Low outdoor temperatures and its association with noise exposure and stress in the preschool

PhD. Fredrik Sjödin, Department of psychology, Umeå university, Sweden

INTRODUCTION

Noise exposure in preschool has been shown to be problematic not only due to the risk of developing an hearing impairment or tinnitus but also in the way it may interfere with the pedagogic work that is being carried out (Sjodin, 2012).

Furthermore, studies have also shown that high noise levels in the preschool may have a negative on the mental wellbeing of the employees (Grebennikov & Wiggins, 2006). This effect may not only be due to the problematic characteristics of the noise itself but also in the way it interferes with verbal communication. However, the long term consequences of long time noise exposure in combination with high levels of stress in the preschool are far from clarified.

It is assumed that employees in preschools are exposed to the highest noise levels while working indoors. More outdoor working hours is therefore preferable in order to reduce noise exposure and experienced stress.

An important factor for working outside with children is temperature. Low outdoor temperatures may lead to more indoor working hours, thus higher noise exposure and in turn high stress levels.

AIM

The hypothesis of this study was that lower outdoor temperatures will have a negative impact on the indoor noise exposure and stress levels of the employees.

METHODS

PARTICIPANTS

The study included 89 employees at 17 preschools in the northern part of Sweden during the six coldest months of the year.

SOUND LEVEL MEASUREMENTS

Noise exposure was measured during all work hours for one week at two departments at each preschool. Noise levels were recorded with stationary recordings using Brüel and Kjaer 2260 sound level meters (dining rooms and play halls) and personal carried noise dosimeters (Brüel and Kjaer 4445 and Larson Davies 706-Atex).

EXPERIENCED STRESS

Stress was evaluated by use of the Stress-Energy questionnaire (Kjellberg & Wadman, 2002). The questionnaire uses a scale from 0 (not at all) to six (extremely). The participating employees filled out the questionnaire at 11 am at work in the middle of the work week (Wednesday).

CORTISOL

Stress was also evaluated by analyses of cortisol from saliva samples. The saliva sample was collected at 11 am at work in the middle of the work week. Cortisol concentration was measured from this saliva sample as an indicator of elevated stress levels.

TEMPERATURE

Temperature data was collected each day at 10 am and 3 pm from a weather database at Umea University.

AUTHOR
PhD. Fredrik Sjödin, Department of psychology, Umeå university
E-mail: fredrik.sjodin@psy.umu.se

RESULTS

NOISE LEVELS AND TEMPERATURES

A significant correlation (r = -0.16, P = 0.03) was observed for lower outdoor temperature at 3 pm and increased equivalent sound levels in the play halls (Figure 1). No significant correlations were observed for the dining rooms and the personal noise dosimeter recordings at any time point.

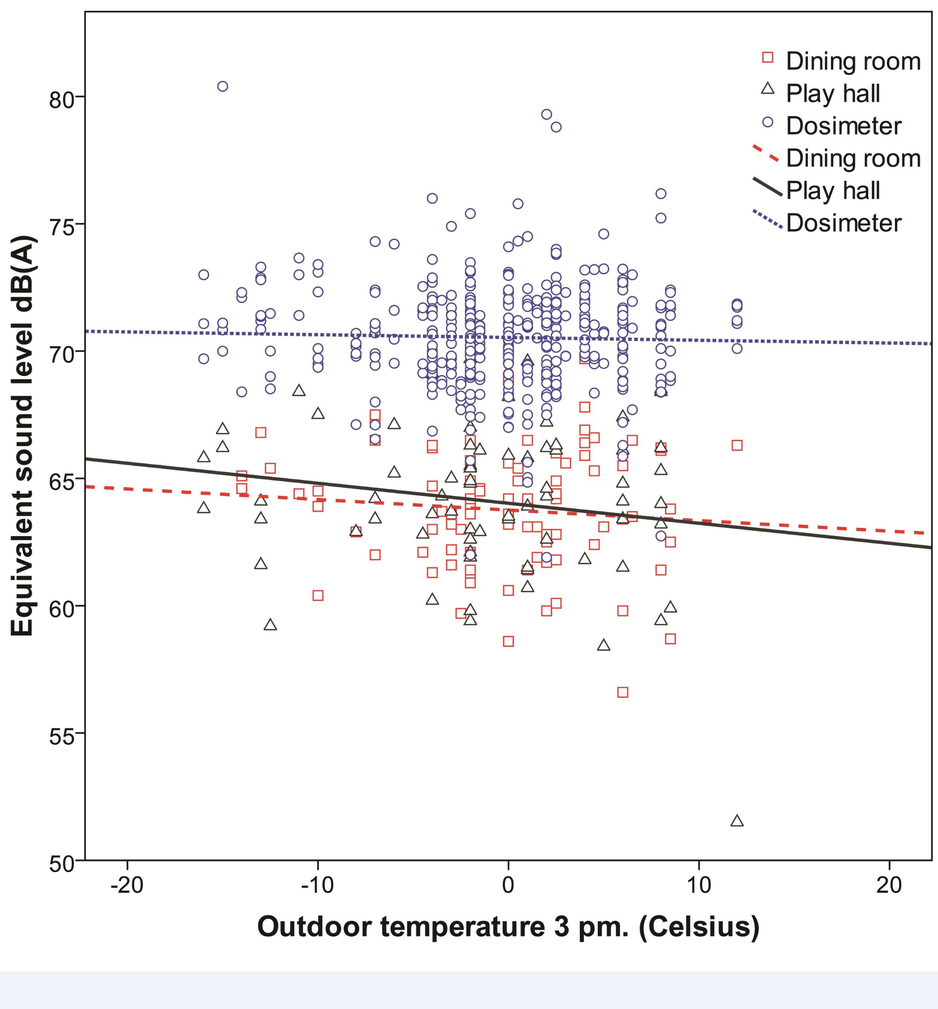

Figure 1. Correlations for outdoor temperature and sound levels.

STRESS AND TEMPERATURES

No significant correlation was observed for subjective rated stress at 11 am and outdoor temperature at 10 am. Neither was no significant association found for cortisol levels at 11 am and outdoor temperature ate 10 am.

The participants were categorized into four different temperature groups on Wednesday (Table 1). ANOVA analyses revealed that employees with an outdoor temperature colder than -10 ^{0}C at 10 am rated their experienced stress at 11 am significantly higher compared to employees having an outdoor temperatures warmer than -10 ^{0}C $F(3, 81) = 3.2$, $P = .03$. No group differences were observed regarding cortisol levels. No association between outdoor temperature at 10 am and cortisol levels at 11 am were observed.

	Colder than -10 ^{0}C	Between -10 ^{0}C and 0 ^{0}C	Between 0 ^{0}C and 10 ^{0}C	Warmer than 10 ^{0}C
Rated stress	3,1	2,2	2,8	2,1
Cortisol levels	3,3	4,2	3,1	3,4

Table 1. Rated stress and cortisol levels separated by temperature group.

CONCLUSIONS

The results indicate that outdoor temperature may have an impact on the working environment regarding increased noise levels and experienced stress. It is also likely that the negative effect seen for experienced stress, with lower temperatures in the morning, is the result of the unplanned changes in the pedagogical work due to a shift from outdoor activities to indoor activates with the children.

However, it is likely that temperatures colder than -10 ^{0}C is needed to force a change from planned outdoor activities to indoor activities with the children. The rather weak results for both sound levels and stress may also be the results of rather few days with temperatures colder than -10 ^{0}C.