공동주택 바닥충격음 성가심 반응에 대한 비음향학 요인 영향

Impact of non-acoustic factors on annoyance caused by floor impact noise

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Key Words : 성가심(annoyance), 비음향요인(non-acoustic factor), 구조방정식(structural equation modelling).

ABSTRACT

This study aims to understand how residents in apartment buildings perceive and react to impact sounds from their neighbours. A conceptual model was developed based on existing studies on environmental noise and recent qualitative research on floor impact noise. Survey was then conducted to test a conceptual model using structural equation modelling. It was found that annoyance was strongly related to disturbance, coping, and self-reported health complaints. In addition, noise sensitivity influenced disturbance and a negative attitude towards neighbours moderated the relationship between annoyance and coping.

1. Introduction

Majority of previous studies on floor impact sound have mainly focused on the acoustic features in terms of spectral characteristics, sound quality metrics, autocorrelation function, and the magnitude of interaural cross-correlation [1-3]. However, previous studies [4, 5] reported that noise annoyance is affected by various non-acoustic factors as well as acoustic components. Therefore, it is vital to investigate the influences of non-acoustic factors on annoyance caused by floor impact noise.

2. Methods

2.1 Conceptual model

As shown in Figure 1, a theoretical framework was constructed to explain the relationships among non-acoustic factors and annoyance caused by floor impact noise based on the literature review [6, 7] and the hypotheses. There are a total of six factors; noise sensitivity, disturbance, annoyance, health complaints, coping, attitudes towards authorities, and closeness with neighbours.

2.2 Sample and measurement

Online surveys were conducted in Korea through Google Form and 487 valid questionnaires were collected. About 67% of the respondents were female while 33% were male. The questionnaire consisted of latent variables in the theoretical framework and they were evaluated using 5-point scales ranging from 1 (“Not at all”) to 5 (“Extremely”).

2.2 Statistical analysis

In the present study, the structural equation modelling (SEM) was employed to test the theoretical framework. There are different types of software for the SEM but in the present study, we used AMOS version 22.0.

3. Results

The results of confirmatory factor analysis (CFA) confirmed that internal consistency exists, and the

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model's construct validity was good. All factor loadings were greater than 0.6 and AVE (Average Variance Extracted) values were also greater than 0.5.

As shown in Figure 1, four paths were statistically significant ($p<0.01$). It was found that noise sensitivity positively affected disturbance, and perceived disturbance was positively associated with noise annoyance. Noise annoyance significantly affected both coping and health complaints, and the standard estimates of these relationships were all positive. These results show good agreement with previous studies on environmental noises [6, 7]. However, two attitudinal variables (attitudes towards authorities and closeness with neighbours) had no significant impacts on coping.

4. Conclusions

This study confirmed that the conceptual models develop for environmental noises can be applicable to understand perception of floor impact noise. It was observed that noise sensitivity, perceive disturbance, coping and self-rated health complaints are significantly related to noise annoyance However, the present study focused on only floor impact noise; further empirical studies are required to examine whether the conceptual model is valid for other building noises.

Acknowledgments

Research funding was provided by a grant from the Residential Environment Research Program funded by the Ministry of Land, Infrastructure and Transport of the Korean Government (15RERP-B082204-02).

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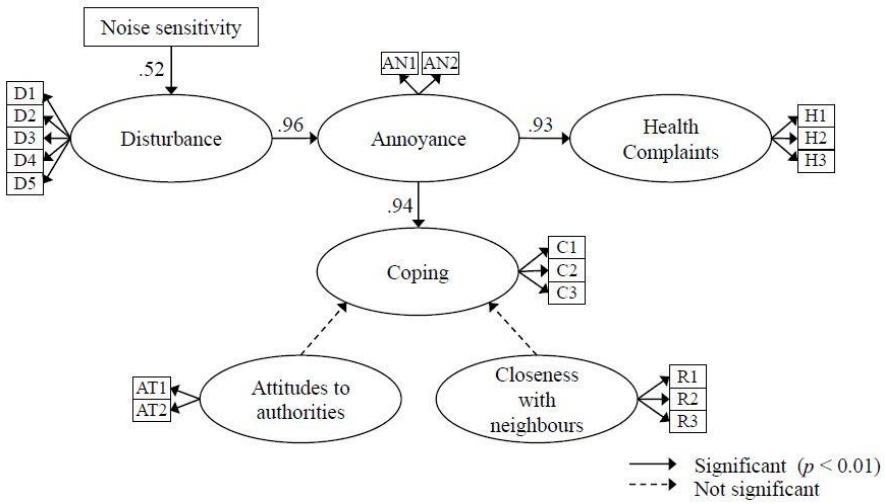

Figure 1. Conceptual model and estimates calculated from SEM analysis