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.

Upper and lower respiratory tract infection (URI & LRI)

Gastrointestinal tract infections (GI)

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 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 1. Summary of associated social network parameters and indication of their potential use in preventive infection intervention programs

	Upper respiratory tract infection	Lower respiratory tract infection	Gastrointestinal tract infection	Potential use in intervention programs
Social network parameters that were considered useful to be reinforced in intervention programs				
Close proximity[1]	Beneficial association	Beneficial association*	Beneficial association*	Reinforce relation to close proximity network members
Proportion of same-age network members	Beneficial association	Beneficial association	Beneficial association	Reinforce relation to same-age network members
Practical support/ Informational support	Beneficial association	Beneficial association	Beneficial association	Reinforce practical and informational support from network members
Total friend contacts per half year	Beneficial association			Reinforce friend contacts
Density between friends and family	Beneficial association			Reinforce network density
Social network parameters that were not considered useful for intervention programs				
Social network size			Detrimental association	Not considered useful to decrease social network size
Emotional support	Detrimental association			Not considered useful to reinforce less emotional support
Proportion of network members who are family members	Beneficial association	Beneficial association*	Beneficial association	Not considered possible to increase proportion of family members in social network

[1]Combined 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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