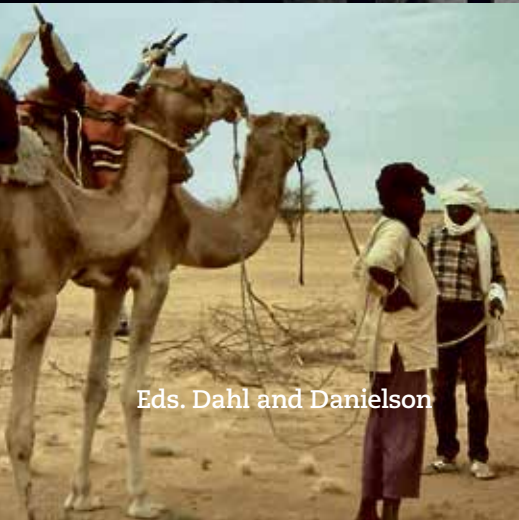




# Faculty of Social Sciences Stockholm University 1964 – 2014



Eds. Dahl and Danielson



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# Stress Research Institute

Torbjörn Åkerstedt

**THE STRESS RESEARCH** Institute was founded in December 1959. The founder was a 29-year old newly-hired intern at the Department of Medicine at the Karolinska Hospital named Lennart Levi. Apart from his medical training, he also brought along ideas from his earlier studies in psychology. He was struck by the lack of interaction between the departments of psychiatry and medicine, despite the apparent need for psychological approaches in medical treatment. So he took it upon himself to bring such interaction about. He put up a small sign on his office door, proclaiming that behind the door resided the “Laboratory for clinical stress research”.

Luckily, the endeavour received moral support from four Heads of Departments, Professors Ulf von Euler (physiology), Börje Cronholm, Henrik Lagerlöf (medicine) and Åke Swensson (occupational medicine). They also provided some support in the form of laboratory assistance. Further support came from the

National Labour Market Board in the form of temporary administrative assistance. The Head of the Board of Labour, Bertil Ohlson, early on realised the value of studying work-related stress.

The budding activity needed offices and laboratories and was at the start permitted to use the light-treatment facilities as well as the staff bathrooms of the Rheumatology clinic. After some time, these facilities were needed for regular hospital activities. The solution was borrowing a small potato field belonging to the Swedish Railways (SJ), close to *Karolinska Institutet*, in combination with a small pavilion set up by the Board of Labour and economically funded by the Swedish Army. Apparently these organisations realised the need for stress research and wanted to help.

With the assistance of the above mentioned organisations and the regular research funding bodies, a number of ground breaking studies were carried out. Many of these were inspired

by the findings of the Nobel Laureate Professor Ulf von Euler and his work on catecholamines. These and other dependent variables were used in laboratory studies on the effects of stressful movies, caffeine, 72-hour sleep deprivation, food restriction and so on. One could probably argue that this work with adrenaline and noradrenaline gave biological/medical support for stress research in general and lent medical respectability to this research area. Besides Levi, Lars Lidberg, Jan Fröberg, Claes-Göran Karlsson and Jan Palmblad are important names during this era. The experimental work was internationally acknowledged. During this time field studies of real-life work conditions also started to come about. Bengt Edgren was one of the key factors here.

In 1972, Levi presented his doctoral thesis 'Stress and Distress in Response to Psychosocial Stimuli – Laboratory and Real Life Studies on Sympathoadrenomedullary and Related Reactions' with Professor Gunnar Ström (Uppsala University) as first opponent and Professor Marianne Frankenheuser (*Karolinska Institutet*) as second opponent. The same year, Levi became docent of experimental psychosomatic medicine, and the following year he received docentship at the Swedish Medical Research Council. At the same time, the laboratory was appointed a WHO collaborative centre for research and training on psychosocial factors and health.

In the 1970s, the laboratory organised five week-long international symposia on 'Society, Stress and Disease' and published the proceedings in five volumes through Oxford University Press. These meetings brought together all the leading researchers of the world in the stress field. They had a profound impact on the field.

During this time new researchers were recruited who came to influence the image of the laboratory greatly. One such was Töres Theorell (MD, PhD) who brought new kinds of field studies to the Laboratory. He pioneered attempts to link psychosocial factors and health. His specialty was cardiology. In his collaboration with Robert Karasek, the two showed that the new concept of 'work demands', or 'work demands in combination with low influence at work', could predict new cases of cardiovascular disease. The combination of demands and influence was termed 'strain', today a very well established concept in psychosocial research and implementation. Also, other combinations of the variables were seen to be of importance. Thus, for example, when high demands occurred together with high work influence, there appeared to occur anabolic/growth effects. This possibility has, however, seen much less research than the high strain approach. These early seminal findings had a great impact on international research concerning psychosocial factors and health. The so-called 'demand/control' index has come

to dominate this type of research and to inspire similar measures, for example, the effort/reward scale.

In the same time interval, another cardiologist was recruited – Kristina Orth-Gomér. One of her foci was social support. Her work with Theorell identified such support as a buffer factor against the effects of stress. Social support, therefore, came to be included in the demand/control/support scale. Orth-Gomér also linked these variables, and sleep, to detailed cardiovascular measures, which came to further support the stress–cardiovascular link. The demand/control model was demonstrated to be related to vascular elasticity, blood lipids and many other indicators of cardiovascular ill health. She also brought women more into focus in this area. Around this time, Torbjörn Åkerstedt was recruited. His central research interests were shift work and sleep. In particular, EEG laboratory studies of the time of day influences on sleep attracted attention, as did field EEG studies of night-driving train drivers, who fell asleep while driving the train.

In 1987, the work of the institute was evaluated by the former chair of the blue-collar workers' union, Gunnar Nilsson, and the Professors Kalle Achté in Helsinki and Björn Folkow in Gothenburg. Their conclusion was that the research was quantitatively and qualitatively impressive. They noted that it had resulted in a high international reputation and was one of

the world's leading units in this important, but difficult to research, area.

At the end of this period, the government took up a suggestion of organising a research institute – The Institute for Psychosocial Medicine (IPM) – reporting to the Ministry of Social Affairs. This government research organisation became administratively linked to *Karolinska Institutet*, (while still being independent). It also remained as the small Department of Stress Research within *Karolinska Institutet* with a shared director (Lennart Levi). This gave IPM an academic connection, which was strengthened by its professors being adjunct professors at *Karolinska Institutet* through this department.

The work at IPM inspired similar processes in the International Labour Organization (a United Nations organization), in collaboration with the American Surgeon General, and in the Soviet Academy of Sciences. In the early 1990s, the European Union followed. In the year of 2000, the European Commission published our work 'Guidance on Work-Related Stress – Spice of Life, or Kiss of Death' in five languages. This was used as a foundation for the general agreement between the social partners and had effects on several hundred thousand employees.

In 1995, Lennart Levi retired at the age of 65 and was succeeded by Töres Theorell, both as the head of IPM and of the Section for Stress Research at the Department of Public Health





The Stress Research Institute, embedded in the lush foliage of Frescati Hage.  
(Photo: Mats Danielson)

Sciences. Since the IPM was a government organisation, it was clearly affected by the developments in Sweden and in the governmental world at this time. The economic crisis during the first years of that decade carried with it cut-downs in the public sector and a number of structural changes in society. This was very obvious in the field research carried out by the institute, and stress increased con-

siderably. One clear trend was also an increase in the demands on reporting from government organisations to the ministries. Luckily, at this time, the IPM was reinforced by a very competent administrative head, Louise Nordenskiöld, who had ended her tour as director general of another government organisation.

The IPM had previously been organised into units for work environment, health care envi-

ronment, social environment, migration and suicide research. Unemployment was a central problem for the government and a special effort was made to organise a ‘field station’ for research in the small city of Falköping, with the intention to study effects and interventions to ameliorate the effects of unemployment. This unit was later turned into an independent organisation with a strong regional input.

There also came about discussions about changing name of the Institute. In particular, the name ‘Stress Research Institute’ was thought both very appropriate and closely reflecting the activities of the Institute. The old name was seen as a bit cumbersome and had difficulties getting established in the minds of the public, media and other government organisations. The board, however, turned this suggestion down because it thought that the stress concept suggested a focus on the individual both in terms in prevention and treatment. It was considered more important to focus on psychosocial processes, that is, on the interaction between the group and the individual.

Another important question that saw much discussion was to what extent the Institute should be focusing on research only or on other tasks more related traditional roles of government organisations (overseeing, information dissemination, etc.). It appeared that the employees considered themselves mainly as researchers and thought that the Institute should

remain a research organisation. It was deemed wise, however, to accept at least one task – to coordinate Swedish research on stress. For this reason, IPM took it upon itself to organise annual meetings for stress researchers. These became very successful and became an important forum for encouraging the exchange of views and knowledge between researchers and practitioners in the field.

Theorell, who had been linked to the Institute since before its inception, was also a professor and section head for stress research at *Karolinska Institutet*. In addition, he was part-time head physician at the occupational medicine clinic at the Karolinska Hospital. This had an influence on a number of activities within the IPM unit for health care research. Clinical studies were focusing on high blood pressure, functional stomach problems, musculoskeletal symptoms, myocardial infarction, and psychiatric disease (including post-traumatic stress). IPM also participated in several governmental studies on work hours and public health work. Several academic as well as popular books were published, also internationally. Researchers from many parts of the world worked at the Institute – from Japan, the US, Canada, Germany, the UK, Italy, Austria, Brazil, Uganda and others.

From the lists of publications it is evident that epidemiology had received a strong position. Many of these were carried out in collaboration

with the Working Life Institute, the Institute for Environmental Medicine at *Karolinska Institutet*, Occupational Medicine at the Karolinska Hospital and others. IPM contributed among other things its established questionnaires for measuring the psychosocial work environment, stress reactions and a set of physiological methods for measuring sleep, blood pressure and hormones (in blood, saliva and urine).

Many of the changes in society also appeared in the scientific publications. This includes the questioned 'Swedish model' effects of reductions in societal support as well as the reluctance in many quarters to discuss psychosocial factors.

Since the usefulness of many government organisations in the early 2000s was questioned, a government group made an analysis of the activity of IPM from 2004 to 2005. The conclusion by the government was to transfer IPM from being a government organisation to being an independent and fully financed unit at a university. Since IPM had been linked to *Karolinska Institutet* and since part of it already formed a section within the Department of Public Health Sciences, the original idea was to transfer IPM to that university. However, the projected budget consequences were extremely negative, because of the financing policies at that university. Therefore, discussions were taken up with the vice-chancellor of Stockholm University. These discussions landed in vastly more positive financial outcomes for IPM. It was thus agreed to

have IPM form a new research institute within Stockholm University.

The transfer was led by Louise Nordenskiöld as temporary head of the Institute (Töres Theorell had retired the year before) and was very successful. Already 9 months after the transfer, the personnel responded in a work environment survey that 84% were positive to the change. Torbjörn Åkerstedt became the new head of the Institute. At this point, the Institute also changed its name to the 'Stress Research Institute' to celebrate and emphasise its new life within Stockholm University. The new name rapidly caught on within the University, the research community and the media.

The first years were characterised by consolidation and refocusing research on the core areas of stress research. It was particularly important to replace the professors that had been lost due to retirement and to *Karolinska Institutet*. It was also important to ascertain the interdisciplinary approach and to bring up psychobiological research as a second pillar besides the dominating epidemiology. The Institute was focused on providing the theoretical bridge between psychosocial factors and biology/medicine in the development of disease. Three units were created: Epidemiology, Sleep and Psychoneuroimmunology.

The present frontline research focuses on stress, work, health and restitution and seeks to understand how various work-related factors



**The seminar room: also a place for unstressing and informal conversations.**  
(Photo: Mats Danielson)

influence health and well-being, as well as to investigate the psychological and biological stress mechanisms that link exposure to risk factors and health outcomes. The research at the Stress Research Institute comprises large-scale epidemiological studies, intensive field studies, brain imaging, and experimental laboratory studies, as well as interventions. A central hypothesis is that excessive stress may interfere with biological restitution during sleep, in turn leading to negative physiological and psychological effects. What aspects of sleep promote recovery? What

is the most problematic aspect of irregular work hours? Other questions concern the long-term consequences of stress. How do retirement and aging interact with stress and health? What defines the feeling of being ill and what are the links to inflammation?

A major event in the development during the last years was the award of 10 year funding for a centre of excellence regarding 'Interdisciplinary research on stress and health' by the Research Council for Work and Social Sciences (FAS, now Forte). The centre was named the



‘Stockholm Stress Centre’, with Torbjörn Åkerstedt as the director. It was initiated in 2009 and has its base at the Stress Research Institute, but also involves organizational/work psychology at the Department of Psychology at the University, as well as the Department of Clinical Neuroscience (the Divisions of Psychology and of Insurance Medicine) plus the Department of Public Health (Division of Occupational Medicine) at *Karolinska Institutet*.

The centre has significantly increased the research collaboration between the Stress Research Institute and *Karolinska Institutet*. There is now intense joint work on stress, sickness absence and disability pension, carried out together with the Division of Insurance Medicine by using the access of important registers provided by that division. Also, burnout and sleep problems are studied, with outcome variables in sickness absence, disability pension, mortality and metabolic diseases.

Two of the professors (Åkerstedt and Lekander) have their own research groups at the Department of Clinical Neuroscience (Division of Psychology). This makes possible major research efforts on sleep physiology as well as immunology and brain imaging. The latter also includes important collaboration with the Department of Psychology at the University (Professor Håkan Fischer) and has resulted in a consortium to address the issue of the ‘sleepy brain’. Other important research partners at

Karolinska are Professors Nancy Pedersen (Department of Epidemiology), Lars-Göran Nilsson (Aging Research Centre), Laura Fratiglioni (Aging Research Centre), and Lars Alfredsson (Department of Environmental Medicine).

Stockholm Stress Centre has also been awarded funding (1 MSEK/year for 3–5 years) for a research school. This school is run in collaboration with the Centre for Health Equity Studies (CHESS) at the University (another FAS excellence centre) and the Centre for Research on Work and Musculoskeletal Problems at Gävle University College. This has a direct effect on the collaboration within the centre as well as the sister centres. It also further raises the quality of overall work in the centre because of the frontline knowledge that can now be disseminated to students through collaboration with leading international researchers that are invited to function as guest teachers for shorter periods.

Long term collaboration outside the SU/KI network also includes Professors Ann Hammarström and Ulf Janlert (Umeå University), with the latter mainly concerning life trajectory research. Our institute also collaborates intensely with the Swedish Road and Transport Research Institute on studies of sleepiness and risk during night-time driving in simulators and on real roads. The collaboration offers internationally unique possibilities of studying sleep, sleepiness and risk.



Former and present directors and co-directors of the Stress Research Institute, depicted at the 50 year jubilee of the Institute: Töres Theorell, Lennart Levi, Louise Nordenskiöld, Hugo Westerlund and Torbjörn Åkerstedt. (Photo: Johan Nilsson)

The Stress Research Institute also has a broad international interface. There is, for example, intense collaboration with the Finnish Institute of Occupational Health, involving important Finnish cohort research such as the Finnish Public Sector Study (Mika Kivimäki, Jussi Vahtera). This is also linked to the network IDEAR (Integrated Datasets across Europe for

Ageing Research) and individual pooled data on work (IPD work). The latter pools data for more than 100,000 individuals and provides unique possibilities for settling major research questions by using extremely large datasets. Our institute also collaborates with the Finnish Institute of Occupational Health on questions regarding sleep and shift work, formalised into

The Stress Research Institute maintains a focus on publishing. (Photo: Mats Danielsson)

the network 'Working Hours in Nordic countries', IWINC. Other important collaboration activities involve Professor Manfred Scherdlowski, University of Essen. He is central in the formation of a European consortium for the study of the effects of inflammation on brain function. Collaboration is also intense with Professor Mike Barnett at the University of South-

ampton in an international project on 'Fatigue risk management at sea'. This also includes the Dalien University (China), the Warsash Maritime Academy (UK) and Professor Jørgen Riis at the University of Southern Denmark.

A research institute within a university should be leading in its field internationally. We believe this is the case for several of our key research areas, and this is evidenced in citations and symposia presentations. Thus, our work on sleep and stress has a world reputation. This is also the case for our work on working time and health, in particular shift/night work. The Institute is also internationally leading in psychosocial work environment epidemiology. Professor Emeritus Töres Theorell is one of the pioneers in the area. The large international collaboration and a unique pooling of research data is very pivotal to this work. The nationally representative cohort study, SLOSH (Swedish Longitudinal Occupational Survey of Health), confirms the leading position of the Institute in this area. The research on psychoneuroimmunology, in collaboration with *Karolinska Institutet* is becoming internationally leading and recently organised the International Congress of the Society of Psychoneuroimmunology (PNIRS) in Stockholm.

In terms of publications, last year's level was 82 original papers (7.5 per PhD). Several of our publications have more than 100 citations and

our researchers are often invited to give keynote lectures and to arrange symposia at international congresses. Our research area and work also receives considerable attention in the public debate. The interest in questions regarding stress, sleep, work hours, and the work environment is extensive. During the last three-year period, the senior researchers of the Stress Research Institute have appeared more than 2,800 times in the media and more than 3,000 individuals have visited us for the Stress Research Day that each year presents our research to the public. The Institute is also consulted for expertise by different government organisations and has contributed to three governmental expert committees in the area of treatment of sleep disorders, effects of stress on sleep, and the effect of psychosocial factors and health. The researchers also participate in teaching at Stockholm University and *Karolinska Institutet*. Recently the Institute, together with CHES, was given the task to oversee the new research education area of public health science.

Most indicators point to an increased lack of labour in many areas in the future. The aging population will necessitate an extension of working life. This is likely to lead to questions of health at work increasing in importance, particularly in relation to the projected extension of the retirement age. Stress related problems will constitute a major part of this development. We believe that our

research area will increase in importance in society. Questions of work environment, work hours, stress, recovery from stress (sleep), aging, retirement and the meaning of health — all will increase in importance. This suggests that external financing should continue at a reasonable level and probably increase. The most important next steps in the development for the Stress Research Institute is to recruit research leaders able to form new research groups and to secure finance for the research activities.

The work of preparing the Stress Research Institute for the future is now led by Professor Hugo Westerlund, who took over as the new director in August 2013, at the end of the appointment period of Professor Torbjörn Åkerstedt.



Levi, Lennart 1972. Stress and Distress in Response to Psychosocial Stimuli – Laboratory and Real Life Studies on Sympathoadrenomedullary and Related Reactions, *Acta Medica Scandinavica*, Supplementum 528: 191.



The staircase of the Stress Research Institute building is decorated with 'Pollen', glass art by the famous Swedish painter Sven X:et Erixson (1956). (Photo: Mats Danielson)





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