

Acoustics and psychological well-being in built environments

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Abstract

It is well known that acoustics has significant influences on people's health, comfort and psychological well-being in built environment. In particular, noise might cause a number of health problems such as cardiovascular disease. This presentation deals with a series of field and laboratory studies concerning the impact of acoustics on health and well-being. Firstly, the effects of soundscape on psycho-physiological restorations in simulated environments were investigated. Ten horror videos were used as stressors and five videos depicted urban or rural soundscapes as restoration stimuli. The stimuli were presented in VR and non-VR environments. Psychological restoration was measured by subjective ratings of each restoration stimulus, while five physiological responses (e.g., fEMG and HR) were also recorded throughout the experiments. It was found that the rural soundscape led to a better psycho-physiological restoration than the urban soundscape in both VR and non-VR environments. In particular, the water soundscape which contained the visual presentation of a flowing water stream with the presentation of water sounds evoked the greatest restoration. The sound presentation had significant impacts on all the measured psychological restorations but it showed an impact on only one physiological response, fEMG of the zygomatic muscle. Secondly, the effects of transportation noise exposure on blood pressure in residents of multi-storey residential buildings were examined. Noise levels were measured on the top of buildings for 24 hours, and levels of each house unit were then predicted for different sources and periods using noise maps. Adjusted linear regression analyses were performed to estimate the associations of noise exposure levels (LDEN, LDay, and LNight) with systolic blood pressure (SBP) and diastolic blood pressure (DBP). Overall and road traffic noise showed stronger associations with SBP than with DBP, whereas railway noise had slightly stronger associations with DBP than with SBP. Noise-sensitive group and persons who reported higher indoor noise annoyance ratings had significantly greater SBP and DBP than others. Furthermore, the exclusion of participants exposed to high railway noise elevated the associations between noise exposure and SBP.

Keywords: *Acoustics, well-being, noise, health, blood pressure, virtual reality*

Biography

Pyoung Jik is a Lecturer (Assistant Professor) in the Acoustics Research Unit, School of Architecture at the University of Liverpool since January 2014. He completed a PhD in Architectural Acoustics from the Hanyang University in Korea. Then he was a postdoctoral researcher at the Institute of Sound and Vibration Research (ISVR), University of Southampton and Swiss Federal Laboratories for Materials Science and Technology (EMPA).