



Scand J Work Environ Health 2003;29(6):407-410

<https://doi.org/10.5271/sjweh.747>

Issue date: Dec 2003

What symptoms can tell about building-related causes

by [Schneider T](#)

Affiliation: National Institute of Occupational Health, Lero Parkalle 105, DK-2100 Copenhagen, Denmark. ts@ami.dk

Refers to the following text of the Journal: [2003;29\(6\):411-430](#)

Key terms: [building-related cause](#); [symptom](#)

This article in PubMed: www.ncbi.nlm.nih.gov/pubmed/14712847



This work is licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/).

What symptoms can tell about building-related causes

“If no one asks me, I know; but if any person should require me to tell him, I cannot” concluded St Augustine of Hippo in the year 397 as he pondered what time really is (1). This statement describes to the letter the feelings of many who try to define the “sick-building syndrome”. For this reason, I put the term in quotation marks. The “sick-building syndrome” is defined by a combination of symptoms, but the combination differs according to the researchers and organizations defining it, and there is no general consensus as to which physical, chemical, biological, and psychosocial conditions, alone or through interactions, are relevant as potential causes. There is punch in the term *sick building* that originated sometime in the 1970s (2) in that it creates the conception that the building should be cured. The term sick building is only used in the health outcome, and exposures have been characterized by the term *indoor air quality* and more recently by *indoor environment quality* to emphasize that there may be causes other than indoor air quality that originate from the building environment. The “sick-building syndrome” is not a disease entity, and it has become common to separate it from the well-defined building-related diseases that are caused by physical, chemical, or biological agents and that can be specifically diagnosed. It has been argued that, as research more and more often identifies such specific causes and re-labels their effects as building-related diseases, the psychosocial component of what remains the “sick-building syndrome” will increase (3). Therefore, when factors associated with the “sick-building syndrome” are reviewed some time in the future and the review shows that, over time, psychosocial factors have begun to dominate, be careful with the interpretation!

Whatever the name chosen for “sick-building syndrome”, it has been explored by researchers from many disciplines, including architecture, engineering, toxicology, medicine, physiology, and psychology, but rarely have all disciplines been represented in the same study. Given the potentially multifactorial associations involved in the “sick-building syndrome”, the studies have often included concepts and terminology from these diverse fields, sometimes with different depth of understanding. Thus an inconsistency in use and a misunderstanding of terms and concepts were bound to occur. This is even the case for the very term *symptom*. Jaakkola (2) noted that, in the medical language, a *symptom* is a *subjective* consciousness of a disturbance in bodily function, whereas a *sign* is *objective* evidence of disease. The term *sign* in English corresponds to the term *objective symptom* in German, and the Scandinavian medical tradition uses *symptom* in both meanings. Jaakkola made the point that studies of the “sick-building syndrome” do not often distinguish between *symptom* (eg, nasal irritation) and *sign* (eg, runny nose), while, on the other hand, eye *symptoms* have, for example, been distinguished from *objective* measurements of tear film stability. He speculated that the means used to collect information (questionnaires, observations, or clinical measurements) determines whether the outcome is denoted as a *symptom* (*subjective*) or a *sign* (*objective*). Many natural scientists have difficulties in accepting the results of questionnaires on the symptoms of the “sick-building syndrome” because *symptom* reports, they say, are *subjective*, and these researchers believe that a major aim of research is to develop *objective methods* that can confirm the associations as found using reported symptoms as outcomes, *objective* meaning “as quantified by clinical or similar methods”. For psychologists it is natural to use questionnaires as a tool with which to study *subjective* phenomena, and a *symptom* (*symptom* used in the sense *subjective*) is, by necessity, a *subjective* phenomenon.

The unclear thinking about what is meant by *subjective* and *objective* is also present in stress research. In his critical review, Kristensen (4) argued that this unclear thinking occurs because the terms

can be used in at least three different ways: (i) to describe *phenomena* (attitudes are subjective, physiological processes are objective), (ii) to describe *methods* (methods influenced by the individual observer are subjective, objective methods reach the same results regardless of the researcher's preference), and (iii) to describe *coherent "knowledge systems"*. Thus a questionnaire study is an *objective method* for studying *subjective phenomena*.

The terms "body perception", "body sensation", and "symptom" are often used interchangeably, and this interchangeability reduces the clarity of presentations. According to a proposed symptom perception model (5), "sensation" refers to the detection of change in somatic information, while symptom implies an evaluation of that sensation as indicative of illness or psychological turmoil. The model consists of the distinct consecutive stages of body attention, detection of somatic information, attribution of sensations to somatic or psychological causes, and experience. The process either proceeds through the individual stages in split seconds or is simultaneous. In addition, when asked about their internal state, respondents tend to report meaningful sensations (ie, symptoms). In practice, it is virtually impossible to measure a body sensation and a symptom separately. However, for the purpose of developing theories for the perception and appraisal process, the two should be treated as distinct concepts (5).

In this issue of the *Scandinavian Journal of Work, Environment & Health*, Wolkoff et al (6) present a timely review of eye irritation. The topic is well chosen for several reasons. Eye irritation is one of the symptoms most frequently reported in relation to work in office-like environments. Compared with other organs, the eye is potentially affected by the largest range of building-related factors, including the physical, chemical, and thermal environments, as well as illumination, the visual task, and ergonomic and psychological factors. Finally, the eye, and the ocular surface in particular, is easily accessible to clinical investigation.

The term "eye irritation" may appear to be well-defined at first sight, but the authors have to conclude that "an operational unambiguous definition of eye irritation does not seem possible [p 413]". They synthesize their findings into a hypothetical physiological model in which blink frequency, destabilization, and break-up of the tear film are inseparable phenomena influenced by specific risk factors. The model offers guidance in planning future studies of eye irritation. It strongly suggests that blink frequency, destabilization, and break-up of the tear film are useful as biomarkers of eye irritation caused by a broad range of risk factors.

Many epidemiologic studies have found that the prevalence of reported eye symptoms is higher for women than for men, and the authors have looked specifically for evidence of physiological gender differences. As they have not assessed confounding in the epidemiologic studies, they are not in the position to suggest the likely fraction explained by physiological differences. This information could have been interesting, as there are gender differences in the perception and appraisal process (5).

Interest in the attention and attribution process leading to exposure reporting and symptom reporting is increasing among "sick-building syndrome" researchers. Self-assessed exposure is an important parameter in studies of the "sick-building syndrome", with implications for the problem identification and solving process. Numerous studies have linked self-assessed exposure with symptoms, as reported by the same persons, and have, all too often, resulted in reporting associations without comments being made on the well-known positive bias caused by this approach. Consider building occupants taking part in an epidemiologic study of eye irritation by filling out a symptom questionnaire. The well-informed occupant will be aware of potential risk factors, and some persons may assume that toxic agents are present in carpets and thus that carpets cause eye irritation. Asking about eye symptoms involves the risk of some persons having an increased tendency to report symptoms if they work in carpeted rooms, because of the perception and attribution process. Vice versa, persons with eye symptoms will often look for a cause of these symptoms and tend to report higher levels of exposure than persons without such symptoms. There are also the "complainers", who tend to overreport, and the "deniers", who tend to

underreport both exposure and symptoms. In the psychosocial literature, associations between self-reported symptoms and self-reported exposures are called “trivial”, and the whole means of studying these associations is called the “triviality trap” (7).

Kristensen (4) critically reviewed the measurement approach in stress research. He particularly addressed the subjectivity-objectivity issue, risk of positive bias in using self-assessed stressors, and stress by the same person. In addition, since it has proved extremely difficult to reach a consensus among researchers regarding the central concepts of stressors, stress, and sickness, Kristensen proposed the use of the principle of triangulation in the assessment of these three concepts. Stressors can be measured through (i) individual assessment, (ii) the average level of homogeneous job groups, and (iii) independent assessment. Stress can be measured by looking at (i) individual perceptions, (ii) physiological markers, and (iii) stress behavior. And, finally, sickness can be assessed by measuring (i) medically diagnosed diseases, (ii) self-reported symptoms and health, and (iii) functional (dis)ability. On the basis of this triple triangulation, Kristensen proposed the 3-S matrix with 45 different combinations of stressors, stress, and sickness and suggested that this matrix could serve as a basis for the collective research effort of researchers in the stress field.

I am convinced that research on the “sick-building syndrome” could benefit from an analogous 3-S matrix approach, and I would like to encourage publications on this issue in the *Scandinavian Journal of Work, Environment & Health*.

References

1. St Augustine. Confessions, Book 11 [translated by RS Pine-Coffin]. Baltimore (MD): Penguin; 1961.
2. Jaakkola JJK. The office environment model: a conceptual analysis of the sick building syndrome. *Indoor Air* 1998;Suppl 4:7–16.
3. Ooi PL, Goh KT. Sick building syndrome: an emerging stress-related disorder? *Int J Epidemiol* 1997;26:1243–1249.
4. Kristensen TS. Job stress and cardiovascular disease: a theoretic critical review. *J Occup Health Psychol* 1996;1:246–260.
5. Gijsbers van Wijk CMT, Kolk AM. Sex differences in physical symptoms: the contribution of symptom perception theory. *Soc Sci Med* 1997;45:231–246.
6. Wolkoff P, Skov P, Franck C, Petersen LN. Eye irritation and environmental factors in the office environment—hypothesis, causes, and a physiological model. *Scand J Work Environ Health* 2003;29(6):411–430.
7. Frese M, Zapf D. Methodological issues in the study of work stress: objective vs. subjective measurement of work stress and the question of longitudinal studies. In: Cooper CL, Payne R, editors. *Causes, coping and consequences of stress at work*. New York (NY): Wiley; 1988. p 375–411.

Thomas Schneider, Co-editor

Scandinavian Journal of Work Environment & Health

