



KEY POINT SUMMARY

OBJECTIVES

This research focused on elderly residents' evaluation of their acoustic comfort using site observation, sound measurements, and a questionnaire conducted in an activity hall in a nursing home in Harbin, China.

Acoustic environment of comprehensive activity spaces in nursing homes: A case study in Harbin, China

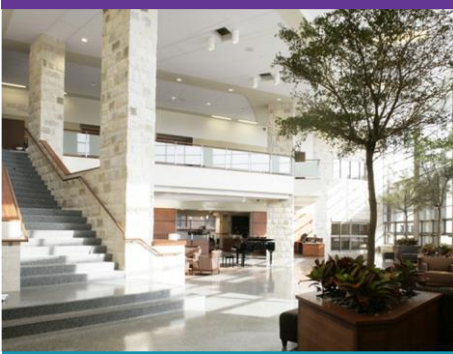
Mu, J., Kang, J., Wu, Y., 2021 | Applied Acoustics, Pages in press, Volume 177

Key Concepts/Context

Research demonstrates that older adults are disproportionately vulnerable to contextual stimulus than their younger counterparts. Little research has evaluated, however, the harmful side effects that unsupportive acoustic environments, comprised of indoor- and outdoor-generated sounds, have on the most vulnerable elderly living in residential care settings. The results of this study suggest that residents' perception of and comfort with sounds are influenced by proximity to, engagement in, and personal preference for different types and intensities of sounds.

Methods

This study used a questionnaire, video observation, and acoustic field measurements to collect relevant data within three areas of an activity hall (a quiet area, rest area, and activity area) in a residential care facility in Harbin, China. Sounds in the hall were divided into five categories: activity sounds, speech sounds, machine sounds, background music, and foreground music. Acoustic comfort was measured by objective room acoustic parameters 10 times per hour between 8:00 a.m. and 6:00 p.m. from a minimum of five different points at least 9'10" (3 m) apart in each area. Simultaneously, sound level meter instant readings were taken every 10 s after each questionnaire was completed. Residents who stayed in the activity hall for 30 minutes or more were recruited for participation, resulting in questionnaire administration to 320 of the 384 total residents. Questionnaires completed by 307 residents used a 7-point Likert-type scale to evaluate the overall sound environment: 1) Acoustic comfort of overall sound environment, 1 "very uncomfortable" to 7 "very comfortable"; 2) Subjective impression of reverberation, 1 "very long" to 7 "very short"; 3) Acoustic comfort of various sound sources, 1 "very uncomfortable" to 7 "very comfortable"; 4) Loudness of various sound sources, 1 "very low" to 7 "very high"; 5) Intelligibility of various sound sources, 1 "very clear" to 7 "very unclear"; 6) Noise level of various sound sources, 1 "very noisy" to 7 "very quiet".



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quiet”; and 7) Preference for various sound sources, 1 “highly disliked” to 7 “highly liked”. Video recording and observation took place for the duration of the survey. sound pressure level. The measured data were sorted and analyzed statistically.

Findings

In general, the participants evaluated the acoustic environment in the activity hall with a low rating. The sound pressure level (SPL) measurement found that its two peaks in the event hall were within one hour: before lunch and dinner. When the reverberation time exceeded 4 s and the SPL exceeded 65 dB(A), the acoustic environment evaluation declined.

Regardless of types of sound, the elderly residents’ evaluation of their satisfaction with the acoustic environment declined as SPL increased; however, the decline in their evaluation of music was slower than for other sound types, and their satisfaction and preference for music sounds were higher than for other sound types. The questionnaire found that speech sound had the greatest impact on the elderly; thus, this score was the lowest.

For the same sound source, a relatively noisy area had a slightly higher tolerance and higher-rated evaluation of sound than the relatively quiet area.

The respondents preferred (near-) silent activities, while the sound evaluation of low-dB(A) and high-dB(A) activities depended on both the degree of participation in the activity and personal preference..

Limitations

While the study measures and approach are promising for replication in other settings, the study was performed within a limited time-frame in a care setting that accommodates 384 occupants. This may not be representative of the day-to-day acoustic environment and may compromise the generalizability of outcomes to other smaller scale care settings. Furthermore, acoustic preferences may be culturally informed.

Design Implications

The results imply that older adults were unbothered by mechanical sounds in the activity hall, since they were less sensitive to them and the low frequency did not influence them. The foreground music score was the highest, and so it appears that proper music provision can help improve elderly people’s evaluation of an acoustic environment. If used, this style is “Number.”



And Also...

The authors provide floor plans with hourly acoustic heat maps to help the reader understand the acoustic environmental performance between 8:00 a.m. and 6:00 p.m.

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