How to prioritize work-related psychosocial factors impacting mental health? Regression and random forest approaches

Oumou S. Daouda, Laura Temime, Gilbert Saporta, Mounia Hocine

How to prioritize work-related psychosocial factors impacting mental health?

Regression and random forest approaches

Oumou S. Daouda[1], Laura Temime[1], Gilbert Saporta[2], Mounia N. Hocine[1]

[1]Conservatoire National des Arts et Métiers (le Cnam), MESuRS lab, Paris, France
[2]Le Cnam, CEDRIC lab, Paris, France

1 Background

- Mental health disorders are both a major public health and economic issue
- In modern professional life, its prevention and promotion have become a major challenge for decision-makers
- A broad range of work-related psycho-social factors (**PSFs**) have been documented as having an impact on mental health[1]
- Decision-makers lack pertinent methodological tools to help them identify key PSFs on which they may act to improve mental health among employees
- Most published studies attempting to hierarchize PSFs have focused on their *importance* only i.e. the strength of their association with mental health
- However, the exposure prevalence to each PSF, that is, its *performance*, is also important to consider

2 Objective

- **To propose a new adjusted ranking index (RI) to hierarchize PSFs, that jointly takes into account their *importance* and their *performance***

3 Methods

Ranking methodology

1. **Performance measurement** : prevalence of exposure to each PSF
2. **Importance measurement** : adjusted strength of association between mental health and PSF

Weifila approach[2]
Based on variance decomposition
Linear context

Random forest (RF) approach[3]
Permutation importance
Non-linear context

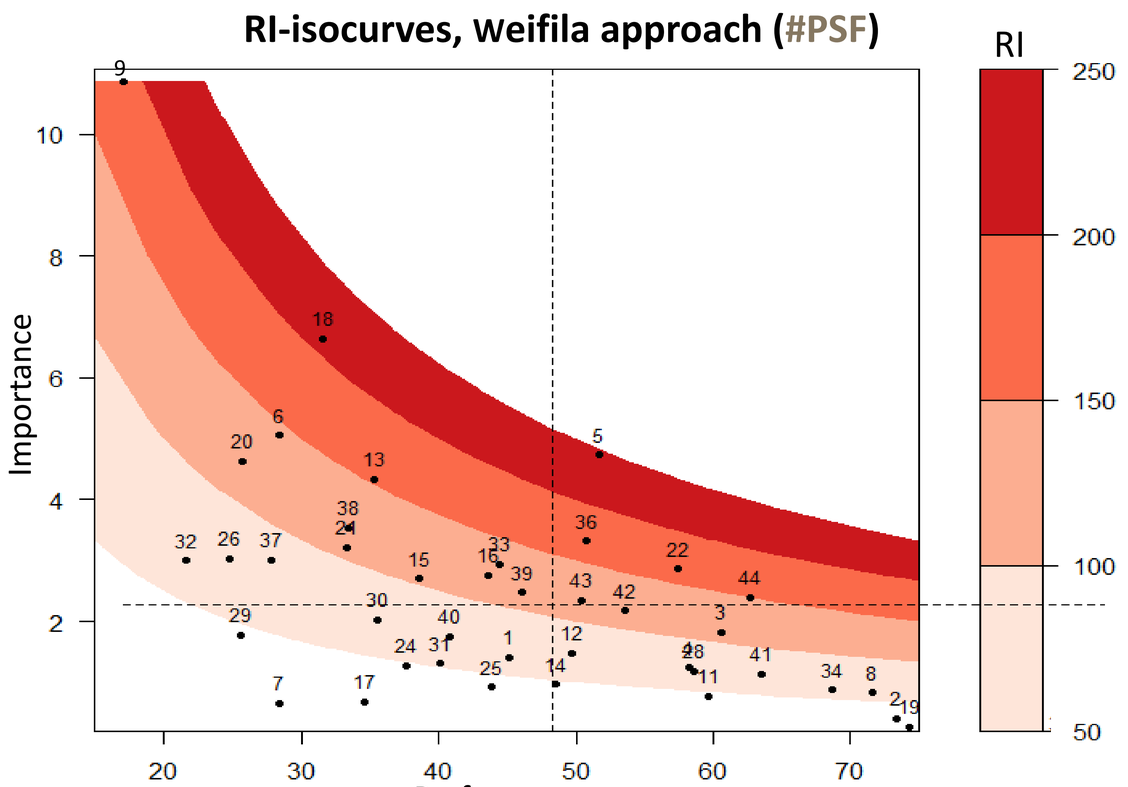
3. ***PSF Ranking Index (RI)***
   - **RI = importance x performance**
   - RI-isocurves to identify PSFs requiring priority actions, with higher RIs
   - We identified key PSFs based on a synthesis of our results

Data

- **Cross sectional study conducted in March 2018**
  Sample of 3200 individuals, living in France and representative of the French workers *(according to the age, the gender, the profession, and the residence place)*
- **Measurement of the mental health status :**
  GHQ-28 « **G**eneral **H**eath **Q**uestionnaire with 28 items »
- **44 PSFs and 9 covariates were documented**

4 Results

Rank	#PSF Weifila	PSF description
1	**5**	Unsatisfactory communication at work
2	**18**	Inability to depend on work collaborators
3	**9**	Imbalance private and professional life
4	**36**	Emotional demands at work
5	**22**	No good career prospects
6	**13**	Not feeling valued or recognized at work



- PSF importance was normalized to 100% to ensure a better comparability between the two methods
- The PSF rankings obtained with the two approaches are strongly consistent with each other (Spearman correlation coefficient = 0.73; p-value < .001)
- From the 10 PSFs with the highest RIs, a total of **six** were found in common (**in bold**) and thus identified as key for decision making
- These PSFs can also be visually identified from the RI-isocurves

5 Conclusion

- To our knowledge, this is the first study considering jointly the importance of PSFs and their exposure prevalence for decision making in work-related health, using multivariate approaches
- A causal analysis is needed to complete all the results already obtained to identify the drivers of mental health improvement
- These findings have the potential to help improve the quality of life of employee

References :

1. Karasek RA. Job Demands, Job Decision Latitude, and Mental Strain: Implications for Job Redesign. Administrative Science Quarterly. 1979;24(2):285–308
2. Wallard H. Using Explained Variance Allocation to analyse Importance of Predictors. 16th ASMDA, Conference Proceeding. 2015;1043-1054
3. Breiman L. Random Forests. Machine Learning. 2001 Oct 1;45(1):5–32

email: oumou-salama.daouda@lecnam.net