Development of prediction models for infections using social network parameters in middle-aged and older persons - The Maastricht Study –

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**Background**

- The ability to predict upper respiratory infections (URI), lower-respiratory infections (LRI), and gastrointestinal tract infections (GI) in independently living older persons would greatly benefit population and individual health.
- Social network parameters have so far not been included in prediction models.
- The aim of the current study was to develop and internally validate prediction models for URI, LRI, and GI in a large group of middle-aged and older persons based on a range of variables including social network parameters.

**Methods**

- Data were obtained from The Maastricht Study, a population-based cohort study (N=3074, mean age (±SD) 59.8±8.3, 48.8% women).
- We used multivariable logistic regression analysis to develop prediction models for self-reported symptomatic URI, LRI, and GI (past 2 months).
- We determined the performance of the models by quantifying measures of discriminative ability and calibration.

**Results**

- Overall, 953 individuals (31.0%) reported URI, 349 (11.4%) LRI, and 380 (12.4%) GI.
- The area under the curve (AUC) was 64.7% (95% confidence interval [CI]: 62.6%–66.8%), for URI, 71.1% (95% CI: 68.4–73.8) for LRI, and 64.2% (95% CI: 61.3–67.1%) for GI.
- All models had good calibration (based on visual inspection of calibration plot, and Hosmer-Lemeshow goodness of fit test).
- Social network parameters were strong predictors for URI, LRI, and GI.

**Conclusion**

- Using social network parameters in prediction models for URI, LRI, and GI seems highly promising.
- Such parameters may be used as potential determinants that can be addressed in a practical intervention in older persons, or in a predictive tool to compute an individual’s probability of infections.

<table>
<thead>
<tr>
<th>Social network parameters that were considered useful to be reinforced in intervention programs</th>
<th>Upper respiratory tract infection</th>
<th>Lower respiratory tract infection</th>
<th>Gastrointestinal tract infection</th>
<th>Potential use in intervention programs</th>
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<tr>
<td>Close proximity¹</td>
<td>Beneficial association</td>
<td>Beneficial association*</td>
<td>Beneficial association*</td>
<td>Reinforce relation to close proximity network members</td>
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<tr>
<td>Proportion of same-age network members</td>
<td>Beneficial association</td>
<td>Beneficial association</td>
<td>Beneficial association</td>
<td>Reinforce relation to same-age network members</td>
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<tr>
<td>Practical support/ Informational support</td>
<td>Beneficial association</td>
<td>Beneficial association</td>
<td>Beneficial association</td>
<td>Reinforce practical and informational support from network members</td>
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<td>Total friend contacts per half year</td>
<td>Beneficial association</td>
<td></td>
<td></td>
<td>Reinforce friend contacts</td>
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<tr>
<td>Density between friends and family</td>
<td>Beneficial association</td>
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<td></td>
<td>Reinforce network density</td>
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<tr>
<th>Social network parameters that were not considered useful for intervention programs</th>
<th>Social network size</th>
<th>Emotional support</th>
<th>Proportion of network members who are family members</th>
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<tr>
<td></td>
<td>Detrimental association</td>
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<tr>
<td>Social network size</td>
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<td>Detrimental association</td>
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<td>Emotional support</td>
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<td>Not considered useful to reinforce less emotional support</td>
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<td>Proportion of network members who are family members</td>
<td>Beneficial association</td>
<td>Beneficial association*</td>
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</tbody>
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1Combined Proportions of network members who are household members, Proportion of alters living within walking distance, Proportion of alters living less than ½ hour away by car
* In this model, the reference category showed a positive relationship

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