



KEY POINT SUMMARY

OBJECTIVES

Researchers examined the impact of different soundscapes on physiological measures, sound preference, and overall individual comfort in residents at a senior care center in China.

Impact of the soundscape on the physical health and the perception of senior adults in senior care facilities

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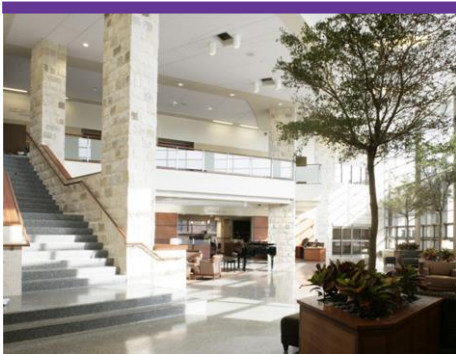
Key Concepts/Context

Research shows that conditions of the indoor environment can affect human perception, satisfaction, and health. Senior adults tend to spend more time indoors such that the soundscape of the indoor environment (acoustics), may influence their health. Undesired or loud sounds (noise) may be a health-limiting disturbance with consequences such as increased blood pressure, whereas pleasant sounds (music) have been linked to decreased blood pressure.

Methods

This study was conducted with residents at the Shenyang Municipal Senior Care Service Centre in Shenyang City, Liaoning Province, China. Inclusion criteria for participation were: minimum age of 60 years, adequate health and mental state to understand research purpose and questions, and no reported health condition or medication regimen that may affect results or cause safety issues during the experiments.

Researchers first assessed resident hearing status and then grouped participants by severity of hearing impairment. Each resident was positioned in a sound treated room and presented with five common soundscapes in random order: conversation, traffic noise, piano music, sports sounds, and entertainment sounds. Each participant took part in five 8.5-minute sessions (one per soundscape). Each session began with 30 seconds of relaxation, 2 minutes of baseline physiological measurements, 4 minutes of exposure to the respective soundscape while physiologic measurements were repeated, and 2 minutes of relaxation. After two minutes of rest, participants completed a questionnaire collecting information about demographics, sound preference, and acoustic comfort using a 7-point Likert-type scale where 1= very uncomfortable and 7= very comfortable.



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During each session, sound pressure levels (SPLs) were measured at two different locations in the room. Heart rate (HR) and blood pressure (BP) metrics were recorded via physiologic monitors including a pulse oximeter to detect and measure heart rate and a blood pressure monitor was placed on each participant's left wrist. AcqKnowledge (version 5.1) was the analysis platform used to record and analyze physiological data, SPSS v20 was used for data analysis, and figures were plotted with Origin 2019 software.

Findings

There were 955 residents at the care center; a random sample of 538 people were invited to participate, and a total of 120 participants were consented to the study. Most participants were female and between 60 to 70 years of age. Forty percent had a reported education level of junior high school and 28% had an elementary level of education. Fifty-nine were considered normal hearing, 39 had mild to moderate hearing impairment, and 22 had severe hearing impairment. Researchers noted that in those with normal hearing, HR dips slightly at 55 dB(A) and BP decreases at a sound pressure level of 55 dB(A) and then increases again. In those with mild to moderate hearing impairment, BP decreased after exposure to sounds until 62 dB(A) and increased with higher SPLs, whereas the HR increased slightly until 55 dB(A) and remained stable.

Researchers performed ANOVA in all five different types of acoustic stimuli across senior adults with different hearing status. The most significant results were seen in music ($F = 16.160, p < .01$), conversation noise ($F = 10.752, p < .01$), and traffic noise ($F = 7.258, p < .01$). These results also showed statistically significant differences for sports sound ($F = 10.360, p < .01$), and entertainment sound ($F = 8.682, p < .01$). Senior adults with normal hearing rated music their highest preference, while those with mild to moderate hearing impairment rated sports sounds the highest, and senior adults with severe hearing impairment rated entertainment sounds highest. The increase in decibels was found to increase heart rate except for conversation noise. However, this may be attributed to mood swings, as heart rate remained relatively stable otherwise. The inconsistent results noted in the physiologic measures were found to be congruent with similar research.

Limitations

The study was conducted at one care facility and lacked a control group, which limits the generalizability of findings. Additionally, the sounds were played using headphones or speakers in a sound-treated room with different furniture and layout than the participants were used to, which may have affected the validity of the results.



Design Implications

It is recommended to maintain sound pressure levels below 55 to 65 decibels in senior care facilities. However, the physiological response associated with soundscapes within indoor environments remains inconclusive. Participants with normal hearing preferred music the most, while participants with severe hearing impairment preferred entertainment sounds the most.

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