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

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

To cite this version:

Oumou S. Daouda, Laura Temime, Gilbert Saporta, Mounia Hocine. How to prioritize work-related psychosocial factors impacting mental health? Regression and random forest approaches. ISCB 40, Jun 2019, Leuven, Belgium. hal-02471323

HAL Id: hal-02471323
https://cnam.hal.science/hal-02471323

Submitted on 7 Feb 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.
How to prioritize work-related psychosocial factors impacting mental health? Regression and random forest approaches

Oumou S. Daouda1, Laura Temime2, Gilbert Saporta3, Mounia N. Hocine1

1Conservatoire National des Arts et Métiers (le Cnam), MESuRS lab, Paris, France
2Le 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
- 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
   - Random forest (RF) approach
   - Based on variance decomposition Linear context
   - 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

4 Results

<table>
<thead>
<tr>
<th>Rank</th>
<th>#PSF</th>
<th>PSF description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td>Unsatisfactory communication at work</td>
</tr>
<tr>
<td>2</td>
<td>18</td>
<td>Inability to depend on work collaborators</td>
</tr>
<tr>
<td>3</td>
<td>9</td>
<td>Imbalance private and professional life</td>
</tr>
<tr>
<td>4</td>
<td>36</td>
<td>Emotional demands at work</td>
</tr>
<tr>
<td>5</td>
<td>22</td>
<td>No good career prospects</td>
</tr>
<tr>
<td>6</td>
<td>13</td>
<td>Not feeling valued or recognized at work</td>
</tr>
</tbody>
</table>

- 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:
2. Wallard H. Using Explained Variance Allocation to analyse Importance of Predictors. 16th ASMDA, Conference Proceeding. 2015;1043-1054