

# GAP-Santé Research Unit

## Research Thrust

### Stress / Stress and Immunity



The general theoretical framework we developed is based on a biopsychosocial model of stress that includes environmental parameters and individual processes of perception and coping with stressors. Developed outside the field of psychopathology, this model is ideal for assessing psychological stress in primary care and population health research. The state of stress depends on the interaction between an individual's environment and his or her representation of that environment. It can result in physical or mental illness through the agency of neuron-immune mediators and depends on various structural or functional vulnerabilities. Stress disorders occur only as a result of stress of great intensity or long duration or when other pathogenic processes are present. Psychological stress is, therefore, a hinge construct associated with both psychological phenomena and factual parameters.

It is well accepted that stress has a detrimental effect on the immune system. Medical evidence supports the hypothesis that individuals suffering from long-term stress are much more likely to demonstrate an associated depression of the immune system. It is also known however, that radiation causes a similar suppression of the immune system. An interesting question is whether or not the systemic changes in the immune system can be profiled and used for the identification of biomarkers of radiation exposure. For this purpose, the difference in the immune system responses to the two variables (radiation and stress) requires further investigation. Can the induced effects by stress and radiation be distinguished based on their immune system profiles?

This research project seeks to answer part of this question by monitoring blood samples from stressed individuals for changes in the immune system proteins.

**The Psychosocial Stress Measure:** First introduced by Hans Selye, the term stress is now widely used to describe a state of tension often seen as being related to modern life. In the context of primary care, a definition integrated into a conceptual model with a validated measurement instrument would help to ensure that this term is used appropriately. This article is designed to provide primary care researchers with a concept, a model, and a psychological stress measurement tool adapted to their context and needs.

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**The Concept of Stress:** Psychological stress concerns the state of “normal” tension, preoccupation, and agitation reported by many people. Sometimes extreme and sometimes an energy booster, its statistical distribution is normal, and it is considered a precipitating factor in the development of various physical and mental disorders. It is, however, different from distress and psychopathology, which are dysfunctional and morbid.

All too often, researchers and clinicians use clinical psychiatric measurement tools (such as the Present State Examination, the Brief Symptom Inventory, or the Beck Depression Inventory) to assess stress. These were designed for pathologic disorders and validated using dysfunctional clinical populations. Their statistical distributions are not normal, and they are not particularly sensitive below the critical diagnostic threshold. In contrast, the concept of stress refers to a set of affective, cognitive, somatic, and behavioural manifestations within the range of functional integrity.

## **Measuring Psychological Stress:**

In our qualitative studies, stress was recognized as a target construct in the process of adapting to life events and circumstances; it appeared socially acceptable. For this reason, it warranted a measurement instrument validated for the specific concept of stress that is reliable, responsive, user-friendly, and economical.

The **Psychological Stress Measure (PSM)** was designed using 49 items drawn from descriptors generated by focus groups on stress. For content validity, we conducted a quantitative analysis of items selected as the best indicators of stress. We then tested for internal consistency, retaining the indicators that had inter-item and item-total correlations of between .35 and .85, a Cronbach a coefficient of approximately .95, and the normality of distribution that is at the core of the definition of the construct. The scale is unifactorial in structure and maintains a test-retest stability of .68 to .80 under apparently constant conditions.

To validate the tool, we compared groups that differed in social and economic status and urban density, school examinations and holidays, and benign and malignant diagnostic biopsies. Convergence validity was established with classic depressive or anxiety scales; divergence validity was established by distinct factorial scores on these measurements. Concomitant validity with immune competency was demonstrated in a double before-after design of school stress and holidays, using salivary immunoglobulin concentrations. The discriminatory power of the PSM was also tested on a clinical sample of patients with schizophrenia and major depression. Finally, the predictive power of the PSM over an 8-month period, with respect to indicators of physical health among child-care workers, was significant.

The PSM’s responsiveness and normality of distribution give it statistical power in analysis, hence its usefulness in research designs. For longitudinal follow-up protocols with repeated measurements, two parallel 25-item versions were developed using the original long version, and each showed a Cronbach a coefficient of .92 and .93.

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For general surveys of health and well-being in the workplace, an abridged 9-item version was developed (Table 1) to meet a variety of research needs and applications. The PSM-9 version is used at Hydro-Québec and Renault (France) as well as in public service, hospitals, community services, and private practice. Having been translated into English, Japanese, Spanish, Portuguese, and Italian, it can be used for international comparisons. It has the same psychometric qualities of reliability, validity, and internal consistency (.89) and maintains the same heuristic value for statistics: normality of distribution and responsiveness.

Psychological stress is an important factor in health, and tools that are generally available are inadequate for studying the “normal” population. We believe, therefore, that the PSM is a critical measurement instrument for those conducting research in family medicine.

- **Lemyre, L., & Tessier, R. (2003). Concept et mesure du stress psychologique. *Médecin de famille canadien*, 49, 1166-1169.**
- **Psychological Stress Measure Manual.**
- **Information sheet**
- **PSM-9 Tool :**  
[http://www.passeportsante.net/fr/VivreEnSante/Tests/Test\\_Msp9\\_Index.aspx](http://www.passeportsante.net/fr/VivreEnSante/Tests/Test_Msp9_Index.aspx)

The Psychological Stress Measure has been used extensively by researchers from various fields examining stress-related topics. Below are some of these publications:

- **Vazquez, E.L. (2001). Risk perception interactions in stress and coping facing extreme risks. *Environmental Management and Health*, Vol. 2 (2): 122-133.**
- **Dion, G., Tessier, R. (1994). Validation de la traduction de l’inventaire d’épuisement professionnel de Maslach et Jackson. *Canadian Journal of Behavioural Science*, 26:210–227.**
- **Brajac, I., Tkalcic, M., Dragojevic, D.M., & Gruber, F. (2003). Role of stress, stress perception and trait-anxiety in the onset and course of alopecia areata. *The Journal of Dermatology*, 30: 871-878.**
- **Nyssen, A. S., Hansez, I., Baele, P., Lamy, M., & De Keyser, V. (2003). Occupational stress and burnout in anaesthesia. *British Journal of Anaesthesia*, 90(3): 333-337.**
- **Ippoliti F, De Santis W, Volterrani A, Canitano N, Frattolillo D, Lucarelli S, Frediani S, Frediani T. (2006). Psychological stress affects response to sublingual immunotherapy in asthmatic children allergic to house dust mite. *Pediatric Allergy and Immunology* 17: 337–345.**