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THE INFLUENCE OF SOUNDWALK DIRECTION ON HEALTHY STREET METRICS

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ABSTRACT

Noise is recognised as one of the key factors influencing the health of streets. This study aims to understand the impact of soundwalk directions on soundscape perceptions and healthy street indicators. The study implemented group soundwalk methods, with groups of 3 to 6 participants, totaling 31 participants. Chelsea High Street (King's Road) was chosen as the study site after evaluating several high streets in London. During the soundwalk, participants were stopped at five different locations to complete a questionnaire, and the soundwalk was applied in two different directions. These questionnaires examine fifty-five different factors, including sound-visual perceptions, and healthy street metrics. Findings reveal that the direction of the soundwalk did not significantly affect healthy street metrics($p > 0.05$), except for activity opportunities ($p= 0.043$).

Keywords: *soundscape, streetscape, group soundwalk.*

1. INTRODUCTION

High streets are essential social, commercial, and health development in both rural and urban regions. In recent years, numerous environmental challenges have highlighted that the future of high streets is becoming increasingly under threat [1]. This risk involves the safety, environmental design, accessibility, air pollution and several other concerns.

Noise is the one of the important problems of high streets. This problem main reasons are identified as the increasing population, traffic etc. In general, street noise is investigated with traffic sounds and annoying conditions of streets in literature. These annoying conditions influence human physical-psychological health and well-being [2]. The noise term identify as the one of the metrics of healthy street parameters [3].

Soundwalk, a participatory method for exploring human sensations, responses, and outcomes, is the primary method used in this research [4]. The study also examines the effects of different soundwalk directions on the perceptions of soundscape, visual perception and healthy streets metrics for urban high streets [3,5,6]. The preliminary research hypothesis is the choice of soundwalk direction significantly influences participants' sound, visual and healthy street perceptions. This research investigates, how do opposite soundwalk directions impact the perception of healthy street metrics.

2. METHODOLOGY

The research process was divided into three primary stages: **field study**, **in-place data collection**, and **analysis**.
The field study begins with reviewing London's high streets and selecting Chelsea High Street due to its diverse sound and visual scenario opportunities. As part of the study, groups were scheduled to walk the area following two distinct directions (see Figure 2). Overall, participants walked approximately 1 kilometre passing through 5 points. Soundwalks were conducted under clear weather conditions and completed before sunset to ensure consistency for all groups. Advanced equipment, including Sound field (Sqobold) microphones and GoPro cameras, was employed to capture both sound and visual data. The sound recordings were processed using Artemis software to analyse sound pressure, sound pressure levels, and assess recording quality.

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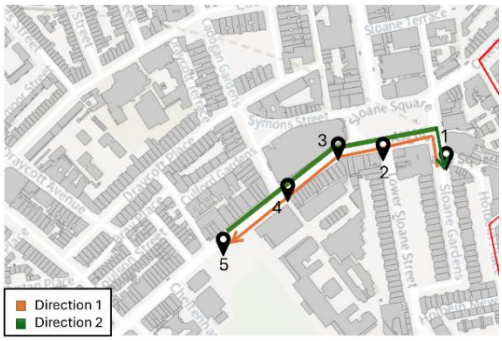


Figure 1 Two different soundwalk directions

Participants for soundwalk groups were recruited through UCL's email system and newsletter announcements among volunteers. The study was approved by the local ethics committee of the University College London. Each participant was informed about their rights before the interview.

The questionnaire was administered at each observation point to maintain consistency across locations. At the conclusion of the soundwalk, participants provided additional feedback either orally or in writing. A paper-based questionnaire was developed to evaluate participants' perceptions of soundscapes, streetscapes, and healthy street metrics [3]. Following the questionnaire process, all paper-based responses were entered into the REDCap program for efficient data management.

Data analysis was performed using SPSS and followed a systematic, multi-step approach to ensure rigorous assessment of the data with two steps:

Firstly normality tests were used to assess whether the distributions of the variables followed a normal distribution. This step is crucial to determine the appropriate statistical tests for subsequent analyses.

Secondly, the Mann-Whitney U test was applied to compare two independent groups based on soundwalk direction across several key parameters, including visual perception, soundscape qualities, and health-related street metrics [3]. This non-parametric test enabled comparisons of these factors across different soundwalk directions.

3. RESULT

The outputs shows that Cronbach's alpha values for all items are acceptable (> .70), indicating high internal consistency of the items for each location and subjects.

The Mann-Whitney U test was employed to investigate the comparative effects of two distinct soundwalk directions on the perception of five specific locations (see figure 2). This analysis aimed to identify patterns and significant differences in how these directions shape participants' perceptions of location-specific attributes. A total of 55 factors were compared across two conditions to understand the perception of each location.

The results of Mann Whitney analysis revealed significant differences between the two groups who walked along different directions. Direction 1 started their walk in a low-decibel environment and moved to a high-decibel one, while direction 2 followed the opposite directions.

3.1 Soundscape Perception Across Soundwalk Directions

Regarding soundscape factors, four criteria have significant differences. Direction 1 (mean rank = 89.10) perceived the "Human sound" higher ($p = 0.002$) compared to direction 2 (mean rank = 67.59). For pleasantness, direction 2, which moved from a quieter to a noisier setting, was rated as more pleasant (mean rank = 84.39) than direction 1 (mean rank = 71.18), though this difference was marginal ($p = 0.059$). Direction 1 was rated as more eventful (mean rank = 85.27) compared to direction 2 (mean rank = 71.19). In terms of "Appropriateness" of the environment ($p = 0.015$), direction 2 was rated as more appropriate (mean rank = 86.03) compared to direction 1 (mean rank = 69.43). Regarding the "Natural Sound Walking Path", direction 1, which started in a quieter environment, was rated favourably (mean rank = 87.47) compared to direction 2 (mean rank = 69.12).

Table 1 Frequency Table of Soundscape Across Five Different Locations

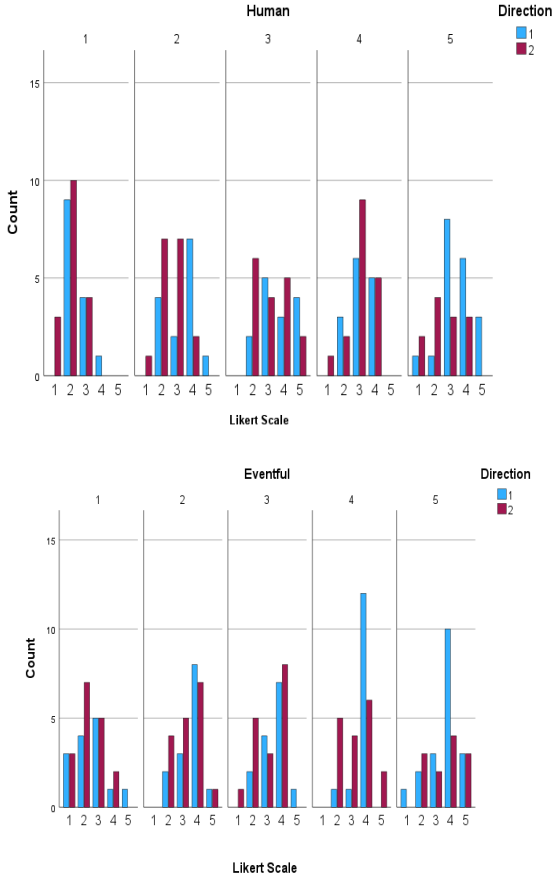
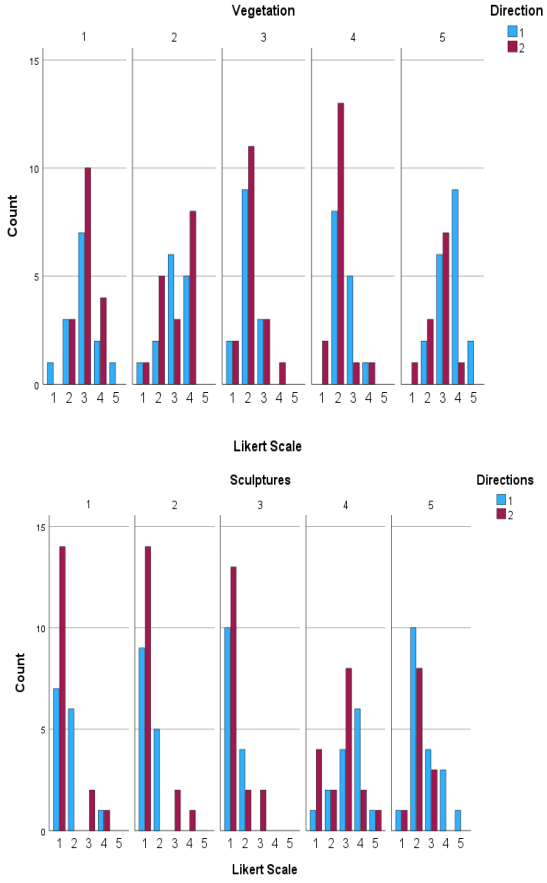


Table 2 Frequency Table of Visual Element Across Five Different Locations

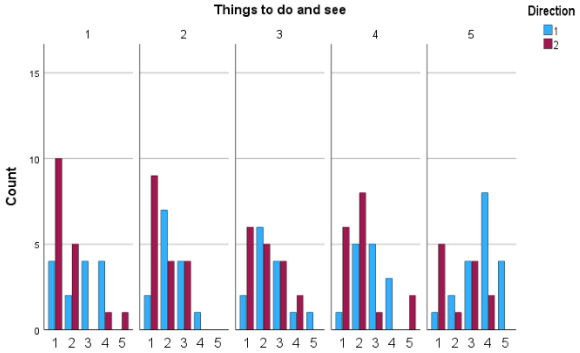


3.2 Visual Perception Across Soundwalk Directions

In terms of visual perception, direction 1 was rated higher for "Vegetation" (mean rank = 84.39) than direction 2 (mean rank = 72.01), with a significant difference (P < .001). Direction 1 also rated "Seating elements" higher (mean rank = 84.22) compared to direction 2 (mean rank = 72.17), and this difference was statistically significant (P < .001). "Sculptures" were rated more favourably for direction 1 (mean rank = 84.79) than direction 2 (mean rank = 71.64), (P < .001).

"Socialising" opportunities were perceived as higher in direction 1 (mean rank = 90.37) than direction 2 (mean rank = 66.40), p = 0.001. Direction 1 was also rated higher in terms of "Recreational" opportunities (mean rank = 91.92) compared to direction 2 (mean rank = 64.95), p <. 001. Similarly, "Lunch-related" activities were rated more positively for direction 1 (mean rank = 87.51) compared to direction 2 (mean rank = 69.08), p <.001. Lastly, the perception of "Things to see and do" was significantly higher in direction 1 (mean rank = 94.79) compared to direction 2 (mean rank = 62.26), p = 0.000) (see Table 3). This is the only factor, which is one of the Healthy Street Metrics [3].

Table 3 Frequency Table of "Things to see and do" factors across Five Different Locations



4. CONCLUSION

As a result of the research, the direction of the soundwalk did not affect healthy street metrics, except for things to see and do opportunities. From a soundscape perspective, factors such as human sounds, pleasantness, and appropriateness indicate that differences depend on the direction of the soundwalk. Participants who walked from quieter to noisier areas (Direction 1) felt the environment was more interactive and offered more social and recreational opportunities. Additionally, this route perceive the visual environments such as vegetation, seating elements and sculptures more favourably.

There are several limitations of the research. Participants are replied many different perception subjects in this process, it cause some translation problems depends on the different cultural background. Highly populated areas also affected the recording quality, background noise and potentially altering participants' sensory experiences. The duration of recordings varied due to differences in group reactions and environmental conditions. Organising challenges with group meetings led to inconsistencies in participant engagement, which may have affected the reliability of the data. Lastly, some residents were uncomfortable with being recorded in public spaces, which may have influenced their behaviour and interactions during the soundwalks.

5. REFERENCES

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