

Sound Environment Center at Lund University
- Ljudmiljöcentrum -

Child & Noise

Karin Stjernqvist
Irene van Kamp
Bridget Shield
Jenny Selander
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Kerstin Person Waye
Jonas Christensson
Viveka Lyberg Åhlander
Mette Sörensen

How Does the Child Percieve Sound Environment?



foto: overthewomb.com

AN INTERNATIONAL INTERDISCIPLINARY SYMPOSIUM
Belfragesalen, BMC, LUND, 17/3 2017 9.15- 16.00
Föranmälan

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The Sound Environment Center presents

CHILD & NOISE – an Interdisciplinary Symposium

How does the child experience sound environment?

This interdisciplinary symposium is aimed at shedding light on how the sound environment may affect children spanning from the prenatal stage to the young person enjoying loud music or engaging in other loud activities. We too seldom ask how the child him/herself perceives the sound environment.

The Sound Environment Center at Lund University takes a holistic grasp on childrens' chronological exposure to sound and noise. Research on childrens' exposure to sound and noise today spans over many different disciplines, like audiology, acoustics, logopedy psychology, environmental medicine and neuroscience to name a few. Top researchers from these fields are taking part in this symposium and the child's exposure to sound will be scrutinized both in detail and at meta levels.

Can the background to our noise sensitivity be traced to our early life? Is the fetus affected by its mothers' exposure to external occupational noise? Does it react to musical sounds before birth? Could experiences of music and sound before birth have impact after delivery for the child?

What can brain research reveal about early auditory learning? What do we know of lifecourse effects of early exposure? Experiences of noise levels at preschools? How are the acoustic realities today and what improvements can be made? What about kids with hearing disabilities? How do mobile music players affect young people and finally to what extent can performance and learning be improved by carefulness of soundscape in childhood and youth?

We need to look at the most important gaps in knowledge and research. The above questions will be addressed on the Child & Noise symposium on the 17th of March. Don't miss this opportunity for a memorable day for anybody interested in how sound affects us from the start of life and onwards.

Child & Noise is free and open to anybody interested.

When: March 17th. 9.00 – 16.00

Where: Belfragesalen, BMC, Sölvegatan 19, Lund. (D1539a, floor 15, lift) Entrance Klinikgatan 32!

Cost: free of charge (lunch and coffee included).

Preregistration necessary to projektledare@ljudcentrum.lu.se. Write 17/3 in the subject line. Please register early to be sure of seating.

PROGRAM - Child & Noise, Belfragesalen 17/3 2017

Opening of symposium	9:15
MORNING SESSION	
A short filmclip with comments by Karin Stjernqvist (moderator) prof. em. Psychology, Lund university <i>Birth process and muted light and sound at time of entry to the world</i>	9:20 - 9:35
Jenny Selander PhD, Assistant prof. Institute of Environmental Medicine, Karolinska Institutet <i>Occupational noise affecting stress levels of mother and child</i>	9:35 - 9:55
Mette Sörensen Danish Cancer Society Research Center, Copenhagen <i>Exposure to Road Traffic Noise and Behavioral Problems in 7-Year-Old Children</i>	10:00 – 10:20
COFFEE	10:25 - 10:50 (25 min)
Ulrika Åden prof. Neonatology, Karolinska Institutet <i>The impacts of maternal singing during kangaroo care on mothers and infants - Preliminary Parental singing for preterm infants: brain function and development</i>	10:50 – 11:10
Minna Houtilainen Docent, University of Helsinki and Swedish Collegium for Advanced Study, Uppsala University <i>What electromagnetic brain responses reveal of the fetal and neonatal auditory exposure and learning</i>	11:15-11:35
Irene van Kamp PhD. National Institute for Public Health and the Environment, Utrecht, Netherlands <i>Long-term effects of exposure to noise in (early) childhood: a life-course approach</i>	11:40 - 12:00
LUNCH	12:00 - 12:45 (45 min)
AFTERNOON SESSION	
Kerstin Person Waye prof. Occupational and Environmental Medicine, Sahlgrenska Academy, University of Gothenburg <i>Health implications of early preschool noise exposure</i>	12:45 - 13:10
Viveka L Åhlander Docent. Logopedy, Lund university, Board member of Sound Environment Center at Lund university <i>The classroom as a shared work-environment. On the effects of noise and voice quality on students' comprehension and learning.</i>	13:10 - 13:30
Jonas Christenson Acoustic consultant, Ecophon, St.Gobain, Sweden <i>How room acoustics affect students and teachers</i>	13:35 - 13:55
COFFEE	13:55 – 14:20 (25 min)
Kristofer Hansson Ass.prof. Ethnology, Culture studies, LU <i>Hearing impaired youth, outsidersness versus participation</i>	14:20 - 14:35
Margareta Bohlin Associate professor in Psychology, Gothenburg University <i>Music and risks in an existential and gendered world - A current social challenge</i>	14:40 - 15:00
Bridget Shield prof. em. Acoustics, London South Bank University, Great Britain <i>Effects of noise on children's learning and performance in primary and secondary schools</i>	15:05 - 15:25
DISCUSSION	15:30 – 16:00
Closing of symposium	

Child & Noise – Interdisciplinary Symposium Mars 17, 2017 in Lund

ABSTRACTS

Karin Stjernqvist (moderator in the morning sessions) is professor emerita at Department of Psychology at Lund University.

Karin Stjernqvist has had a position as a clinical psychologist at Department of Neonatology at Lund University Hospital. Her main research fields are:

-Longitudinal studies of cognitive, behavioural and relational outcomes in extremely preterm infants (EPT) from birth to adolescence.

-Interventions to support the cognitive development of preterm infants.

-The impact the birth of a preterm infant has on parents and siblings.

Jenny Selander Assistant Professor, Unit of Occupational Medicine, Institute of Environmental Medicine, Karolinska Institutet Jenny.Selander@ki.se

Occupational noise exposure during pregnancy and health effects in the mother and child

Many women are occupationally active during pregnancy in Sweden, however it is still not fully understood how occupational exposures affect the health of the mother and child. The Swedish Work Environment Authority show that approximately 15-20% of women in childbearing ages in 2013 were exposed to noise level so loud that they could not have a normal conversation. High noise levels can affect the mother, but noise is also transmitted from the air over the abdominal wall and the uterus to the fetal head during pregnancy, potentially affecting the unborn child. This presentation will give a summary of the published studies so far regarding occupational noise during pregnancy and health effects in the mother and child. In addition, a presentation of the ongoing large-scale Swedish cohort study on occupational noise during pregnancy and health effects in the mother and child will be made.

Dr. Docent **Minna Huotilainen**, University of Helsinki and Swedish Collegium for Advanced Study, Uppsala University,
minna.huotilainen@swedishcollegium.se

What electromagnetic brain responses reveal of the fetal and neonatal auditory exposure and learning

Brain responses recorded with electric (ERP and EEG) and magnetic (ERF and MEG) methods reveal that the human fetal and neonatal brain is inclined towards learning from sounds. The auditory input to the fetus and neonate contain plenty of information and statistical and memory-related learning has been shown to occur during the last trimester of pregnancy and in infancy. Such learning is crucial for the later development of language

skills, the precedents of which are observed already in the new-born infant. The initial auditory processing is universal, i.e., not specific to any language, but the learning patterns turn the auditory processing quickly towards preferring the acoustic input crucial for the native language perception. This paper discusses the possible effects of noise during the fetal period when pregnant women are exposed to structured, repeated noise like that of machines at work. In addition, the exposure and learning of auditory content in prematurely-born infants residing in different types of hospital wards is discussed. Evidence from human and animal models show that auditory input is crucial for the normal development of the auditory system in this fragile and malleable phase. Brain plasticity, allowing the auditory system to develop language-specific memory traces needed for fast and accurate perception of the native language, has its caveats - in a non-optimal noisy environment without speech sounds and other human voices, the plasticity may adapt the auditory system networks towards non-optimal directions. Implications of these findings are discussed and key factors for an optimal sound environment for fetal and neonatal development is proposed.

Ulrika Åden, professor in Neonatology, senior consultant, Karolinska Institutet and Karolinska University Hospital, Dept of Women´s and Children´s Health Karolinska Institutet Sweden, Ulrika.Aden@karolinska.se

The impacts of maternal singing during kangaroo care on mothers and infants - Preliminary Parental singing for preterm infants: brain function and development.

Parental voices provides an important source of sensory stimulation for the fetus during a vulnerable period of development of the auditory system in the last trimester of pregnancy (Partanen 2013). It has been suggested that disruption of exposure to the maternal voice in preterm infants adversely affect language development (Krueger 2010).

Benefits of music therapy, including maternal singing (Filippa 2013) in neonatal intensive care settings have been described for heart rate variability, behavior state, oxygen saturation, sucking/feeding ability, and length of stay (Standley 2012),

Children who are born very or extremely preterm are at risk for developmental delay including language delay. Standard care for preterm born in many countries includes skin to skin care and this ongoing study aims at studying the effects of parental singing during skin to skin care on the development of the auditory system of infants who were born preterm at less than 32 weeks. The intervention families get music therapy sessions to promote parental singing during skin to skin care. Control families get standard instruction for skin to skin care. Duration of singing and skin to skin care are recorded in diaries and validated by LENA recordings. Parental anxiety and depression is evaluated by questionnaires. At term equivalent age, we use a specific multi-feature mismatch negativity stimulus paradigm to study the auditory responses with evoked response paradigms and magnetoencephalography to semantic and prosodic speech changes. Attachment and language will be evaluated at toddler age. We will present preliminary data at the conference.

Mette Sørensen, Senior researcher, Danish Cancer Society Research Centre, Copenhagen, Denmark, mettes@cancer.dk

Exposure to Road Traffic Noise and Behavioral Problems in 7-Year-Old Children

We investigated associations between exposure to residential road traffic noise and behavioral problems in 7-year-old children, within a national birth cohort of 46,940 children. For all children we obtained complete address history from conception to 7-years of age, and modelled road traffic noise at all addresses. Behavioral problems were assessed by the parent-reported strengths and difficulties questionnaire (SDQ). For the hyperactivity / inattention subscale we found a 10-dB higher road traffic noise exposure during childhood to be associated with an increase in risk for being borderline of 5% (1.00, 1.10) and abnormal of 9% (95% CI: 1.03, 1.18). Exposure to road traffic noise during pregnancy was not associated with behavioral problems. In conclusion, road traffic noise may be associated with behavioral problems in children.

Irene van Kamp

Dr. National Institute for Public Health and the Environment in the Netherlands, irene.van.kamp@rivm.nl

Long-term effects of exposure to noise in (early) childhood: a life-course approach

Health in a life course perspective acknowledges the cumulative effects of events that occur across the lifespan and includes intergenerational effects. Life course is subdivided in different life phases and usually these are based on age and developmental stages. In some life phases people are more susceptible for environmental health effects than in others - so called sensitive periods. It is also possible that health effects of a sensitive period are co-affected by factors during later phases. In that case we speak of a domino effect. The living environment (including noise) can negatively and positively affect people's health. Most studies have focused on negative effects and it is only recent that positive effects are studied. Vulnerable or susceptible groups are mentioned in most reviews regarding noise and health, but only a few studies address this issue in a concrete and focused way. Groups at risk most often mentioned in the literature are children, the elderly, the chronically ill and people with a hearing impairment. Other categories encountered are sensitive persons, shift workers, people with mental illness (e.g., schizophrenia or autism), people suffering from other hearing related symptoms, and fetuses and neonates. This paper reviews the existing knowledge on how children's short and long term health and cognitive development are affected by noise in the home and school environment. A preliminary framework will also be presented.

Kerstin Persson Waye

Professor Occupational and Environmental Medicine, The Sahlgrenska Academy, Gothenburg, kerstin.persson.waye@amm.gu.se

Health implications of early preschool noise exposure

At pre-schools personnel and children are known to be exposed to high sound levels. Annoyance, tiredness and hearing related symptoms such as sound fatigue, hyperacusis among the personnel are reported, while less is known about how children are affected. This presentation will give a summary of our findings of perception, reaction and response to sounds in the preschool environment as experienced by 4-5 years old children. The personnel perspective on how children may be affected by noise will also be described. Apart from implications on every day symptoms and wellbeing, hearing may be affected. This risk will be discussed in relation to exposure, children specific hearing and the risks found among the personnel.

Viveka Lyberg- Åhlander

Ass. Professor. Reg. Speech Language Pathologist, Logopedics, Phoniatics and Audiology, Lund University mailto:viveka.lyberg_ahlander@med.lu.se

The classroom as a shared work-environment. On the effects of noise and voice quality on students' comprehension and learning.

The spoken word is the major means of communication in the classroom. The teaching profession is acknowledged as an occupation with high vocal demands and a heavy voice load. The classroom is a shared work-environment for teachers and children. Back-ground noise and adverse room acoustics have been shown to affect both teacher's voice and listeners' memory. The child's perception of the speaker's voice-quality and the possible consequences for comprehension and learning has however, been scarcely researched. The presentation will cover reports from a larger, ongoing project about the impact of teachers' voices on children's performance on language comprehension tests and, also of their attitudes towards normophonic and dysphonic voices. Further, a newly started project will be presented; targeting development of training modules for teacher education. The aim is to train voice and communication and understanding of the sound environment and thus to increase awareness of the impact of these aspects on children's learning.

Jonas Christensson, Concept Developer, Saint-Gobain Ecophon, Sweden
<mailto:Jonas.Christensson@ecophon.se>

How room acoustics affect students and teachers

As an engineer with great interest in how different sound environments affect students and teachers, Christensson has studied how room acoustics affect the pupil's ability to understand what the teacher says, and how it affects the teacher's way to talk. Unfortunately the sound environment in many schools is so bad so it becomes an obstacle for good teaching and learning.

The effects of bad acoustics are students with bad school results and teachers with voice problems. The presentation will not only be about bad acoustics, but will also show examples and explain what we have to do to create the best acoustics for students and teachers.

If we want to build school buildings with good working environment for students and teachers, we need money. For a country it is a very good investment to improve the sound environment in schools. Too few politicians understand that the value of good acoustics is higher than the cost.

Kristofer Hansson

Associate Professor, Ethnology, Department of Arts and Cultural Sciences, Lund University kristofer.hansson@kultur.lu.se

Hearing impaired youth, outsidership versus participation

*In this presentation I present an ethnological perspective on hearing impairment for the young in relation to sound environments. Sounds are never disconnected from their contexts, but instead a part of the environments around the individual. In this way sound also varies from one place to another. Focusing on sound environments provides possibilities for unique critical perspectives on the social implications that places can have for young people with hearing impairments. In a recently published anthology *Ljud tar plats (Sound Occupies Space)* ethnological and sociological perspectives on sound environments were presented and problematized. I will discuss problems and findings from the research group behind the book.*

Margareta Bohlin

Associate professor in Psychology, Institution for Social and Behavioural Sciences, University West, Sweden margareta.bohlin@psy.gu.se

Music and risks in an existential and gendered world

- A current societal challenge

The speech will draw from multi-methodological studies using statistics, phenomenological and critical discourse analysis. People of all ages participate in activities that can pose a risk to their health, for example being exposed to high sound levels in musical settings. However, it is important not only to see risks as threats, but also something that can enhance positive experiences and opportunities. The media has a vast influence on young people and thus there are good reasons to investigate how risks and risk-taking are portrayed. The human identity is constructed from self-experiences, but also through the different public discourses that are present in the media and in everyday speech and attitudes.

For adolescents in particular, contact with the media affects their lives and the development of their identity. Results show that young women judge risk situations, including risks in musical settings, as generally more dangerous than young men, although they behave in the same way as the men. An analysis on "Social identity" and "Existential identity" of risk taking among young women and men reveals that interviewees' express social (gender) - and existential considerations which affected them in many areas of their daily lives.

Also, studies on risk discourses in media show the importance of discussing the discourses media create and reproduce, and that all levels of society need to take responsibility for what risks are reported, how and, by whom. Media can reproduce outdated gender roles and may

obstruct equal opportunities for young people. Studies concludes that risk taking among young people is discursive, gendered but also contributes to existential meaning. Awareness about this could have impact on young peoples' opportunities to create balanced and conscious attitudes to risks and the activities they involve in.

Bridget Shield, Professor Emerita of Acoustics
The School of the Built Environment and Architecture
London South Bank University, London, UK
shieldbm@lsbu.ac.uk

THE EFFECTS OF NOISE ON PUPILS IN PRIMARY AND SECONDARY SCHOOLS

The paper will provide a brief general review of the results of research carried out since the 1960s which has shown that noise in classrooms affects children's performance in verbal and non-verbal tasks, and also causes annoyance and distraction to pupils. More detailed results of research carried out by the Acoustics group at London South Bank University since 1999, in collaboration with the Institute of Education and the University of Salford, will then be presented. The research has involved several projects studying different aspects of the effects of noise and poor acoustic design on pupils and teachers in both primary (aged 5 to 11) and secondary (aged 11 to 18) schools in England. In all the schools studied questionnaire surveys of pupils have shown that they are annoyed by noise and that it has a detrimental impact upon their ability to hear and understand their teachers. The effects of noise on pupils' academic performance has been investigated by comparing noise levels with primary school scores in standardised tests, and by experimental testing of primary and secondary school pupils in quiet and noisy conditions. The research results show that noise has a negative impact upon the performance of pupils of all ages, in all subjects, the impact being most marked for pupils with additional learning needs.

Child & Noise - Speakers

Karin Stjernqvist (moderator morning sessions)
Prof. em. Psychology, Lund university

Jenny Selander

PhD, Assistant prof. Institute of Environmental Medicine, Karolinska Institutet

Minna Houtilainen

Docent, University of Helsinki and Swedish Collegium for Advanced Study, Uppsala University

Ulrika Åden

prof. Neonatology, Karolinska Institutet

Mette Sörensen

Senior Scientist at Danish Cancer Society, Copenhagen, Denmark

Irene van Kamp

PhD. National Institute for Public Health and the Environment, Utrecht, Netherlands

Kerstin Person Waye

prof. Occupational and Environmental Medicine, Sahlgrenska Academy, University of Gothenburg

Viveka L Åhlander

Docent. Logopedy, Lund university, Board member of Sound Environment Center at Lund university

Jonas Christenson

Acoustic consultant, Ecophon, St.Gobain, Sweden

Kristofer Hansson

Ethnology, Culture studies, LU

Margareta Bohlin

Associate professor, Psychology, Institution for Social and Behavioural Sciences, University West, Sweden

Bridget Shield

prof. em. Acoustics, London South Bank University, Great Britain

