

STRESS MEASUREMENT

Identify the stress to prevent its effects : burnout, heart diseases...

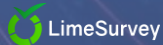
Abstract: This screening involves observing for signs of acute and chronic stress of a subject in order to create a "stress indicator" to avoid burnouts, and also other health problems caused or exacerbated by stress (sleep, digestive and weight problems, heart diseases, depression, skin conditions...). Our cohort gathers 50+ subjects with a final objective of 80 subjects by the end of Q1 2019. Participants stress is assessed over a period of 3 months from three different measurements (sensed, daily and chronic stress). Our study provides indicators to detect the drift of one's stress from a "daily" stress to a chronic status potentially leading to a burnout phase.



Data:

We collect stress measurements through three different channels:

- Survey forms, assessing the **stress felt by the subject** (subjective measurement, linked to the feelings): two forms MSP25 and Sumer (from the French Department of Work, including the Karasek diagram)
- **Chronic stress** measured with the innovative **Codesna** device consisting of a short two minutes respiratory protocol with heartrate monitoring, giving a precise measure of the stress accumulated over the days/weeks (i.e. chronic stress)
- Connected Watch monitoring Heart Rate and pulse pressure (**Zensorium** by Nitto): assessing a **daily acute stress ratio**.



To enable exploratory analysis linked to environmental factors affecting stress of a person, the collected data from the three sources is augmented with exogenous data from **Weather, Traffic and air pollution**.



Data Analysis #1: Visual reporting for the subject

The three stress measurements used in this study are not investigating the same type of stress. In the example below, the subject does not feel stressed (a) but shows signs of physiological stress, both during the day (b) and accumulated (c), despite having a good capability to adapt to a stressful event (d). This type of stress could be dangerous and lead to a potential burnout, and should be therefore acknowledged.

Sensed stress (score from MSP25 survey form)

37



(a)

% time stressed during the day (from connected watch)

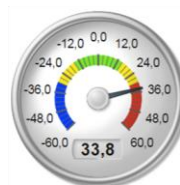
17,2 %



(b)

Chronic stress (from Codesna) (%)

33,8



(c)

Adaptation capability to a stressful event (from Codesna) (%)

141,7



(d)

The purpose of our study is to establish profiles of stress type (e.g., generally stressed, unknown stressed, daily stressed but not yet accumulated) to propose pre-diagnostics of stress levels and to give a prediction of burnout risk.

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Main results



Data Analysis #2: Global analysis of the population at mid-study

Going forwards, we lead different multivariate analysis (Principal Component Analysis PCA, parametric, clustering etc.) on the whole population of our study to get a global view of the different stress indicators.

Our main results at mid-study are summarized below:

- Perceived stressed (from survey forms) and daily acute stress (from Zensorium watch) are correlated: the stress that we feel is directly linked to the stress we experience daily.
- Chronic stress (from Codesna) shows similar behavior with weather data (cf figure on the right).
- We also see consistency in our measurements: the Heart Rate monitored with the watch (FC_med) and the HR monitored with Codesna (FC) are in the same area of the plot thus showing that they explain the same type of variability.

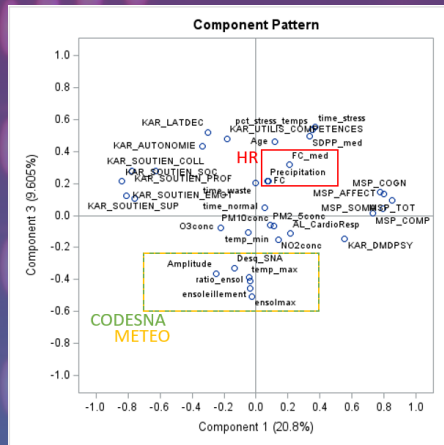


Figure illustrating one of our PCA: this plot is showing the variability of the different variables we are using (blue open circles with the names written in black) according to the Components 1 and 3 of the analysis.

OUR REFERENCES



OUR CONTACT INFORMATION

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