Data Documentation

November 02, 2021

1 Participants and days excluded from all analyses

In this documentation, we refer to the date when the participant was scheduled to have their second in-person lab visit (i.e., their Quit Day) as 'Day 0' and subsequent days as 'Day 1', 'Day 2', ..., and so on. Day 0 was the first day when participants could be micro-randomized. Day 0 marks a significant transition in the *Sense2Stop* study: only participants who attended their second in-person lab visit were able to have study coordinators activate the *mCerebrum* app's micro-randomization capabilities; *mCerebrum* is an app installed on the mobile phones loaned to participants and orchestrates data collection between the mobile phone and wearables. The last day when participants could be micro-randomized occurred 10 days after Day 0 (i.e., on 'Day 10'). Thus, each participant would have at most 11 days when they could have been micro-randomized. 'Day 10' was also the day prior to the participants' third lab visit, the date when participants were asked to return the mobile phone and wearables loaned to them.

Table 1: Participants and days excluded from all analysis

No. Participants	No. Days/Participant	Total Participant-Days	Rationale
5	11	55	Pilot Participants
12	11	132	Did not attend their second lab visit
1	6	6	Withdrew from the study on Day 6

The remainder of this document exclude the participants and days described above.

2 Availability for micro-randomization

Unavailability due to inclement weather

Although participants generally attended their second in-person lab visit on their scheduled date, there were few instances when participants contacted study coordinators to delay their second in-person lab visit. In all these cases, participants reported that they could not attend their second in-person lab visit on Day 4 due to hazardous weather conditions, but were able to complete their second in-person lab visit on Day 5. We regarded all decision points on Day 0 as unavailable for these participants.

Unavailability due to omission of initiating start-of-day

Micro-randomizations for a particular day of the study (e.g., on Day 9) did not occur unless the participant initiated 'start-of-day' through pressing a start-of-day icon within the *mCerebrum* app. In other words, for micro-randomizations to occur daily between Day 0 to Day 11, participants needed to press the start-of-day daily after waking. We regarded all decision points on those participant-days when the participant did not press the start-of-day icon within the *mCerebrum* app as unavailable.

Table 2: Participant-days when no decision points were regarded as available for micro-randomization

No. Days/Participant	No. Participants	Total Participant-Days
Inclement weather		
1	2	2
Omission of initiation of start-of-day		
10	2	20
9	4	36
8	4	32
7	2	14
6	2	12
5	1	5
4	3	12
3	1	3
2	5	10
1	8	8

Unavailability for micro-randomizations determined in real-time by the mCerebrum app

Only the 720 minutes following initiation of start-of-day can be potentially regarded by the *mCerebrum* app as available for micro-randomization. We refer to start-of-day as DP 0, and the 1, 2, ..., 720 minutes after start-of-day as DP 1, 2, 720. Hence, the upper limit in the number of available decision points (DP's) for each participant-day is 721.

Availability for micro-randomization is determined in real-time by the mCerebrum app via a decision rule (see Figure 2 in Battalio, et al., 2021) involving consideration of the following conditions as long as a particular DP (among DP 0, DP 1, DP 720) does not fall after 'sleep time'.

- Whether the participant was at the *peak* of an episode
- Whether less than 50% of minutes between the *start* and *peak* of an episode could be regarded as having poor data quality
- Whether the episode was classified as *stress* or *not stress*
- Whether privacy mode was not activated
- Whether time since last Random EMA was more than 10 minutes
- Whether time since last participant-initiated EMA was more than 10 minutes
- Whether the participant was not physically active in the last 5 minutes
- Whether the participant was not driving in the last 5 minutes
- Whether the mobile phone's battery was greater than 10% in the last 5 minutes

In brief, 'sleep time' refers to the time of day at which the *mCerebrum* app automatically paused Random EMA and EMI delivery until the next time start-of-day is initiated; 'sleep time' was pre-set by study staff in consultation with the participant prior to completion of the first in-person clinic visit. Hence, DP's which occur after 'sleep time', but prior to the next time start-of-day was initiated will be regarded as unavailable for micro-randomization.

Table 3: Among participant-days not included in Table 1 or Table 2, count decision points (DP's) regarded by the mCerebrum app as available for micro-randomization.

No. DP's/Participant-Day	No. Participant-Days	Total DP's
48	1	48
47	1	47
45	1	45
43	2	86
41	2	82
40	1	40
38	2	76
37	2	74
36	3	108
35	3	105
34	1	34
33	2	66
32	2	64
31	5	155
30	7	210
29	3	87
28	9	252
27	12	324
26	6	156
25	7	175
24	10	240
23	6	138
22	13	286
21	8	168
20	8	160
19	13	247
18	18	324
17	13	221
16	10	160
15	9	135
14	10	140
13	13	169
12	8	96
11	16	176
10	11	110
9	10	90
8	13	104
7	8	56
6	10	60
5	10	50
4	18	72
3	6	18
2	10	20
1	15	15
0	140	0
Grand Total:		5489

Table 4: Among participant-days not included in Table 1 or Table 2, count decision points (DP's) regarded by the mCerebrum app as available for micro-randomization. In contrast with Table 3, the current table does not count the last 720 - M DP's. Here, M=120 minutes.

No. DP's/Participant-Day	No. Participant-Days	Total DP's
41	1	41
40	1	40
39	1	39
36	2	72
33	3	99
32	5	160
31	1	31
30	2	60
29	5	145
28	3	84
27	7	189
26	4	104
25	5	125
24	7	168
23	4	92
22	11	242
21	13	273
20	13	260
19	13	247
18	15	270
17	20	340
16	9	144
15	9	135
14	13	182
13	13	169
12	9	108
11	18	198
10	18	180
9	12	108
8	12	96
7	9	63
6	13	78
5	14	70
4	19	76
3	8	24
2	9	18
1	14	14
0	143	0
Grand Total:		4744

3 Working with predictions of a stress episode detection algorithm

How often and how long were the Stress/Not Stress/Physically Active Episodes?

Among participant-days not included in Table 1 or Table 2, we only included stress/not stressed/physically episodes which occurred within the first 720 minutes following the moment when the participant initiates start-of-day. That is, stress/not stress episodes occurring beyond beyond the first 720 minutes, but prior to the next time the participant initiates start-of-day were not included.

Table 5: No. Episodes Classified as Stressed/Not Stressed/Physically Active

Episode Classification	No. Episodes
Stress	1137
Physically Active	4642
Not Stress	11251

Table 6: Minutes elapsed between the start, peak, and end of stress episodes, summarized in percentiles

	0% (MIN)	10%	50% (MEDIAN)	90%	100% (MAX)
Start to Peak (A to B)	0.00	1.00	3.99	7.42	4115.01
Peak to End (B to C)	0.58	2.99	6.01	11.99	841.01
Start to End (A to C)	1.82	5.00	10.00	17.99	4116.01

Table 7: Minutes elapsed between the start, peak, and end of not stress episodes, summarized in percentiles

	0% (MIN)	10%	50% (MEDIAN)	90%	100% (MAX)
Start to Peak (A to B)	0.00	1.01	4.00	12.98	809.00
Peak to End (B to C)	0.66	1.00	4.01	9.13	985.99
Start to End (A to C)	0.91	4.00	9.01	19.01	986.99

4 Overlapping windows?

We use DP's included in Table 4 as our starting point. In contrast to those DP's in Table 3, we excluded DP's $\{720 - m : m = 1, 2, 3, ..., M\}$, where $M = 120$. In other words, we additionally excluded the DP's for which we will not be able to 'look ahead' for a full $M = 120$ minutes. Now, for each DP in Table 4 which we regard as available for micro-randomization:

1. We noted whether the DP was followed by *any* micro-randomization within the next M minutes
2. We noted whether the DP was followed by micro-randomization to *a stress management prompt* within the next M minutes

Table 8: Among DP's regarded as available for micro-randomization (see Table 4): How many were followed by any microrandomization within the next M=120 minutes? How many were follwed by micro-randomization to a stress management prompt within the next M=120 minutes?

At current DP (k)		Among current DP's (k), in how many did any of the following occur within the next M=120 minutes (i.e., (k+1, k+1, ..., k+M))?	
Randomized to Stress Management Prompt?	Total Number of DP's	Any Randomization?	Randomized to Stress Management Prompt?
0	4160	3949	1616
1	584	453	128
Grand Total:	4744	4402	1744

5 References

1. Battalio, S. L., Conroy, D. E., Dempsey, W., Liao, P., Menictas, M., Murphy, S., ... & Spring, B. (2021). Sense2Stop: A micro-randomized trial using wearable sensors to optimize a just-in-time-adaptive stress management intervention for smoking relapse prevention. Contemporary Clinical Trials, 109, 106534.