



Development of the Immune Status Questionnaire (ISQ)

Van de Loo AJAE^{1,2}, Wilod Versprille LJF¹, Mackus M¹, Kraneveld AD^{1,2}, Garssen J^{1,3}, Verster JC^{1,2,4}

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1. Division of Pharmacology, Utrecht University, Utrecht, The Netherlands
2. Institute for Risk Assessment Sciences (IRAS), Utrecht University, Utrecht, The Netherlands
3. Nutricia Research, Utrecht, The Netherlands
4. Centre for Human Psychopharmacology, Swinburne University, Melbourne, Australia

Background

The self-assessment of perceived immune status is important, as this subjective observation is leading for individuals to decide whether or not to seek medical help or adapt their lifestyle. Current assessments of perceived immune status are conducted with 1-item ratings [1], the Immune Function Questionnaire (IFQ) [2], or various self-composed questionnaires. While a 1-item perceived immune functioning score provides no information about which aspects of immune status may be affected, the disadvantage of multiple item scales is that they are time-consuming to complete. This may be a burden to certain patient populations, and limit their use in clinical practice in which quick and cost-effective assessments are sometimes essential.

Aim

The aim of the current studies was to develop a short Immune Status Questionnaire (ISQ).

Methods

To develop the ISQ, four studies were conducted. Participants were young adults, aged 18 to 30 years old. In Study 1 (N=295), an adjusted version of the IFQ was administered, which was complemented with the items shortness of breath, skin problems, muscle and joint pain, and the common cold. A stepwise linear regression analysis was conducted to identify those items that had a predictive validity of at least 85% with regard to the sum score of all items. These items were combined to form the ISQ. In Study 2 (N=569), the ISQ was compared with the 1-item perceived immune functioning score [1]. In Study 3 (N=291), the original item scoring was compared to a new Likert scale scoring. Study 4 (N=52) was conducted to investigate the test-retest reliability of the ISQ.

Results

Analysis of the data from Study 1 revealed seven items that together comprised the ISQ (predictive validity of 85%): common cold, diarrhea, sudden high fever, headache, muscle and joint pain, skin problems and coughing. The items are scored on a 5-point Likert scale ranging from 0 to 4. The overall ISQ score ranges from 0 to 28, with higher scores indicating a poorer immune status. Study 2 revealed that the ISQ correlated significantly with the 1-item perceived immune functioning ($r = 0.383$, $p = 0.000$). The strongest correlation for individual items was found for common cold ($r = 0.328$, $p = 0.000$). In Study 3, it was shown that using the original scoring categories (never, once or twice, occasionally, regularly and frequently) correlated significantly ($r=0.81$, $p= 0.000$) with the new scoring categories (never, sometimes, regularly, often and (almost) always), and thus could replace them. Study 3 confirmed that ISQ scores follow a normal distribution curve with a mean (SD) of 12.3 (2.7). Study 4 showed that the test-retest reliability of the final ISQ was acceptable ($r=0.80$).

Discussion

The ISQ is a short questionnaire to assess immune status. Future research is needed to further validate the ISQ. ISQ scores should be related to objective markers of immune functioning such as blood cytokine levels, and assessments must also be conducted in healthy people with perceived depressed immune functioning and patients with immune-related disease.

Model	R	R square	Item's predictive validity (%)
Model 1: Common cold	0.675	0.431	43.1%
Model 2: model 1 + Diarrhea	0.770	0.593	16.2%
Model 3: model 2 + Sudden high fever	0.829	0.687	9.4%
Model 4: model 3 + Headache	0.861	0.741	5.4%
Model 5: model 4+ Muscle and joint pain	0.884	0.781	4.0%
Model 6: model 5 + Skin problems	0.902	0.814	3.3%
Model 7: model 6 + Coughing	0.922	0.850	3.6%

Table 1: Stepwise linear regression (Study 1)

The models with the items and their predictive validity with regard to the sum score of all items.

Immune Status Questionnaire

Please indicate how often you have had the following complaints **in the past year**:

	Never	Sometimes	Regularly	Often	(Almost) always
Sudden high fever	<input type="radio"/>				
Diarrhea	<input type="radio"/>				
Headache	<input type="radio"/>				
Skin problems (e.g. acne & eczema)	<input type="radio"/>				
Muscle and joint pain	<input type="radio"/>				
Common Cold	<input type="radio"/>				
Coughing	<input type="radio"/>				

Figure 1: The Immune Status Questionnaire (study 3)

The ISQ consist of 7 representative immune associated symptoms and diseases which are scored a 5-point Likert scale ranging from 0 to 4.

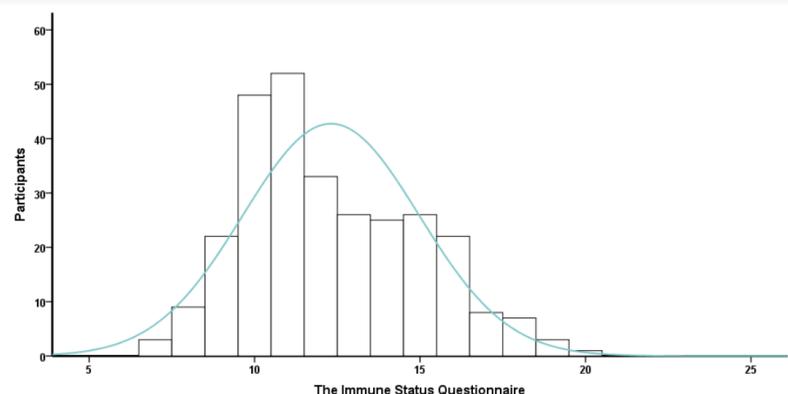


Figure 2: Histogram of the Immune Status Questionnaire (Study 3)

The number of participants is plotted with the subsequent ISQ score, showing a normal distribution score of the ISQ.

References

- [1] Donners, A.A.M.T., Tromp, M.D.P., Garssen, J., Roth, T., Verster, J.C., 2015. Perceived immune status and sleep: a survey among Dutch students. *Sleep Disord.* 2015:721607.
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Disclosure of interest

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