructed
- 1 Item

Show Items

Variable	Item	Scale	Scale Endpoints	Measurement Time
physical_health	How physically healthy did you feel today?	-2, -1, 0, 1, 2	worse than usual / normal / better than usual	1x/day, 8th beep

ECG Control

- Description: During measurement bursts, patients were asked twice per day to conduct a resting-state ECG on their Scanwatch. To control for potential confounders influencing the signal, we asked if they had consumed nicotine, caffeine or alcohol or had a heavy meal in the last 30 minutes
- Construct: Self-constructed
- 1 Item

Show Items

Variable	Item	Scale	Scale Endpoints	Measurement Time
`ecg_control`	Within the last 30 minutes, did you … - drink coffee or alcohol? - smoke? - eat a heavy meal?	binary: yes/no		2x/day, 1th and 5th beep

Passive Sensor Data

Activity

Heartrate

Sleep

GPS

ECG Data