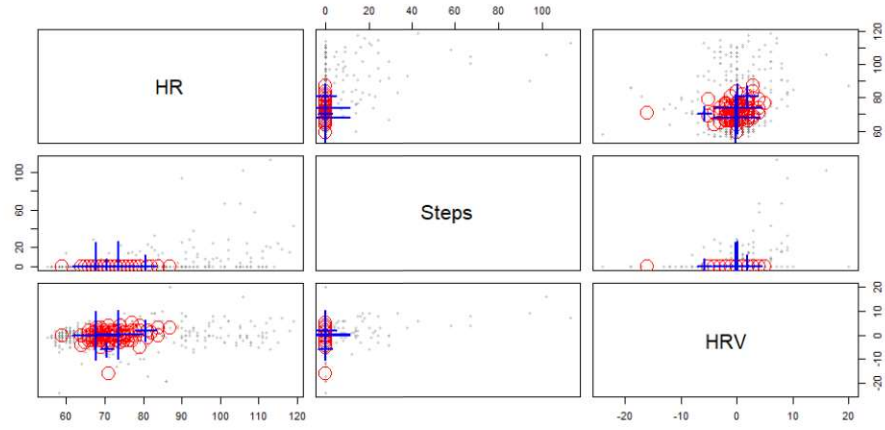# Appendix
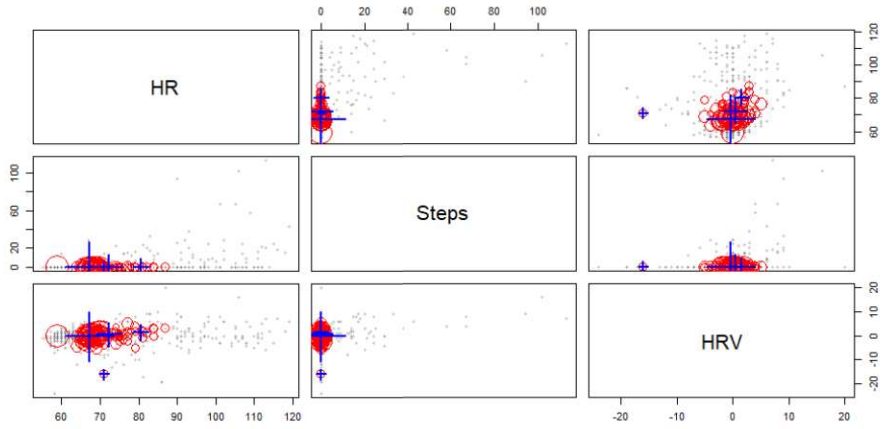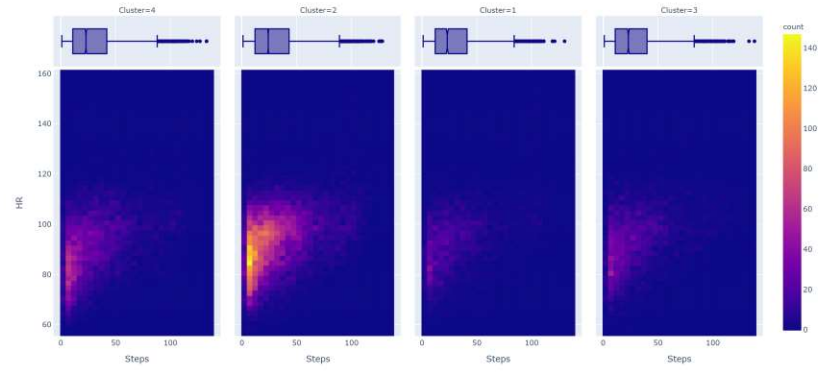
A   Figures
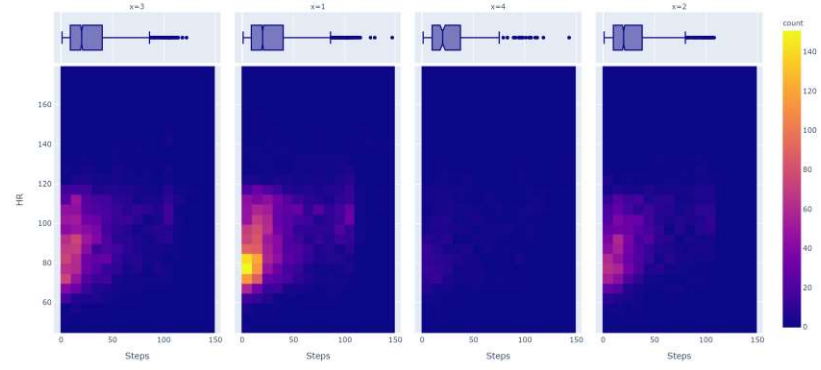

(a) Sliding time window model.
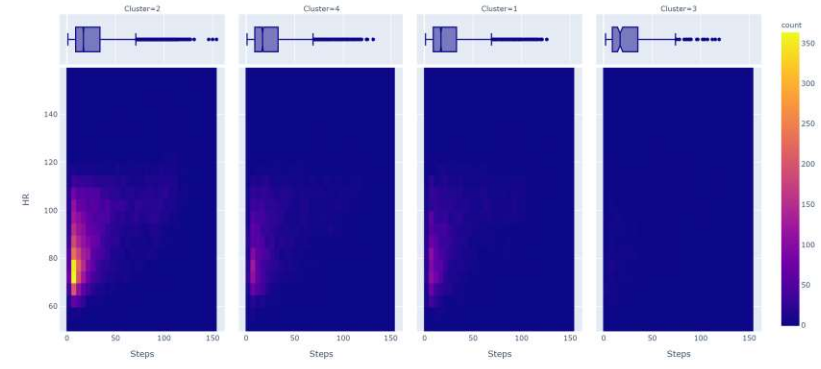

(b) Damped time window model.

Figure A.1: Macro-cluster (blue crosses) and micro-clusters (red circles) results for Participant 19 using the sliding time window model and damped time window model.
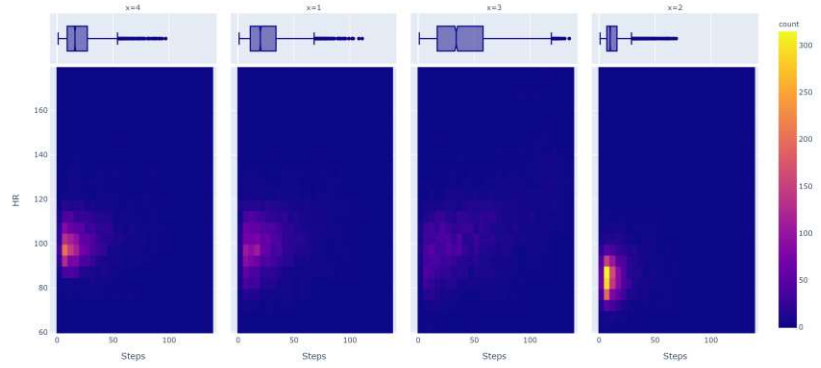
(a) Participant 12.

(b) Participant 18.

(c) Participant 19.

(d) Participant 20.

Figure A.2: Density heat map for Participant 12, 18, 19, and 20.

B Tables

Table B.1: List of the variables collected for each participant during the experiment.

Attributes	Measurement	Definition
Timestamp	1 minute intervals	From start of study period (01/03/2018) to end (30/04/2018)
Gender	0=Female, 1=Male	Gender of Participant
Age	numeric	Age of Participant
Weight	kgs	Weight of Participant
Height	cm	Height of Participant
PID		Participant ID
Steps	1 minute intervals	From Fitabase
HR	1 minute intervals	From Fitabase
Intensity	1 minute intervals	From Fitabase
Sleep_Dur	1 minute intervals	From Fitabase
HRV	numeric	From Fitabase
Temp	15 minute intervals	Temperature indoor, one decimal point. Adjust for Daylight savings
BatteryLevel	0, 1, 2, 3	From Fitabase, measured when device is synced, random, 1=flat, 3=full, 0 means nothing/ignore
Days_elapsed		Days since the last sync event
Hours_elapsed		Hours since the last sync event
DOW	1, 2, 3, 4, 5, 6, 7	Day of the week, 1=Sunday, 2=Monday, 3=Tuesday, 4=Wednesday, 5=Thursday, 6=Friday, 7=Saturday
Hour	1, 2, 3, 4, 5, … 23	Hour of the day, 1am=1, 2am=2, 3am=3 … 11pm=23
Date	dd/mm/yyyy	Date
Time	hh:mm:ss AM/PM	Time
Missing	0=no missing data, 1=missing data	Missing = 1 if heart rate date is missing. If missing = 1, worktime/sleeptime/leisuretime = 0. Missing will never be blank
Weekends	0=Weekend, 1=Weekday	Weekend or not weekend, Saturday/Sunday = 1, Monday-Friday = 0
Pub_Holiday	0=Not a pub hol, 1=a pub hol	Public holiday (30/03/2018, 31/03/2018, 02/04/2018, 25/04/2018)
Leave	0=Not a leave day, 1=a leave day	Self reported taken a personal leave day (pub hols are also counted as leave)
WorkfromHome	0=Not a WFH day, 1=a WFH day	Self reported that worked from home (can be a weekend/pub hol and still a WFH day)
WorkTIME	Self-reported	Hours of work - self report minus 30 minute from start and end of day, cannot be a weekend or holiday/leave day
Sleeptime	1 minute intervals	As determined by fitbit and downloaded from Fitabase
Leisuretime	1 minute intervals	Time not defined as Sleeptime or Worktime
Check	1	Must be 1 or there is an error. Sum of worktime, sleeptime, leisuretime and missing
AM_transit	Self-reported	Travel to work time +30 minutes, may cross over with work time by one minute
PM_transit	Self-reported	Travel to home time +30 minutes, may cross over with work time by one minute
Lunchtime	Self-reported	Lunch period +30 minutes

Table B.2: Selected input variables for clustering the data points.

Variable	Description
HR	Heart-rate/min
Steps	Steps/min
HRV	Heart Rate Variability

Table B.3: The input data for stream simulation

Timestamp	Steps	HR	HRV	PID
Mar-6-2018 12:00:00 AM	0	71	0	18
Mar-6-2018 12:01:00 AM	0	71	0	18
Mar-6-2018 12:02:00 AM	0	69	-2	18
Mar-6-2018 12:03:00 AM	0	70	1	18
...	...	...	...	...
...	...	...	...	...
Apr-30-2018 11:58:00 AM	0	65	-2	18
Apr-30-2018 11:59:00 AM	0	66	1	18

Table B.4: Participants in the experiment.

Participant	Description
12	59 year old female
18	30 year old female
19	28 year old male
20	60 year old female